

MARKETING
IDENTITY:
HUMAN VS.
ARTIFICIAL

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IDENTITY

HUMAN
VS.
ARTIFICIAL

ÜSM FMK

Monika Prostináková Hossová
Martin Solík
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(eds.)

Faculty of Mass Media Communication
University of Ss. Cyril and Methodius in Trnava

MARKETING IDENTITY HUMAN VS. ARTIFICIAL

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Conference Proceedings
from the International Scientific Conference
12th November 2024
Trnava



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MARKETING IDENTITY: HUMAN VS. ARTIFICIAL

International Scientific Conference “Marketing and Media Identity: Human vs. Artificial”, 12th November 2024, Trnava, Slovakia.

The international scientific conference held annually by the Faculty of Mass Media Communication, University of Ss. Cyril and Methodius in Trnava has become a traditional event supported and attended by renowned mass media communication theorists and researchers as well as by media and marketing professionals. The aim of the conference is to discuss the latest knowledge and trends in the field of marketing communication and to create a space for sharing and disseminating up-to-date scientific knowledge and practical experience in the fields of marketing, media studies and communication sciences while outlining the importance of innovations and supporting the critical dialogue between scholars affiliated with academic institutions and professionals with practical experience. The annual international conference Marketing and Media Identity (formerly called New Trends in Marketing and re-named in 2013 to Marketing Identity and again re-named in 2022), was held for the 19th time. The conference took place on 12th November 2024 in Trnava. It was attended by more than 100 participants.

The main theme of the conference was concisely expressed by its subtitle: Human vs. Artificial. Marketing and Media Identity has always tried to react to the latest trends in marketing communication and media production.

More information on the Marketing and Media Identity conference, programme schedules, deadlines and photo galleries related to previous years are available at:

Conference website:

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PREFACE

Technological progress in the field of artificial intelligence (AI) brings not only new opportunities but also crucial questions about our place in a world where the boundaries between the human and the artificial are becoming increasingly blurred. The theme of this year's conference, *Marketing and Media Identity 2024*, with the subtitle "Human vs. Artificial", addresses these pressing challenges and creates a platform for exploring the unique relationship between human creativity and technological innovation.

The conference, along with its scientific output, reflects the ever-evolving trends in marketing and media communication, where AI plays a pivotal role. The ability of machines to analyse data, predict behaviour, and automate processes not only transforms how we approach content creation but also redefines the very concept of creativity. Increasingly, questions are being raised as to whether AI can truly replace human intuition and emotional depth or whether it will serve as an augmentative tool that expands our capabilities.

One of the primary challenges we face is to strike a balance between innovation and ethical principles. How can we ensure that AI remains a tool to enhance human abilities without undermining the authenticity of our interactions? The conference provided a space for addressing these questions, examining the future trajectory of this technology, the new professions it might create, and its potential impact on culture and societal values.

In addition, the conference highlighted the remarkable capabilities of AI in predicting trends and analysing consumer behaviour – capabilities that have the potential to profoundly influence the marketing strategies of the future. At the same time, these advancements raise critical questions about privacy, data security, and the transparency of algorithmic decision-making. The theme "Human vs. Artificial" underscored the necessity for multidisciplinary collaboration that considers the technical, ethical, and social dimensions of AI development.

This conference proceedings volume, entitled "*Marketing Identity: Human vs. Artificial*", brings together a wide spectrum of perspectives and research findings that reflect both the challenges and opportunities of this technological transformation. The contributors offer not only theoretical insights but also practical solutions and examples of AI applications in areas such as digital media, journalism, and the gaming industry. Their work underscores the importance of critical thinking and continuous research in an era marked by dynamic changes.

Our academic discussions also emphasised that questions related to artificial intelligence extend beyond the technology itself to the fundamental aspects of human identity. How can we maintain our authenticity and humanity in an environment where technology increasingly permeates daily life? The answers to these questions shape not only the future of our profession but also the future of society as a whole.

Organising Committee of the Conference

EXPLORING DIGITAL CONTENT LANDSCAPES: INSIGHTS THROUGH THE REPERTORY GRID TECHNIQUE

Magdaléna Balážiková

DOI: <https://doi.org/10.34135/mmidentity-2024-01>

Abstract:

The aim of this theoretical paper is to demonstrate the potential of the Repertory Grid Technique (RGT), originally developed within the framework of Personal Construct Psychology, as a valuable tool for exploring the multifaceted nature of digital content. By uncovering individuals' cognitive frameworks, RGT provides a deeper understanding of how digital content is perceived, categorized, and evaluated across various contexts which makes it an effective tool for researchers and marketers seeking to understand and optimize digital content or digital experiences. The paper explains the theoretical underpinnings of this underestimated methodological tool, outlines its procedure, presents its diverse applications in online research, while it also addresses potential limitations of the technique. Later on paper presents evolving possibilities of integrating artificial intelligence into the RGT process that promises to enhance scalability and reduce interviewer bias, offering exciting opportunities for future research and applications.

Key words:

AI. Digital Text. Mass Media. Methodology. Perception. Personal Construct. Repertory Grid.

1 Introduction

Digital content landscapes refer to the vast and diverse system of digital content across various online platforms. Digital content generally refers to any text, data, or action performed by users on digital platforms, which is published and disseminated through various channels to create a communicative or expressive effect (Barbosa dos Santos, 2022). This includes everything from social media posts, blogs, videos, podcasts, articles, memes, comments and way more. This type of content is significant for several reasons: information exchange, its widespread availability that has transformed how people consume information, communicate, and engage with each other. Additionally, it provides a platform to express and share knowledge, and participate in online communities not only for individuals, but for brands and businesses. The digital content landscape is essential for modern marketing and branding due to its ability to reach a vast audience, precise targeting options ensuring that content reaches the most relevant audiences, ability to foster real-time two-way interactions with consumers, create personalized experiences, quickly update and modify digital content and provide detailed analytics as well as user-generated content. Moreover, digital marketing tools are considered more cost-effective (compared to TV commercials or print media) and allow brands to build and nurture communities around their products or services. The digital content landscape has revolutionized content production by making it more accessible, diverse, and collaborative. Distribution has become more immediate, personalized, and multi-channel (van Esch & Stewart Black, 2021). Data analysis has advanced significantly, providing deeper insights, real-time feedback, and predictive capabilities (Omol, 2024). However, along with the benefits of digital content landscapes, there are also challenges in conducting research in this particular domain. First of all, researchers have to deal with a sheer volume and dynamic ever-changing nature of digital content. Not only that, the quality and credibility of digital content can vary greatly, making it important for researchers to carefully evaluate their sources. Researchers may encounter challenges in accessing and

obtaining relevant content for analysis due to factors such as copyright or licensing. Understanding digital content requires considering its context, in this case not only cultural background, but also primary purpose and the platform itself. Aside from standard ethical considerations, researchers in digital content landscapes should also be mindful of issues related to privacy, data protection, and consent. These challenges highlight the need for rigorous research methods and frameworks that can help navigate the complexities of the digital content. Although the potential of the repertory grid technique as a tool for examining digital content has been somehow recognized, it remains unfamiliar to many researchers. This article provides a detailed description of the principles, steps, practical recommendations and applications within digital space.

2 Repertory Grid Technique: A Hidden Gem in Research

The repertory grid (repertory grid method/repertory grid technique/repertory grid analysis, abbreviated as REP or RGT) is a psychosemantic method conducted in the form of a structured interview that examines the relationship between elements and constructs in a given context (Burke, 2002). It is named after its format – a grid – where columns represent elements and rows represent constructs generated by the individuals being studied. Elements represent what we are going to examine, and the main advantage of this method is that virtually anything can be used as elements: objects, people, brands, photographs, advertising concepts, websites, social networks, artworks, user interfaces, social media posts, etc. Constructs generated by participants later on represent the dimensions used to analyze elements, extending beyond their apparent qualities (Kelly, 1955, in Martins et al., 2023). Martins et al. sum up perfectly the essence of RGT: “The goal of the interview is for the interviewee to articulate their views based on their expertise and the powers of comparison and contrast” (2023, p. 804).

Repertory grid was introduced by the American psychologist George Alexander Kelly, the author of the Theory of Personal Constructs from which this method originates. Personal Construct Psychology stems from constructive alternativism, a philosophical approach suggesting that each individual perceives the “true” reality from their own perspective. According to Kelly (1963), a person’s construct system consists of a finite number of dichotomous constructs. Bipolar constructs thus represent the fundamental building blocks of meaning and perception. However, these subjective meanings are not just a random collection of bipolar constructs but rather a system organized into complex hierarchical relationships. The dichotomous nature of constructs allows for capturing finer nuances of perception compared to just one characteristic (the second pole of the construct refines the first one), and it also prevents placing the perception of the studied subject into a mental map of someone else (i.e., the researcher), thereby adding balance to the evaluation. Since we are referring to the dynamic psychological process of perception, constructs are changing over time (Alexander et al., 2010).

Originally, REP emerged as a qualitative method and later became established in its quantitative form. Currently, it often exhibits a qualitative-quantitative character.

Proper implementation of the repertory grid demands familiarity with its precise procedure for administration, as well as structured interview techniques. For better clarity, the process of the repertory grid interview is outlined in Figure 1 below. These processes should always begin with the formulation of research question and a straightforward objective of the study, followed by the selection of elements. The researcher can provide the elements to the participant or the participant can generate them directly within certain criteria. Likewise, participant can generate several elements and researcher may provide additional ones. An example of such approach would be letting participants generate elements of internationally

known webpages while adding an element of the “ideal webpage” for better comparison (Kačániová & Szabová, 2014). It is up to the researcher’s decision in what form the substituted elements will be presented to the respondent (for example: brand names vs. logos vs. particular ads; printed vs. on screen; black and white vs. in color), but the elements have to be relevant to the research topic, specific, of the same type, yet distinct from each other, understandable, and familiar to the research participant. It is important to remember that as the number of elements increases, so does the administration time and the difficulty for the participant. Too few elements may not provide enough data for meaningful analysis, while too many can overwhelm participants (as well as administrators) and make the grid hard to manage. Subsequently, by pairing or tripling the elements, we proceed to reveal the participant’s constructs using one or a combination of these approaches: dyading, triading, laddering, pyramiding (see, Marsden & Littler, 2000). It is important to preserve the participant’s constructs in the most authentic form possible (as we aim to capture how the individual constructs their perception of a certain segment of reality); therefore, the resulting summary may also include informal language expressions (e.g. slang or even expressive language). Construct generation should end when the participant starts repeating constructs or when new constructs no longer provide meaningful differentiation among the elements, meaning they are essentially only variations of previously stated ones. The general rule is that the number of constructs should be sufficient to capture the relevant dimensions without overburdening the participant. Practical constraints such as the time allotted for the session can also dictate when to stop generating constructs. There exists also the possibility of repgrid group administration, where we lose a certain subjectivity of perception but in return gain more data in a shorter time frame (see, Kačániová & Szabová, 2014). Subsequently, the respondent combines elements and constructs either based on dichotomization (assigning a positive or negative pole to each element according to each construct), rating (evaluating the element on a scale made of each individual construct), or ranking (arranging elements in order). In practice, scaling is most commonly used.

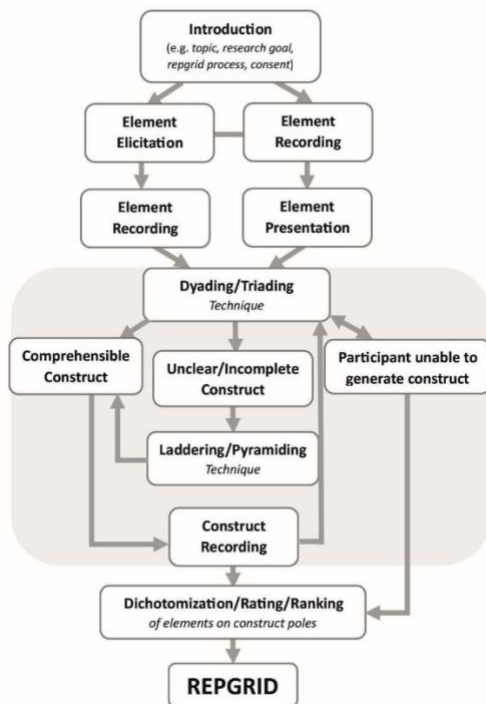


Figure 1: The repertory grid interview process
Source: own processing, 2024

Repertory grids offer a wide range of statistical processing options. Descriptive statistics, cluster analysis, factor analysis, principal component analysis, multidimensional scaling, discriminant analysis, regression analysis, content analysis (usually of all generated constructs), and a variety of qualitative analyses can be applied. It is possible to analyze individual grids and/or grids formed by merging data from multiple (or all) research participants. The choice of statistical methods depends on the specific research goals and the nature of the data. Currently, there are several software options for administering and evaluating repertory grids, significantly facilitating the research process: IdioGrid (Grice, n.d.), WebgridPlus (n.d.), Gridstat (Bell, 1998), Gridcor (Garcia-Gutierrez & Feixas, 2018), OpenRepGrid (2014), Rep Plus (Shaw & Gaines, n.d.), Grid Suite (Fromm, n.d.). Repertory grids can be as well analysed using standard statistical packages such as SPSS (IBM Corp, 2022). With the continual advancement of technology, there are emerging some attempts to involve the artificial intelligence as a part of data elicitation within RGT (Rosenberger, 2022, in Rahman et al., 2022; Liu & Martens, 2024) that will be discussed in the next section.

The repertory grid technique provides a highly adaptable method for examining individual cognitive frameworks, combining the richness of qualitative insights with the rigor of quantitative analysis. In the following chapter, we will explore the potential of the discussed technique as a tool of researching digital content.

3 Repertory Grid Technique as a Digital Content Analysis Tool

The repertory grid technique offers a unique and valuable approach to analyzing digital content due to its ability to uncover underlying constructs and relationships that may not be immediately apparent through ‘traditional’ methods. It allows researchers not only to explore how individuals perceive and categorize digital content but how they do so based on their subjective criteria. RGT involves participants actively in the research process, empowering them to articulate their own constructs and evaluations of (digital) content. This participatory approach fosters engagement and authenticity, leading to more insightful data. As a result, technique is also able to provide foundational information for psychological user segmentation (see types of segmentation in Kollárová, 2023) based on their unique perceptions (i.e. constructs), possibly resulting in more relevant and engaging content for respective users. RTG enables the identification of patterns and themes within digital content that is oftentimes very robust regarding analyzed data. It has a potential to reveal underlying structures, commonalities, and differences that will inform content creators, marketers, and researchers about audience preferences, trends, or emerging topics. These insights can be further applied to tailor either the content or design to specific audience segment(s).

RGT is particularly suitable for uncovering perceptions of otherwise vague or abstract concepts such as effectiveness, normality, risk, esthetics, user experience, usability, quality, engagement. RGT provides a holistic view of digital content landscapes by considering multiple dimensions simultaneously and it is particularly suitable for creating comprehensible and easy to interpret perceptual maps as an analysis outputs. According to Adams-Webber, 1989 (in Wright, 2004); Slater, 1977 (in Wright, 2004); Smith, 2000 (in Wright, 2004) it is highly reliable with a low tendency of interviewer bias (if administered correctly).

So far, personal construct psychology and repertory grids have been successfully applied for example to the research of: perception of webpages (Kačaniová & Szabová, 2014), perception of online shopping experience (Kawaf & Tagg, 2017), perception of cyber security in virtual space (Ashraf et al., 2023), the phenomenon of social media mourning among filipino millennials (Dula et al., 2023), self-presentations and identity within various online platforms (Davidson & Joinson, 2021), virtual self and identity construction in online video games (Gabarnet et al., 2021), domain-specific emotions in the context of affective design

(Hu et al., 2020). Multi-dimensional repertory grid was even applied as a graphical organizer-based feedback in a role-play educational game in a work of Hwang et al. (2021). Min et al. (2020) analyzed twenty-two repertory grid interviews to identify the perceived attributes of newly emerging digital games and compared them to existing typologies in order to prove that the newly emerging digital games have different attributes than the old ones.

Liu & Martens (2024) in an effort to automate an RTG survey developed a hybrid user interface that combines a graphical user interface with a conversational user interface. In their recently published paper they presented data supporting a hypothesis that automating qualitative repertory grid surveys is possible with proper interface design. Under laboratory conditions, their prototype demonstrated its ability to substitute for a human interviewer reducing the (human) effort required. Nonetheless, results shown a slight decrease in observed hedonistic user experience aspects. This research highlights the potential for improving research tools with the latest technology, particularly with the advent of generative AI systems (like ChatGPT). A great advantage is that automated surveys can potentially reach a wider audience than personal interviews usually allow. This could address the issue of small research samples in RTG studies, however, this remains a prospect for the future. Automating interviews for repertory grids (e.g. by integrating a chatbot) can reduce the time required for individual interviews, ultimately leading to lower financial costs. Additionally, it lessens the likelihood of interviewer bias, thus addressing one of the main disadvantages of the otherwise robust methodological procedure. Burger et al. (2023) recommend AI for tedious parts of the research process and highlight the fact that adding an automated component to the research can reduce the potential for human error and attain better reproducibility. According to them use of AI within research is not limited to any methodology or a certain level of technical knowledge. Furthermore, efforts to add automated aspects to REP methodology have the potential to eliminate inconsistencies in data collection when multiple researchers are involved in a single study. On the downside, a chatbot has limited capacity to respond to unexpected answers, which could affect the depth of the discussion. Automated interactions may be perceived as less personal or unnatural, potentially impacting participants' willingness to share their thoughts. Unlike a live researcher, a chatbot cannot respond empathetically, which is crucial especially when dealing with sensitive topics. It may also struggle to understand context, double meanings, irony, etc., leading to misinterpretations. Technical issues can disrupt the flow of the conversation and may contribute to participants' frustration. Not to mention, it remains debatable whether the quality and quantity of constructs differ when comparing those generated in the presence of a researcher with those generated by an automated system. Aside from the aforementioned study by Liu and Martens (2024), which found that the prototype collected a comparable number of personal constructs to the control condition, we still lack empirical evidence, leaving room for future exploration. Another consideration is the level of user acceptance regarding an automated interface. In addition, Fichnová et al. in a recent research on data reception pointed out that "changing the medium changes the way information is read from it" (2024, p. 33), and further debated whether digital and printed texts are comprehensible to the same degree by young adults. Their results suggest that the performance in media text comprehension is not related to the form (print vs. digital) of presented content. Despite, there is still a significant need for further research regarding this topic. Grossman et al. (2023) discuss in a *Science* article how advances in artificial intelligence, particularly large language models (LLMs), are transforming social science research. They highlight the potential for large language models to replace human participants in data collection. They further state that this shift in social sciences caused by AI will require researchers to diversify their expertise and put even more emphasis on ethics, foundational social science training, and quantitative methods.

4 Conclusion

As we all know, the digital content landscape is an extremely dynamic and diverse domain that has transformed thinking, communication, marketing, and content creation. While it offers huge opportunities for personalization and data-driven insights, it also presents significant challenges for researchers. This study presented the repertory grid technique (RGT) as a valuable yet underused tool for analyzing digital content.

In the broadest sense, examining perception provides important psychological insights into the mental frameworks, motivations, and decision-making processes of target audiences. Because of the nature of online content, perception research shouldn't just be a one-time marketing effort, but rather an ongoing process that will enable businesses to identify areas where improvement is needed (e.g. accessibility, usability, promotion), to keep up with user preferences and real trends and create content that is relevant and engaging (and therefore supposedly more effective). Expanding one's focus to include competitor analysis can also provide valuable insights. The repertory grid technique, with its ability to compare a large number of elements, is particularly useful in this context. Overall, such efforts will lead to more effective communication strategies, improved strategic planning and more effectively allocated resources. And that is definitely not a small thing.

Future research directions of the repertory grid technique in the context of digital content research should encompass the further exploration of user experiences especially in emerging technologies such as augmented reality, virtual reality, or mixed reality environments along with AI-generated content (e.g. its perceived authenticity or creativity). As technology continues to advance, there is a growing need to investigate critical issues related to digital content ethics and trust (such as privacy, misinformation, transparency), as well as concept of accessibility in digital content. In these contexts, RGT holds significant potential due to its ability to provide a discreet approach to data collection while also accommodating potentially extensive datasets. Beyond these topics, further efforts should be made to automate the repertory grid process. Refining and testing automated interfaces for repertory grids promises the enhancement of RGT's scalability and accessibility. On top of that, more efforts should be made to integrate it with other research methodologies.

By spotlighting the repertory grid technique, this paper provides a fresh perspective on analyzing the dynamic and complex digital content landscape. Despite the fact that due to the limited length of the paper certain areas had to be omitted (such as a detailed elaboration of Kelly's theories, specific ways of generating constructs, a comparison of software for repertory grids, details on statistical processing, etc.), it presents a concise summary of everything one needs to know as an introduction to using repertory grids in online research. By addressing the method's theoretical foundations, practical applications, and future directions, the paper equips researchers with a robust tool for advancing both academic inquiry and practical implementation in digital content research.

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AI-POWERED INSIGHTS: STRENGTHENING NONPROFIT COMMUNICATION THROUGH NEUROMARKETING

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Abstract:

Artificial intelligence's potential in neuromarketing offers transformative opportunities for nonprofit organizations by enabling the analysis of vast, complex data sets and delivering real-time insights that exceed human capabilities. For nonprofits, Artificial intelligence (AI) enhances communication strategies by automating data analysis, audience segmentation, and campaign optimization, making it possible to craft highly personalized and emotionally resonant messages. By leveraging AI, nonprofit leaders can tailor their outreach strategies based on supporters' emotional responses, preferences, and behaviors, fostering stronger connections, increased engagement, and greater alignment with their mission. This paper explores the integration of AI into neuromarketing research to improve communication strategies specifically within the nonprofit sector. Neuromarketing, which studies neural and biometric data such as EEG and fMRI, traditionally measures emotional and cognitive reactions to assess the effectiveness of campaigns. Incorporating AI enhances this process by bringing precision and efficiency, allowing nonprofit organizations to better understand and respond to emotional triggers and audience preferences. The paper identifies three key areas where AI integration benefits nonprofit communication strategies: emotion recognition through AI-driven software, AI-enhanced eye-tracking for visual engagement analysis, and deep learning models that process neural data to uncover subconscious audience preferences. These tools enable nonprofits to design campaigns that resonate deeply with donors, volunteers, and beneficiaries, thereby amplifying their social impact and advancing their missions.

Key words:

Artificial Intelligence. Communication Strategies. Consumer Engagement. Neuromarketing. Nonprofit Organizations.

1 Introduction

Nonprofit organizations play a critical role in addressing social, environmental, and humanitarian challenges, often relying on effective communication strategies to engage donors, volunteers, and beneficiaries. In an increasingly competitive landscape, nonprofits must adopt innovative approaches to amplify their messaging and strengthen emotional connections with their audiences. Traditional marketing tools, while effective, are often limited in their ability to understand and predict the emotional and cognitive responses of individuals. This limitation underscores the need for advanced methodologies, such as neuromarketing, that leverage insights from neuroscience and psychology to design more impactful communication strategies.

The integration of artificial intelligence (AI) into neuromarketing research represents a significant step forward for nonprofits seeking to refine their messaging and outreach. AI's ability to analyze large datasets, recognize patterns, and provide real-time insights equips organizations with tools to better understand their audiences' preferences and emotional triggers. By automating processes like emotion recognition, audience segmentation, and content personalization,

The integration of neuromarketing insights with AI-driven technologies offers a powerful synergy. This combination allows marketers to design campaigns that are both highly personalized and emotionally resonant, fostering deeper engagement with target audiences and maximizing the effectiveness of marketing efforts (Kumar et al., 2024).

AI empowers nonprofits to create highly targeted campaigns that foster deeper connections and drive action. The benefits of AI in marketing extend beyond personalization. AI facilitates predictive analytics, enabling marketers to anticipate future consumer behavior and market trends based on historical data. This proactive approach allows companies to adjust strategies quickly, staying ahead of the competition. AI's ability to offer real-time feedback through technologies such as facial recognition, eye-tracking, and sentiment analysis empowers marketers to optimize their strategies dynamically, improving campaign performance as it unfolds. Additionally, AI contributes to cost efficiency by streamlining processes and enabling better allocation of marketing resources.

Social advertising aims to influence the behavior of its target audience to enhance the well-being of both individuals and society as a whole. A key challenge in social marketing lies in addressing the exchange process from a social perspective, as nonprofit initiatives are often perceived as intangible due to their focus on services rather than products. In this context, the application of neuroscience to consumer behavior provides significant added value. It offers insights into how individuals react to emotional content, helping to better understand and influence audience responses, particularly in areas such as encouraging donations and fostering support for social causes (Zito et al., 2021). Neuromarketing offers critical insights into the emotional drivers behind consumer behavior, enabling nonprofit organizations to craft impactful campaigns. By leveraging these insights, nonprofit organizations can inspire behavior change and contribute to building a more social responsible future (Beličková & Kusá, 2023).

Ultimately, this AI-driven approach not only amplifies the precision and effectiveness of marketing communications but also establishes a new paradigm for consumer engagement. By merging emotional insights from neuromarketing with AI's data-driven precision, businesses can create more dynamic, responsive, and impactful marketing campaigns. This transformative fusion of technologies redefines how businesses interact with their consumers, enabling them to build stronger, more meaningful relationships through highly targeted and emotionally resonant marketing strategies.

The rapid advancement of artificial intelligence (AI) and neuromarketing tools presents nonprofit organizations with new opportunities to enhance their communication campaigns. Unlike traditional methods, AI-powered neuromarketing software combines psychological insights and machine learning algorithms to analyze the emotional, cognitive, and behavioral responses of audiences. By leveraging these tools, nonprofits can create more targeted, engaging, and effective campaigns, ensuring their messages resonate deeply with their stakeholders and inspire action.

1.1 Identifying Emotional Triggers

At the core of effective emotional marketing is the strategic identification and utilization of key emotional triggers. These triggers, which may include emotions such as joy, trust, fear, and surprise, have the potential to significantly impact consumer perceptions and decision-making processes. The effectiveness of emotional marketing lies not merely in recognizing these triggers but in their deliberate integration into brand narratives and communication strategies. This integration must be meticulously aligned with the brand's fundamental values and messaging to ensure coherence and authenticity. When achieved, this alignment facilitates the creation of a brand experience that is both emotionally resonant and perceived as genuine by the target audience (Padia, 2024).

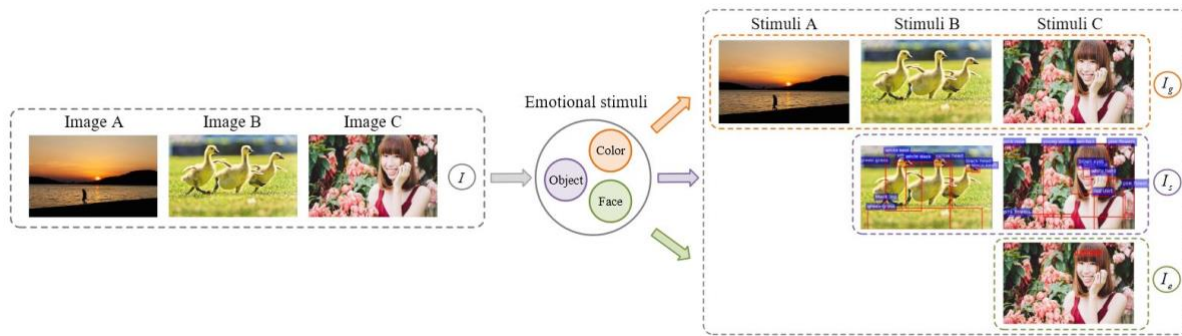


Figure 1: Emotion context analysis with AI deep learning
Source: Yang et al. (2021)

One of the primary ways AI neuromarketing software improves nonprofit communication campaigns is through emotion recognition technology. Tools such as facial expression analysis, voice sentiment analysis, and physiological response tracking (e.g., heart rate or galvanic skin response) can identify how audiences emotionally react to various campaign elements. For example, a nonprofit running a fundraising campaign can use AI to analyze how potential donors respond to specific imagery, language, or video content. This feedback enables the organization to optimize their messaging by focusing on elements that evoke empathy, urgency, or hope – key emotions often linked to charitable giving and volunteer participation. According to Kaur and Sharma (2021) this refers to the technology which deals with observing non-verbal human signs, such as gestures, facial expressions, voice tone, attitudes, and body language, with the aim of analyzing user’s emotional state.

As with other branches of artificial intelligence, with Emotional AI we have the opportunity to choose from a wide range of software from different companies. Software that deals with emotional artificial intelligence includes, for example:

- Affective;
- Hume AI;
- SourceForge;
- UneeQ.

1.2 Enhancing Personalization

AI’s ability to analyze and segment audiences in detail is foundational to enhancing personalization. AI algorithms can process vast amounts of data to identify meaningful patterns and group people based on demographics, interests, behavior, past engagement, and emotional response. Unlike traditional segmentation methods, which might only group people by age or location, AI allows nonprofits to create more nuanced audience profiles. For example, AI can identify segments based on donors’ motivations – such as those driven by empathy, those seeking social recognition, or those passionate about specific aspects of a cause (like environmental conservation or education). According to website Pathmonk (2023), the capacity of artificial intelligence (AI) to analyze neuromarketing data enables the delivery of highly personalized marketing content. This advanced level of personalization enhances the relevance of marketing campaigns while simultaneously fostering deeper customer engagement. By addressing individual consumer needs and preferences, AI-driven personalization cultivates a sense of recognition and value, thereby strengthening the connection between the brand and its target audience.

Neuromarketing can enhance personalized marketing strategies by allowing businesses to customize their offerings for distinct consumer groups. By analyzing neural reactions to various stimuli, marketers can design targeted campaigns that connect with individual consumers, boosting both engagement and conversion rates (Geetha & Hegde, 2024).

Neuromarketing allows businesses to personalize their marketing strategies in a way that deeply connects with their target audience. By studying neurological responses to stimuli like ads or website layouts, businesses can craft messages and experiences that engage consumers on a subconscious level. This tailored approach boosts engagement, improves conversion rates, and fosters greater customer loyalty (Dwivedi et al., 2024). These insights allow nonprofits to design highly customized campaigns. An environmental nonprofit, for instance, could use AI to segment supporters into groups like “young climate activists”, “nature enthusiasts”, and “parents concerned about future generations”. Each segment would receive content that appeals directly to their values and priorities. Young activists might receive messaging focused on social justice and urgent calls for action, while parents could see content that emphasizes legacy and protecting the planet for their children. By addressing the unique motivations of each segment, nonprofits can increase the relevance of their campaigns, ultimately enhancing engagement and support. Another powerful aspect of AI in personalization is predictive analytics, which uses historical data to anticipate future behavior. For nonprofits, this can mean predicting who is most likely to donate, volunteer, or engage with a specific campaign, allowing organizations to deliver the right message at the right time.

1.3 Campaign Optimization

Campaign optimization is a critical area where AI-powered neuromarketing can significantly enhance the effectiveness of nonprofit communication strategies. By leveraging AI tools to analyze, test, and adjust campaign elements in real-time, nonprofit organizations can maximize engagement, increase conversion rates, and ensure their messages resonate with the target audience. AI allows for the systematic fine-tuning of visual elements, messaging, and distribution channels, making it possible for campaigns to reach their fullest potential. The application of AI in this context enables nonprofits to allocate resources more efficiently, enhance audience targeting, and improve overall campaign performance (Gohain et al., 2024).

Neurons AI is a company that uses cutting-edge neuromarketing and AI-driven insights to help organizations, including nonprofits, optimize their marketing campaigns. By combining neuroscience and artificial intelligence, Neurons AI provides a unique approach to understanding consumer emotions and decision-making processes, which can significantly enhance the effectiveness of nonprofit campaigns.

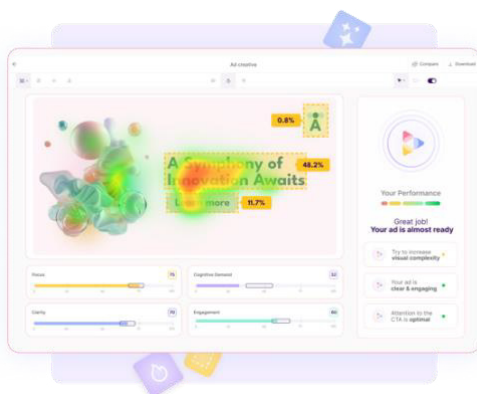


Figure 2: Neurons AI software
Source: Neurons (2024)

2 Methodology

In this study, we conducted an extensive analysis of both domestic and international literature concerning the application of artificial intelligence (AI) in the neuromarketing communication strategies of nonprofit organizations. Our primary sources consisted of book

publications, scientific research papers, professional articles, and peer-reviewed journals from reputable indexed databases. We strategically selected relevant literature based on its explanatory power and relevance to the topic, forming the foundation for the subsequent development of the Results chapter.

Given the broader application and development of neuromarketing tools in nonprofit sectors abroad, we expanded our search to include international studies, as the use of AI in nonprofit neuromarketing communication is less established in Slovakia. We focused particularly on secondary research conducted outside Slovakia, as these studies offer more insight into the innovative uses of AI in nonprofit contexts.

By synthesizing and analyzing the knowledge gathered from various sources, we were able to identify both the advantages and limitations associated with the use of AI-powered neuromarketing tools in nonprofit marketing communication. Several studies confirmed that AI-driven neuromarketing presents significant opportunities for nonprofits to improve their outreach and communication effectiveness with target audiences.

Based on our review of these secondary studies, we developed simplified, actionable recommendations tailored not only for nonprofit organizations but also for other sectors, including commercial businesses, seeking to improve their communication strategies using AI and neuromarketing. These recommendations serve as a practical guide for adopting AI tools in ways that maximize engagement and impact.

In summary, this methodology is rooted in secondary research analysis, which allows us to draw on a broad range of insights from established studies to address the challenges and opportunities of using AI in nonprofit communication. This approach ensures that our findings are well-grounded in existing knowledge while contributing new perspectives and recommendations for future applications.

3 Results

This chapter presents the findings from our analysis of AI-powered neuromarketing applications in nonprofit communication strategies. By synthesizing insights from relevant literature, secondary research, and case studies, we identified key ways in which AI-enhanced neuromarketing tools can improve the effectiveness of nonprofit campaigns. The results are organized into several key areas: emotional trigger identification, content personalization, campaign optimization, real-time feedback, and enhanced impact measurement. Each of these areas contributes to an overall improvement in the nonprofit sector's ability to engage and mobilize audiences through emotionally resonant, targeted, and adaptable communication strategies.

Emotional Trigger Identification

The first major result is the effectiveness of AI-driven emotional trigger identification in improving the emotional impact of nonprofit campaigns. Our findings indicate that AI-powered tools, including facial recognition software, sentiment analysis, and physiological tracking, allow nonprofits to understand how different messages, images, and tones affect their audiences on an emotional level. This understanding enables organizations to select and amplify content that generates empathy, urgency, hope, or other emotions aligned with their mission. For example, studies showed that organizations that implemented facial recognition and sentiment analysis could identify specific visual or textual elements that elicited strong emotional responses. Nonprofits utilizing these insights were able to reconfigure their messaging to feature more impactful images and language, resulting in increased engagement. This ability to tap into core emotional drivers proved to be a powerful way to build stronger connections with audiences and increase responsiveness to calls for action.

Content Personalization

Our analysis revealed that AI-enabled neuromarketing greatly enhances personalization capabilities, allowing nonprofits to segment their audience more precisely and deliver customized messages to different demographic and psychographic groups. By using AI to analyze audience data, nonprofits can tailor their messaging based on individual preferences, values, and behaviors. For instance, a nonprofit seeking to raise awareness about environmental conservation was able to use AI-driven data analysis to identify specific audience segments that were most responsive to particular messaging styles. Younger audiences responded more strongly to messages highlighting climate urgency and social justice, while older audiences preferred narratives about legacy and long-term environmental protection. Personalizing messages in this way led to higher engagement rates and greater donor loyalty across diverse audience groups. The findings underscore the value of AI in enhancing nonprofit communication strategies by fostering meaningful and targeted connections with supporters.

Campaign Optimization

The findings indicate that AI-powered neuromarketing tools contribute significantly to campaign optimization by enabling nonprofits to refine their content for maximum impact. Tools such as eye-tracking and heat mapping provided insights into which visual elements captured attention most effectively, allowing organizations to prioritize those elements in their digital and print media. In one case, a nonprofit organization dedicated to hunger relief used eye-tracking technology to analyze how potential donors interacted with its website. The data showed that visitors were more likely to focus on images of individuals impacted by hunger than on general statistics. As a result, the nonprofit redesigned its website to feature more personal stories and close-up photos of individuals, resulting in a 30% increase in online donations. This example highlights how AI tools can improve visual storytelling, helping nonprofits optimize both design and messaging for better outcomes.

4 Discussion

The application of AI-powered neuromarketing in nonprofit communication strategies opens a wide array of possibilities for enhancing audience engagement and advancing organizational missions. Unlike traditional marketing, which often relies on broad messaging and assumptions about audience behavior, AI-powered neuromarketing allows nonprofits to delve into the emotional and cognitive factors that drive decision-making. This precision in understanding can help nonprofits overcome one of their biggest challenges: inspiring meaningful action in a resource-constrained environment.

One significant advantage of AI-powered neuromarketing is its ability to personalize communication at scale. For example, emotion recognition software enables nonprofits to identify and respond to the emotional states of their audiences in real-time. This can be especially useful in donation campaigns, where evoking empathy and urgency is crucial to motivating support. By tailoring content to the emotional triggers of specific audiences, nonprofits can create campaigns that resonate deeply, increasing the likelihood of donations, volunteer sign-ups, or other desired actions.

Additionally, AI-enhanced eye-tracking technologies offer insights into how audiences visually engage with nonprofit campaigns. These tools can help organizations optimize their visual content, such as website layouts, social media posts, or promotional materials, to ensure key messages and calls to action are effectively highlighted. For example, eye-tracking studies might reveal that certain visual elements are distracting viewers from the intended message, allowing nonprofits to refine their designs for maximum impact. Deep learning

models also play a crucial role in analyzing neural data to uncover subconscious preferences and behaviors. These insights are particularly valuable for nonprofits, as they often aim to appeal to the values and emotions of their supporters. Understanding what motivates individuals at a subconscious level allows organizations to design communication strategies that align with their audience's deeply held beliefs and aspirations. This approach not only enhances message effectiveness but also builds stronger emotional connections between the organization and its supporters.

However, the use of AI-powered neuromarketing in the nonprofit sector also raises ethical considerations. While these tools provide unparalleled insights, their implementation must be guided by transparency, consent, and a commitment to respecting audience privacy. Nonprofits have a responsibility to use these technologies in ways that align with their values and missions, ensuring that they foster trust rather than exploitation. Addressing these ethical concerns will be critical to the successful adoption of AI in nonprofit communication strategies. Resource constraints within nonprofit organizations may limit the adoption of AI technologies. While larger nonprofits may have the capacity to invest in sophisticated tools and expertise, smaller organizations might struggle to access these resources. This disparity highlights the need for collaborative solutions, such as partnerships with technology providers or the development of affordable AI tools specifically designed for nonprofits.

In summary, AI-powered neuromarketing holds immense potential to transform nonprofit communication strategies by providing actionable insights into audience behavior, enhancing the personalization of campaigns, and improving overall effectiveness. However, nonprofits must address ethical concerns and resource limitations to ensure the responsible and equitable adoption of these technologies. As AI continues to evolve, its role in nonprofit communication strategies is likely to grow, offering innovative ways to foster deeper connections with stakeholders and amplify social impact.

5 Conclusion

The integration of AI-powered neuromarketing into nonprofit communication strategies has the potential to revolutionize how organizations connect with their audiences and achieve their missions. By leveraging AI's ability to analyze vast amounts of complex data, nonprofits can gain deeper insights into the emotional and cognitive drivers of their supporters, enabling them to craft more personalized and impactful messages. Tools such as emotion recognition software, AI-enhanced eye-tracking, and neural data analysis empower nonprofits to understand audience preferences at a subconscious level, enhancing the relevance and effectiveness of their campaigns.

These advancements not only help nonprofits strengthen relationships with donors, volunteers, and beneficiaries but also improve their capacity to inspire action and drive social change. By tailoring messages to resonate with their audiences' emotions and values, nonprofits can amplify engagement, build loyalty, and achieve greater impact. As AI technologies continue to evolve, their application in neuromarketing will provide nonprofits with innovative solutions to overcome communication challenges and create campaigns that truly resonate with their stakeholders. In conclusion, embracing AI-powered neuromarketing represents a significant opportunity for nonprofits to enhance their communication strategies, improve outreach effectiveness, and make meaningful progress toward their missions, fostering a positive impact on society.

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RADIO PLAYS: REDUCTION OF THE HUMAN, EXPANSION OF THE ARTIFICIAL INTELLIGENCE

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Abstract:

The psychologically sophisticated story of three sisters is set during a covid pandemic. The author explores the individual survival of each of them. Each of them lives as if alone in their own world: they communicate via mobile phones, skype or other means. Human authenticity is reduced, replaced by artificial emotions and superficiality of communication. The creators deliberately work with indeterminacy, the loneliness of the characters is relativized. An interesting phenomenon is mutual emotional blackmail. Technology supports it more than face-to-face communication. In covid's solitude, the characters bolster their egos by deceiving their surroundings, but they deceive themselves. An explicit intervention, highlighting the artificial construct of emotion for the purposes of communication through technology, is the newly developed artificial intelligence. It enters into the action, commenting on it in its own way and, above all, distorting reality and adding a grotesque dimension to the whole. The authorial practices analysed are reflected upon with regard to the sensitivity of the interface between the human and the artificial, the authentic and the pretended, the serious and the grotesque, and the original and the programmatically acted.

Key words:

Artificial Intelligence. Digital Audio. Emotions. Grotesque. Imagination. Isolation. Radio Play. Sound Design. Virtual World.

1 Introduction: Radio Play in the Context of Unity of Emotion and Imagination

The radio play as a type of media content fulfils P. Karvaš (1992) concept based on an inherent characteristic of radio art, which is opposed to the ability to transcend the boundaries of reality and materiality of phenomena and tends towards sobriety and rational control with an emphasis on a sense of proportion: “It is the hegemony of the word and language in radio programmes, dramatic ones in particular, a word-sign system capable of the highest concreteness, precision of meaning and carrying capacity”¹ (Karvaš, 1992, p. 39). Radio was the first electronic medium of mass entertainment, and it is also credited with the attribute of a psychologizing medium. T. Crook says of radio that “its relationship with its audience is based on emotional and imaginative enquiry” (1999, p. 105). The radio dramatic story represents reality and the process of its transformation into a work of art is reflective and creative. According to T. Crook, author, director, and producer of award-winning radio plays and creator of the acclaimed publication *International Radio Journalism* (1998)

academics, media theorists, and writers have so far largely failed to appreciate that the radio play environment provides a platform for a new storytelling genre. The radio play has evolved with sophistication and explosive energy and now occupies a prominent position in the cultural life of societies around the world. (Crook, 1999, p. 3)

¹ Authors' note: The text of the quotation in the original language: “Je to hegemonia slova a jazyka v rozhlasových reláciách, dramatických obzvlášť, slovom znakového systému schopného najvyššej konkrétosti, významovej precíznosti a nosnosti” (Karvaš, 1992, p. 39).

When sound recording and transmission technology was introduced, it brought the restriction to sound as the only meaning. However, the reduction to sound has a strong visual potential in the psychological dimension. In terms of perceptual psychology, reduction to sound encourages an intensification of the use of other senses and, in particular, an emphasis on imagination and the story co-created by the listener. The radio play makes contact with the media audience through its narrative. In a deeper psychological sense, listening to podcasts and radio plays can be a contemporary's reaction to reality, expressed in the words of M. Machalová and P. Senko that “the social environment often appears to today's people as a desert of social communication and interpersonal and personal relationships”² (2018, p. 319). This is a two-way process, as social communication and interpersonal and personal relationships are frequent themes of radio plays, consequently affecting the listener's psyche. Original radio plays also very often respond to current social events and provide an artistic and philosophical reflection on them. With the intention of capturing the last twelve years of life in Slovak society, which have been greatly affected by global events, including the COVID-19 pandemic, a series of radio plays called *Bludisko* was created in 2023. The phenomenon of pandemic isolation in 2020 and 2021 was reflected in several radio plays. Moreover, L. Kerata's radio play *Tri sestry v éteri* from 2023 can be considered as a work that interestingly works with the moment of social isolation compensated by contact through social networks and the involvement of artificial intelligence. It develops the line of the forced and unforced isolation of three sisters during the COVID isolation. It thematises isolation, manipulative ego games and the moment of stark contradiction between reality and its virtual presentation. Passages of AI commentary give the basic narrative framework of the three sisters the hallmark of an artistic reflection of authentic and purposefully feigned emotion.

2 Radio Play in the Optics of Working with Sound and Emotion

Radio play is fixated on sound. In a broader sense, its perceptual qualities derive from the qualities of sound as the dominant means of expression. J. Leeds (2010) in *The Power of Sound: How to Be Healthy and Productive Using Music and Sound* states that “the concept of sympathetic vibration—the way an outside vibration can sympathetically vibrate other vibration—holds true with people, too. When you are around someone with a vibrational rate similar to your own, you feel comfortable and familiar” (2010, p. 9). The sounds of a radio play also interact with the listener's psyche. Either there is a resonance with its emotional content or a collision due to a diametrically opposed setting, but in any case, the listener is not left without interaction when listening to a radio play. The distinctive potential of the radio play is increasingly being exploited by fiction writers. Radio plays are not only created as dramatizations of writers' works; writers become the authors of original radio plays. In his text titled “Radio and English-language literature” Ch. Higashida (2024) noted that writers around the world have written for radio, read their own and others' work over the airwaves, and hosted and produced broadcast programs. Listening to, participating in, and working on radio spurred writerly interests in heteroglossia, monoglossia, and ventriloquism; mass culture and audiences; the destabilization of temporal, spatial, and subjective boundaries; and the interrelationships of technology, the human body, and the modern sensorium. Writers love to explore human emotions, and the radio play is a very suitable platform for such research because of the added value of affecting the listener's emotionality. Even before her, A. Plhánková (2006) saw emotions as something that is composed of three interrelated components – subjective

² Authors' note: The text of the quotation in the original language: “púšť sociálnej komunikácie a medziľudských i osobných vzťahov” (Senko, 2018, p. 319).

emotional experiences (phenomenological component), outward expressive behaviours, and their physiological correlates.

Thus, it is the perception of emotions as an autonomous unity of experiencing, physical feeling and external expressions; the emotions of the characters in the radio play are reduced to the reflection of authentic human emotions into sound – the voice of the actors and the sound component reflecting non-verbal communication. The realization of a radio play is technological in nature. It reinforces the distinction between reality and its transformation into a work of art, but at the same time adds to the radio play the believability and intensity of a realistic depiction of emotions. The statements of W. Wirth and H. Schramm about emotions in media as the result of a usually unconscious evaluative process during which

we test perceived media objects, events, and situations with respect to their novelty, pleasantness, goal attainability, copability, and compatibility with norms. The result of this process produces specific response patterns (physiological responses, motor expression, action tendencies, feelings) or specific media emotions. (Wirth & Schramm, 2005, p. 8).

The difference between real and fake emotions can be seen even more clearly on social networks and in communication in virtual space, which is used by the characters of L. Kerata's radio play *Tri sestry v éteri* (2023) in times of pandemic isolation. The key differences lie mainly in motivation, purpose and intention, as people, as bearers of real emotions, process their authentic experiences and feel an intrinsic need to share them with an audience composed of other social network users. Those who present fake emotions on social media are motivated by external factors – for example, profit in product promotion, or an internal psychological need to gain sympathy, recognition, followers and the satisfaction of popularity in the community. C. L. Toma in “Social media self-presentation and emotion: Evidence of selective self-presentation, self-affirmation, and social sharing” uses a distinction between impression motivation and impression construction.

Relevant to impression motivation is the affordance of publicity, which refers to the audience to whom social media self-presentation is directed. Unlike face-to-face self-presentation, which is typically done in dyadic or small group settings, social media self-presentations are available to large audiences, comprised of hundreds or even thousands of users. (Toma, 2023, p. 264)

Authentic emotions presented on social media and in electronic communication are consistent with the values and behaviours of the bearer in other contexts. Those who substitute fake emotions for authentic emotions in their self-presentation on social media are not consistent in their expressions in different forums. There is also a difference in the depth, nuance and complexity of emotions. On the level of the lexis used, the difference is in the degree of expression of the terms used: fake emotions are more often associated with flashy but clichéd expressions. False emotions, unlike authentic ones, manipulate the audience. They appear at a higher frequency than posts presenting authentic emotions, as no one experiences strong emotions every day. Potentially, there may also be a difference in the style of posts presenting emotions: descriptions of fake emotions appear more polished and linguistically sophisticated than less thoughtful posts reflecting authentic emotions. A good radio play writer transforms a rational grasp of the difference between authentic and feigned emotion into the dialogue of the characters of the radio play protagonists. He or she credibly imitates both strong authentic and fake, ulteriorly motivated emotion so that the listener has a reasonably intense experience of its reflection.

3 Methodology

The aim of this study is to use the example of a specific radio play by the author L. Kerata, *Tri sestry v éteri* (2023), to show the productivity and audience appeal of works of art thematizing or otherwise using the motif of artificial intelligence. Since artificial intelligence is a significant element of contemporary colour, we anticipate – in addition to its practical use for the creation of texts – a tendency for its motif to appear more and more frequently in works. The radio play was chosen by the authors of the study from seven radio plays of the drama cycle *Bludisko* created in Slovak Radio as a reflection of the social development and colour of the decade from 2010 to 2022. The play was chosen on the basis of the criterion of consistency with the theme “Human vs. Artificial”. In processing the study, they use qualitative methods of research – methods of logical analysis, discourse analysis, comparison and generalization, because they best reveal and help to process the issue under study from the point of view of the intentions of the authors.

4 Results and Discussion: Character Emotions and the Dramatic Effect of a Radio Play

Communication in virtual space, communication on social networks and electronically assisted contact are not only an effective way of networking, but also a risk factor in deciphering the difference between authentic and feigned emotions. Although the primary goal is emotional and social interaction, if fake emotions prevail and are deciphered, trust in interpersonal relationships built online decreases significantly. If the presentation of false emotions is not debunked, it distorts the user’s perception of reality, or even leads to feelings of inadequacy for those whose emotions are not as extreme and intense as the manipulated and stylized posts of the presenters of false emotions. L. Kerata’s radio play *Tri sestry v éteri* (2023) also works with the balancing and shifting proportionality of ostentatiously feigned and less conspicuous authentic emotions. The title itself is a clear allusion to Čechov’s tragicomic poetics. While A. P. Čechov’s *Tri sestry* from 1900 depicts the Russian countryside and the monotonous, stereotypical life of the landed gentry, Kerata situates the plot of his radio tragicomedy in the urban environment of the actual present: the period of the Covid-19 disease pandemic, that is, the years 2020 – 2021. While Čechov’s three sisters oscillate between the past, the present, and the desire for the future, Kerata’s three sisters, under the influence of pandemic isolation, find themselves in a timelessness or have a distorted perception of time and paradigmatically rethink the rhythms of life before and after the pandemic, and they are so paralyzed by the situation that they are unable to project a possible future after the pandemic. Both Čechov’s and Kerata’s protagonists yearn for a better life, but do not have the strength or ability to achieve it. In both cases, time and social isolation are important factors influencing the characters’ fates. The initial situation of the numerous dialogues between the sisters in Kerata’s play is a variation on Čechovian practices in the construction of dramatic form. However, while Čechov’s represents classical personal interaction, the characters’ collisions with each other in Kerata occur exclusively in a virtual space created by dialogues from conversations conducted via mobile phones, Skype calls, or through references to communication via social media. L. Kerata’s work is most often associated with postmodernism, an experimental approach, irony, absurdity and playfulness. According to Barborik (2014) the basic features of literary postmodernism are paraphrased in literary works as the Lyotardian end of grand narratives, the absence of stories with totalizing, globally explanatory meaning, typical irony, and the fusion of disparate styles, incongruous in the traditional conception, stylistic or expressive elements into a single whole, textuality as an emphasis on the fact that a literary work is not a reflection of some pre-textual reality, intertextuality, intertextual continuity (its forms are, for example, quotation, paraphrase,

pastiche, parody), and overlapping, mixing of the “high” and the “low” (Barborík, 2014). When applied to L. Kerata’s radio play *Tri sestry v éteri* (2023), it can be noted that the grand narrative is replaced by the micro-stories of the characters, which, moreover, the listener does not gain through an all-encompassing complex narrative. He must reconstruct them himself from fragments of dialogue and from passages of artificial intelligence. In addition to the explicit verbal expressions, the listener gets information about the characters’ emotions mainly from intonation and through sound design – the sounds and music used to complete the overall experience. For example, the information about the emptiness and the need for ritualized survival of the monotonous pandemic days of one of the characters is deciphered in the radio play L. Kerata’s (2023) *Tri sestry v éteri* through the speech of Camilla in a conference call with the remaining two sisters:

CAMILLA: (gently, half-loudly, sincerely, drawing herself up a little) No, no, nothing like that, I’ll get up in the morning, then I’ll lie down. But I wanted to explain to you... that it saves me when there’s absolute harmony around me. Baby, I always have a scarf placed in exactly one place, next to the spoon on the right. A shallow plate and a deep plate is placed on top of it. And on the left, towards the top, the dessert bowl. The napkin on the right, below the spoon, is a sign of hygiene and purity of spirit. (Of course, it’s also extremely romantic. At least to me. I can feel it. And my feelings can be deep... (Kerata, 2023)³

The exaltation, the exaggerated enthusiasm, the abundance of precisely formulated details and the generous use of fancy yet clichéd expressions such as “absolute harmony” or “hygiene and purity of spirit” point to the possibility of a modified, inauthentic, feigned emotion. It overlays the character’s authentic emotion, representing her conscious decision to adhere to a contrived role in front of the sisters. In response to her manner of communication, the sisters in L. Kerata’s *Tri sestry v éteri* (2023) partially reveal Camilla’s inconsistency, and thus unconvincingness:

MILA: You’re kind of weird. Last time we were together...
 DASHA: You’ve changed a lot. Haven’t you gained weight in that time? A little?
 MILA: And where is Dusan?
 CAMILLA: (doesn’t want to listen to them, so she says even more urgently) And I always keep everything I need and can use in every drawer, I have a system like etc.
 DASHA: (with concern, urgently) Kamilka, Kamilka, aren’t you stuffing yourself too much?
 MILA: Aren’t you putting it on yourself?
 CAMILLA: (more and more as if in some strange melancholy) Also the scarves, the little boxes, the spice boxes, the upper, middle or lower shelves...
 MILA: Kamilka, don’t you want to watch something on TV? Some super loose comedy. You’ve found the remote, haven’t you?
 CAMILLA: (in her own way, passionately) Listen! I liked that man very much in that dream, as if we’d ever seen each other anywhere. And often. Yes, yes, we met often.
 MILA: What man? Again?
 DASHA: Who? What dream? (plays disgust) Man?... Yuck!
 MILA: Dash, don’t talk to men all the time yuck.

³ Authors’ note: The dialogues occur in the time frame 02:42-03:28.

- DASHA: (explaining) But you know... So what?... Yuck! Just so yuck! It's not about the men. That's yuck! Just like that.
- Chat: The word "yuck" is an interjection we use when we want to express dislike or disgust for something. In some cases, the word "fuj" is also used as a diminutive for the word "fujara", which is a musical instrument resembling a pipe.
- CAMILLA: I have my own rich world, ... even if the outer one is blocked to us now, hopefully only temporarily. There's a pandemic outside, and there's a whole universe inside me. Balanced. What a balance. I'm winning! I'm winning over the lockdown! My rich inner world is clearly and absolutely winning! (Kerata, 2023)⁴

The author's method of vagueness and incoherence of speeches corresponds with Barborík's (2014) summarization of postmodern practices in literature: irony is also typical for Kerata. This may be in the speech of some of the characters-most often it is ironic towards her sisters Mila – but it may also be in the ironic fusion of the characters' conversational contexts into unexpected counter positions and interactions. The fusion of disparate and incongruous elements of style, style, or expression can also be considered a structural method of postmodernism. The protagonists of Kerata's *Tri sestry v éteri* (2023) are also markedly disparate – in speech, in diction, in themes, and in the intensity or frequency of their participation in communication. They are united by their lack of grounding in the situation they are currently experiencing and their inability to model their own perspective. Kerata constructs the dialogue as an edited mosaic of fragments. In this respect he is very convincing, as even authentic spoken communication is not perfect in its connotation, the lexis used or the stylization of the utterances. On the other hand, the rhapsodic and chaotic nature of the characters' communication is a deeper artistic intention. It speaks of the fluid world of the characters, a situation that lacks precise contours and has thrown its players into even greater confusion than they experienced in the emotional realm before the pandemic. The sisters talk over each other, and most of the time it is difficult to discern when a motif relevant to the further development of the dramatic situation enters the discourse, and when it is merely a consequence of the author's extremely playful nature. Kerata is a proponent of postmodernist pastiche: instead of first-rate satire or critique, his radio play *Tri sestry v éteri* is a creative experiment, taking advantage of the benefits of the original: A. P. Čechov's *Tri sestry*. With its penchant for the grotesque and hyperbole, it manages to remain humorous alongside its undoubtedly tragic undertones, but it is more concerned with honouring the original and infusing it with new meanings than with mocking the dedicated source. He is not concerned with a simple imitation of style. It remains neutral and, instead of polemic with Čechovian discourse, adds to it new tones of exacerbation of social isolation and the collision of the human with the artificial. Moreover, Kerata (2023) is playful and poetic in his version of the creative work in *Tri sestry v éteri*:

- CAMILLE: (boasting further) The man wanted to kiss my hand, but in a French way, without touching, just a kiss in the air, in the breeze (chuckles). And he was dressed like some kind of lord count from a castle, seriously... His gaze shone a kindly devotion on me, and he had little mirrors in the pupils of his eyes that I could normally see myself in. I was colourful, shimmering, beautiful.
- MILA: (ironically) Mirror, mirror, tell me, who is the most beautiful in the world?

⁴ Authors' note: The dialogues occur in the time frame 03:30-05:27.

DASHA: Well, I do! Me, me, me! I am the most beautiful! (Kerata, 2023)⁵

J. Ševčíková (2012) reminds that in the context of all people, behaviour is “linked to their intentions, intentions, feelings, desires and beliefs, and how their social interactions are affected by the comparison of these mental states in two or more individuals. In the context of interpersonal relationships, emotion regulation is intrinsic to the concept of emotional intelligence”⁶ (2012, p. 26). The feelings, beliefs, mental states, and emotions of the protagonists of Kerata’s *Tri sestry v éteri* are largely influenced by a peculiar reflection on Čechov’s variation on the theme of the “useless man”. J. Kopaničák wrote about it in his *Dejiny svetovej literatúry II* in connection with the figure of Eugene Onegin.

The character of the hero, the ‘useless man’, disillusioned with life and unable to make either himself or others happy, is presented by the poet as the result of an incorrect upbringing in aristocratic families and the empty life of landlords, whose welfare was cared for by hundreds of peasants.⁷ (Kopaničák, 1963, p. 227)

A variant of the “useless man” in Čechov’s *Tri sestry* is reflected in V. Perovská (2019), emphasizing that

the motif of uselessness, among others (e.g., static, rigidity of life, feelings of disappointment, helplessness, anxiety, the banal tragic nature of life’s vicissitudes), interconnects the characters and contributes to the creation of the aforementioned unified atmosphere, and thus to the compactness of the drama.⁸ (Perovská, 2019)

It manifests itself in the structure of the dialogues and in the targeting of the relational plane. This is exactly how L. Kerata in *Tri sestry v éteri* (2023) handles the uselessness of man, the emptiness of being and multi-level isolation as concomitants of the pandemic intermezzo.

Kerata’s distinct strength as a playwright is his work with the grotesque. What adds a comic touch to the tragedy of *Tri sestry v éteri* is the author’s ability to achieve the grotesque and create a T. Žilka called it “the ever-present liberating ambivalent laughter of the grotesque, i.e. every strangeness has its counterpart”⁹ (2006, p. 150). The grotesque is highly desirable for the final sound of the radio play *Tri sestry v éteri* (2023) and for the observance of the genre characteristic of tragicomedy, also because the basic story line reconstructed from the sisters’ dialogues is too close to the Čechovian sense of futility. The latter in the context of *Tri sestry* of A. P. Čechov’s V. Perovská locates it as closely connected with pro forma action, which is empty, but in the work, it is functional, completes the distressing atmosphere, reveals something of the character and reinforces the motif of futility. [...] The uselessness of man manifests itself on several levels in the drama *Tri sestry*. I have already hinted at how this is reflected in his actions, but this is closely related to the relationships he enters

⁵ Authors’ note: The dialogues occur in the time frame 05:48-06:32.

⁶ Authors’ note: The text of the quotation in the original language: “prepojené s ich zámermi, intenciami, pocitmi, túžbami a presvedčeniami, a ako sú ich sociálne interakcie ovplyvnené porovnávaním týchto mentálnych stavov u dvoch, či viacerých indivíduí. V súvislosti s interpersonálnymi vzťahmi emočná regulácia neodmysliteľne patrí do konceptu emočnej inteligencie” (Ševčíková, 2012, p. 26).

⁷ Authors’ note: The text of the quotation in the original language: “Charakter hrdinu, ‘zbytočného človeka’, rozčarovaneho životom a neschopného urobiť šťastným ani seba ani iných, podáva básnik ako výsledok nesprávnej výchovy v šľachtických rodinách a prázdneho života statkárov, o blahobyť ktorých sa starali stovky sedliakov.” (Kopaničák, 1963, p. 227)

⁸ Authors’ note: The text of the quotation in the original language: “motív zbytočnosti, okrem iných (napr. „statickosť, strnulosť života, pocity sklamaní, bezmocnosti, úzkosti, banálna tragickosť životných osudov), prepája postavy a spolupodieľa sa na vytváraní spomenutej jednotnej atmosféry, a teda aj na kompaktnosti drámy” (Perovská, 2019).

⁹ Authors’ note: The text of the quotation in the original language: “všade prítomný oslobodzujúci ambivalentný smiech grotesky, t. j. každá zvláštnosť má svoj protipól” (Žilka, 2006, p. 150).

into. It is in these that the inability to make oneself or others happy is fully revealed.¹⁰ (Perovská, 2019)

Unlike Čechov, Kerata is programmatically vague in defining the partner relationships of the sisters' characters. We cannot reconstruct exactly what actual relational constellations the sisters are in. What they do have in common, however, is a tragedy of dissatisfaction and unfulfillment, sensationally amplified by their ongoing pandemic isolation. Although the dialogues give the impression that the pandemic is a cause of anxiety, frustration, and a realization of futility, this is not the case. The pandemic's constraints and their impact on the protagonists' social bonds only catalyse the already present motif of emptiness and futility, which is seemingly overlaid by the numerous verbal ballasts of banal dialogues. As a counterpoint to the tragedy of this context, the grotesque involvement of a band of artificial intelligence commenting on selected elements of the sisters' dialogues acts as a counterpoint. This is purely an authorial fiction, not a real work with a specific artificial intelligence. It helps to achieve a grotesque effect by engaging a combination of opposites, where ordinary banal dialogue is interrupted by seemingly uninvolved expert commentary or inappropriate remarks that put the meaning of the dialogues in a different light.

5 Instead of a Conclusion: The Radio Play as a Sensitive Indicator of the Colour of the Time and a Tool for Reflection on Social Phenomena

In *Tri sestry v éteri* (2023), Kerata exaggerates, distorts, bypasses logic, plays with language, and focuses on humans and their frailties, achieving an appropriate effect of the grotesque, the absurd, and a distance from the critical proximity to human frailty and vulnerability represented by the frustrated characters. A striking moment that highlights the artificial construct of emotion for the purpose of communication through technology is the figure of artificial intelligence. It enters the action, comments on it in its own way and, above all, distorts reality and adds a grotesque dimension to the whole. The use of artificial intelligence as a character, or as a factor significantly influencing the plot, has a long and rich tradition in world literature. The foremost is probably W. Gibson's cult novel *Neuromancer* (1984), in which an AI character named Wintermute plays a key role, along with questions of identity and AI consciousness. Also worthy of mention are *Do Androids Dream of Electric Sheep?* by P. K. Dick (1968), which inspired the film *Blade Runner* (Scott, 1982) and which explores questions of human identity and empathy, T. Chiang's *Exhalation. Stories* (2005), about the emotional and moral aspects of human-AI relationships, addressing emotional and moral dilemmas, or K. Ishiguro's novel *Clara and the Sun* (2021). The perception of the potential of AI and its integration into the context of everyday life has changed over the years. Whereas Gibson's *Neuromancer* was intended as an artistic way of making a statement about frustration with aspects of the author's present, the artificial intelligence incorporated as a grotesque element in Kerata's radio play *Tri sestry v éteri* (2023) is no longer a negative character. She is not even a mover of the plot.

Kerata's (2023) AI character is confined exclusively to the role of commentator and bearer of the comic element:

CAMILLE: I have my own rich multifaceted infinite world. IS THAT NOT ENOUGH for you, you SLIPPIES?

¹⁰ Authors' note: The text of the quotation in the original language: "vyprázdnené, no v diele pôsobí funkčne, dotvára tiesnivú atmosféru, prezrádza čosi z charakteru postavy a posilňuje motív zbytočnosti... Zbytočnosť človeka sa v dráme *Tri sestry* prejavuje na viacerých úrovniach. Už som naznačila ako sa to odráža v jeho konaní, to však úzko súvisí so vzťahmi, do ktorých vstupuje. Práve v nich sa naplno ukazuje neschopnosť urobiť šťastnými seba ani iných" (Perovská, 2019).

- MILA: (trying to be reasonable) Kamila, how are you... Sisters, what are we going to do with us?
- DASHA: (resignedly) Sisters, what's next?
- CAMILLE: (resignedly) Somehow. Will.
- MILA: Can we hear each other?
- DASHA: Can we hear each other?
- CAMILLE: Can we hear each other?
- Chat: Listening – Listening is the process of actively perceiving sounds and correctly interpreting the information that comes from them. The importance of listening is crucial in many areas, including communication, team leadership, relationships and personal growth. The ability to listen is key to building positive and healthy relationships with other people and improving communication effectiveness.
- SOUND: (Short musical interlude, again interrupted by calls, vocals)¹¹ (Kerata, 2023).

Kerata's construct of artificial intelligence is exclusively limited to the role of commentator and bearer of the comic element. However, it demonstrates the state of contemporary society in which communication technologies are taking the lead over face-to-face communication. It is explicit evidence that the reduction of authentic interpersonal contact reduces human empathy and significantly reduces the level of understanding of the meaning of what is being said. There is an increasing error rate in reading the emotional component of communication; artificial communication environments shift meanings at the expense of natural human contact and, in the rendition of Kerata's fabricated artificial intelligence, additionally exaggerate, parody, and create a grotesque effect. Gibson in an interview with T. Leary said:

The most important thing for me is that *Neuromancer* is in fact about the present, that it does not describe some imaginative future. It's a way of dealing with the anxiety and terror that the world we live in has created in me. (Leary, 1997, p. 53)

Kerata, too, is concerned with the present and the nuances of its effects on the microcosm of the ordinary person. Kerata, too, is critical of current reality and is keenly aware of how devastating alienation and the emptiness of interpersonal relationships transformed into distorted communication can be. However, the form of representation and reflection he chooses is, unlike Gibson, inflated towards the absurd grotesque, and he deals with artificial intelligence as a character in a diametrically different way. In any case, it can be said that Kerata's radio play *Tri sestry v éteri* (2023) illustrates the growing trend to thematise in works of art the phenomenon of artificial intelligence, electronic communication and, not least, the disrupted communication that accompanies dysfunctional or disharmonious interpersonal relationships. Given the current wave of increasing social anxiety, it is likely that the number of artistic treatments of such phenomena will not decrease for a long time to come.

In an interview for the *Art & History* magazine website, when challenged by S. M. Petrovits to formulate a creative credo, Kerata stated that he writes "mainly so that I can make things up" (Petrovits, 2022, "Ked' je inšpiráciou život" section, para. 2). This is human and is in marked counterpoint to the concept of artificial intelligence used for creation. Kerata does not see artificial intelligence as a friend and helper. On the other hand, artificial intelligence is a strong inspirational model for him. In an interview with S. M. Petrovits, he states that "a person can be inspired by something totally unexpected" (Petrovits, 2022, "Ked' je inšpiráciou

¹¹ Authors' note: The dialogues occur in the time frame 08:58-09:50.

život” section, para. 2). Thus, he is not interested in artificial intelligence either as a tool in writing a text or as a technical support in the realization of a radio play. He is aware of its absurd aspects and the comicality of its shortcomings in deciphering human emotion. This is what he finds inspiring.

Considering the currently low level of involvement of artificial intelligence in the process of production of artistic content in the conditions of Slovak public radio broadcasting, it is premature at this moment to talk about specific ways of using it technically. What is relevant, however, is the perception of AI as a source of inspiration. The direct entry of intelligence into the content component of public radio has so far happened only once: since September 2024, Radio Slovakia has been broadcasting a daily column called *Nekonečné príbehy (písané umelou inteligenciou)* [*Endless Stories (written by artificial intelligence)*] at 20:52. Based on ten words sent in by listeners, the ChatGPT app creates a two-minute short story. It is read by live actors, Lucia Vráblicová and Přemysl Boublík. Radio plays will continue to be a different type of inspiration in the future. It is a type of creative thinking that programmatically avoids the direct input of artificial intelligence into the process of text creation. However, artificial intelligence as a progressive social phenomenon will undoubtedly be increasingly reflected as a character, theme or illustrative phenomenon in the content of works of art. Kerata has mined comic moments from artificial intelligence; other authors and writers may approach it seriously, critically, celebratory, polemical, appreciative, analytical – whatever their artistic freedom allows.

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THE IMPORTANCE OF AI LITERACY AND ADVERTISING LITERACY IN THE DYNAMIC ENVIRONMENT OF MARKETING COMMUNICATIONS

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Abstract:

Rapid advances in artificial intelligence (AI) and its implementation in marketing communications are bringing new challenges and opportunities for consumers. Advertising literacy and AI literacy are increasingly important competencies that enable consumers to effectively navigate the digital environment. This paper focuses on the link between these two types of literacies and analyses existing research that has been conducted in Slovakia in the area of advertising literacy. In particular, it focuses its attention on the results of research conducted at the Faculty of Mass Media Communication at the University of Ss. Cyril and Methodius in Trnava (Slovakia). This faculty has the highest number of researches on the topic of advertising literacy in Slovakia. The aim is to identify the main benefits and risks associated with the use of artificial intelligence in advertising and to highlight the need for education in these areas. The basic scientific approaches in the paper include a secondary analysis and synthesis of existing studies and research in the field of advertising literacy.

Key words:

Advertising. Advertising Literacy. AI Literacy. Artificial Intelligence. Consumer. Generations.

1 Introduction

In the digital era, technology and marketing communications are increasingly interconnected. The digital transformation has completely changed the processes and ways organisations operate. If businesses want to get closer to their target audience, be successful and competitive in the market, they are forced to adapt their communication strategies to the changing environment. Consumers are increasingly using digital platforms for information, social interaction, entertainment and leisure (Miśkiewicz et al., 2022). Artificial intelligence (AI) is bringing with it major changes, allowing companies to create advertising campaigns that are more effective and personalized (Jaiwant, 2023). However, these advancements also place greater demands on consumers, who must be able to recognize the commercial and manipulation techniques that AI brings. Its use in advertising brings a great number of opportunities in the creation of content (text, video, visual), increasing the effectiveness of advertising campaigns or predicting customers' purchasing behaviour. Advertising literacy thus becomes a necessity for critical content evaluation, while AI literacy extends this ability by understanding the algorithms and data processes that drive these campaigns.

A consumer with sufficient AI literacy will be better able to understand the technological background to the promotional processes that influence their decision-making. AI literacy provides individuals with the ability to recognise personalised and targeted advertising techniques that are based on an analysis of their behaviour, preferences and interactions in the digital environment (Long & Magerko, 2020).

This paper explores how the combination of advertising and AI literacy enables consumers to better protect themselves from manipulation by advertising, as well as other promotional tools, and make more informed decisions.

The author systematically summarizes research conducted in Slovakia, emphasizing the important role of the Faculty of Mass Media Communication at the University of Ss. Cyril and

Methodius in Trnava. The research results are mostly in the field of advertising literacy, AI literacy is not yet sufficiently researched in Slovakia. Although research in this area is only partial, it can be concluded that it will have to be given more attention in the future.

The paper is a partial output of the project “Critical Exploration of Media-related Risks and Opportunities for Deliberative Communication: Scenarios for the Development of the Slovak Media Space in the Field of Advertising Literacy”. Within the framework of the project, the researchers analyse the level of advertising literacy in Slovakia and in other V4 countries, conduct research on advertising literacy and design a diagnostic tool that can be used to recognize the level of advertising literacy of the respondents.

2 The Basic Premises of AI Literacy and Advertising Literacy

Advertising literacy is the ability to decode and the content of an advertising message, to identify it, to recognize its intent and to have the ability to resist it. The development of advertising literacy is a necessity in the digital age, as advertising literacy is particularly susceptible to weakening in the digital environment (Krajčovič et al., 2023).

Austin et al. (2016) state that “advertising literacy can help consumers better understand advertising messages, identify deceptive advertising, and make informed purchasing decisions” (p. 7). There are a number of studies and research that have looked at different aspects of advertising literacy. Some have examined the impact of advertising on consumer perceptions (Hwang et al., 2018), while others have focused on the development of advertising literacy skills in children and adolescents (Zarouali et al., 2019; Feijoo & Sádaba, 2021; Rozendaal et al., 2010; De Jans et al., 2018; Čábyová & Hudáková, 2022; Van Dam & Van Reijmersdal, 2019; Balaban et al., 2022). There are also studies focusing on the advertising literacy of seniors (Čábyová et al., 2023a).

Hoek et al. (2020) defined three dimensions of advertising literacy – cognitive advertising literacy, attitudinal advertising literacy and performance advertising literacy. Cognitive advertising literacy is the ability to recognize advertising and understand advertising messages. It includes seven main components, namely: recognizing the advertisement, recognizing the advertiser, understanding the sales intent, understanding the intent to persuade, understanding the advertisers’ tactics, understanding the distortion in the advertisement, and perceiving the target audience (Rozendaal et al., 2016). Attitudinal advertising literacy includes attitudes towards advertising. Hoek et al. (2020) defined two components of attitudinal advertising literacy, namely skepticism towards advertising and aversion to advertising. First of all, these are therefore certain negative emotions that advertising evokes in us, which influence our critical attitude towards advertising. However, it should not be forgotten that positive emotions can also be associated with advertising, e.g. joy, enthusiasm, trust, empathy, etc. The last aspect of advertising literacy is the performance itself. This dimension includes two components – the acquisition of advertising literacy and its application (Rozendaal et al., 2016). This refers to the recipient’s use of cognitive advertising literacy skills when interacting with an advertisement. Simply put, it is about how we apply the acquired knowledge in situations where we are the target of an advertising message.

With the advent of AI, advertising campaigns are becoming increasingly sophisticated. This greatly affects the ability of individuals to discern the line between real information and manipulative content. As AI capabilities make ad campaigns increasingly personal, effective and targeted to specific interests (Krajčovič, 2024), it becomes harder and harder to realise that the message is commercial. Rapid advances in artificial intelligence (AI) require constant updating of knowledge on the latest technologies and applications. This is where ‘AI literacy’ becomes important, combining traditional marketing practices with innovative AI-based strategies of the future. Long and Magerko (2020) define AI literacy as “a set of competencies

that enable individuals to critically evaluate AI technologies, effectively communicate and collaborate with AI, and use AI as a tool online, at home, and in the workplace” (p. 2). AI literacy is clearly related to other literacies such as digital, data and computer literacy (Chiu et al., 2024). The term “AI literacy” in marketing terms represents the ability to understand not only the capabilities but also the limitations of AI and its applications in practice. The Marketing AI Institute (2024) published a report stating that as many as 67% of respondents cited lack of education and training as a major barrier to AI adoption in marketing (up from 64% last year). 75% of organizations either offer no AI-focused training for their marketing teams (47%), have it in development (24%), or are unsure if it exists (4%). On the other hand, up to 99% of respondents are using AI, with Chat GPT being the most commonly used and most popular.

Several authors define four main areas in which artificial intelligence is used: ad targeting, personalization, content creation, and ad optimization (Jaiwant, 2023; Nikolajeva & Teilans, 2021; Malthouse & Copulsky, 2022). Currently available artificial intelligence systems have the ability to process and analyse large amounts of consumer data, thus providing more information about consumer behaviour, decision making and preferences, and can more accurately **target advertising** (Chandra et al., 2022). These systems can use information from a variety of sources, such as social media interactions, previous purchase history browsing or shopping patterns, to more accurately target advertising to a relevant target group (De Bruyn et al., 2020). AI is not only able to analyse their behaviour but also predict changes in the market (Potwora et al., 2024).

AI enables extremely precise **personalisation of ads** based on user behaviour. By analysing consumer data, AI can serve them ads that are directly targeted to their interests and needs. This aspect can help consumers better understand their preferences, but it also requires that they have developed sufficient advertising literacy to be able to recognise that this is targeted marketing. With the increasing effectiveness of advertising strategies that use AI, consumers are becoming exposed to more intensive amounts of personalised advertising messages. Here, advertising literacy manifests itself as the ability to distinguish between different sources and perspectives. However, this requires a high level of knowledge about algorithmic processes and how user data is processed. With the emergence of generative AI, another area that seems to have a big future is somewhat unexpectedly emerging – copywriting and content creation (Murár et al., 2024). According to Krajčovič (2024), by using a variety of AI-based tools, marketers can create tailored content, measure results faster and more accurately, and provide feedback, all in much less time than before. Generative AI technologies can help creative teams create diverse and rich advertising content by analysing vast amounts of data and information (Wiredu et al., 2023; Zhang et al., 2021). Again, advertising literacy means the ability to interpret digital content correctly and distinguish between authentic and commercial messages. It is necessary to identify elements that are targeted to manipulate preferences and decisions, and to distinguish between natural and commercial information. The importance of education in this case is unquestionable, and in particular the promotion of the teaching of algorithmic literacy and critical thinking in schools and other educational institutions.

3 Methodology

The methodology of this review study involved a systematic collection and analysis of available research on advertising literacy in Slovakia. The paper uses an analysis of various published studies and their synthesis to create a coherent view of the concepts of advertising and AI literacy. The author combines different views and findings from the literature to define the basic assumptions of AI literacy and advertising literacy. The basic scientific methods are

secondary analysis and synthesis of previously published studies and research in the field of advertising literacy.

4 Research on Advertising Literacy in Slovakia

In Slovakia, research on advertising literacy is systematically conducted at the Faculty of Mass Media Communication of the University of Ss. Cyril and Methodius in Trnava. It is mainly a collective of authors Čábyová, Hudáková, Javořík. Their research activities are mainly directed at the target group of adolescents, but partial results of research on the older target group (Generation Z), as well as older adults are also known.

Čábyová and Hudáková (2022) conducted research on a sample of 348 young people aged 13 to 17 years. The aim of the research was to determine the level of advertising literacy among adolescents. The authors of the paper investigated the influence of age on advertising literacy in the process of identifying the intention of advertising on the social network Instagram using new digital communication formats such as reels, stories and meme images. The results of the research show that the selected age group of adolescents possess a medium level of advertising literacy, which means that they can identify the advertisement, but not always. The research also showed that adolescents are interested in information and want to navigate posts or advertisements on the internet well. The difference in advertising literacy of 13-year-old adolescents compared to their 14-year-old peers was not significant at all. When comparing 13-year-old respondents to their 17-year-old peers, there was a huge increase in advertising literacy.

In 2023, the team of authors Čábyová, Hrušková and Rybníkárová (2023a) investigated the advertising literacy of the older adults. This is a very attractive target group that is always willing to buy and try new products. They also have sufficient financial resources to satisfy their interests and needs. This target group is therefore very attractive to advertisers, but their ability to understand advertising may be impaired compared to younger target groups. This is due to the use of new digital forms of advertising which may not be as comprehensible to older adults. The survey results show that although respondents are very active on social media, more than 60% of them do not see and are not aware of the difference between paid and unpaid content, especially in the case of PR articles and native advertising. Respondents do not consider the possibilities of commercial use of space on social networks, they could not give practical examples at all. After repeated surveys and explanations of the concepts, their interest and knowledge improved. Based on the above, it can be concluded that education can have an impact on their level of advertising literacy. The same applies to offline forms of promotion such as product placement and teleshopping. However, their knowledge was higher for offline forms. Although the respondents knew the basic characteristics of social media advertising and its basic features, their knowledge was very low regarding the functioning and algorithm of social media advertising.

The three authors Čábyová, Hudáková, Darázs (2023b) investigated the ability to recognize product placement on social networks. The aim of the research was to assess the effectiveness of product placement in videos on social networks. The research was conducted using neuromarketing methods. The researchers focused on the analysis of a video, specifically a video featuring famous influencer and comedian Fero Joke, who has 489k followers on Instagram (November, 2023). The research analysed his collaboration with Pan-European College, which included paid product placement. The research was conducted on a sample of 24 respondents aged between 13 and 17 years and consisted of two parts. The research participants' reactions and responses to a specific instance of product placement on social media were monitored and their attention, emotional resonance and attitudes towards the brand that was promoted within the video were thoroughly analysed as part of the implementation of this

study. Subsequently, during face-to-face interviews with the researchers, study participants were confronted with whether they noticed that the content was commercial and were asked to identify the specific brand that was placed within the content and indicate how much they liked the video. The product placement technique did not engage respondents and proved ineffective. This conclusion is supported by data from neuromarketing research showing a decrease in respondents' attention after hearing an audio mention of a product. This is supported by follow-up research in which only 4 out of 25 respondents remembered the name of the product featured in the video. Together, these results suggest that the product placement did not provide significant engagement with respondents or leave a lasting impression, pointing to the need to develop a more effective marketing strategy to capture and retain consumer attention. Based on the analysis of the heat maps, it can be concluded that respondents paid increased attention to the face and object identified as a notebook or book in the initial phase of the video. In the later phase of the video, a shift in the distribution of attention was noted. Some respondents also began to pay attention to the description of the video. Despite this, in the follow-up interview, up to 80% of respondents could not identify that it was a paid advertisement.

The same trio of authors conducted research on the ability to recognize memes in commercial communication and their impact on adolescents' advertising literacy and emotional experience. The study was conducted through a qualitative neuromarketing study and follow-up face-to-face interviews with a sample of 24 respondents. The results indicate a lower level of advertising literacy among adolescents who, while recognizing the sales intent of the meme image, were unable to identify the sponsor. The results also confirmed that memes can evoke different emotions in adolescents, such as joy, but also anger and frustration. The research findings raise concerns that teens are not sufficiently able to safely navigate the online environment, which is exploited by many companies in their sales techniques. Such teenagers can easily be deceived, misled. This has triggered the need for more intensive media education on the one hand and the introduction of strict ethical principles on the other, i.e. on the part of advertisers (Čábyová et al., 2024).

Čábyová and Javořík (2024) discussed advertising literacy in relation to misinformation in political campaigns. From the results of the research, it can be concluded that first-time voters have difficulty defining political advertising accurately and often confuse it with unsolicited communication or propaganda. Many respondents failed to recognise the role of the advertiser and often perceived advertising as unsolicited interruptions or as offensive reactions to sensitive topics.

In their study, Kusá and Belíčková (2023) investigated respondents' perceptions and preferences when presented with advertising photographs created by human photographers compared to photographs generated by artificial intelligence (AI). The primary objective of their research was to determine whether respondents can identify technical imperfections in AI-generated images and how these imperfections affect their preferences and evaluations. Participants showed a clear preference for photos taken by human photographers. The results of the research point to a potential unconscious bias towards visuals that have been created by artificial intelligence. The study revealed that technical shortcomings in AI-generated images had a significant impact on shaping participants' perceptions and preferences. Specifically, images with inconsistencies, such as mismatched product shadows, inaccuracies in the display of utensils, or anomalies in product elements, were consistently associated with reduced attractiveness. The dominance of participants' selection of human photos for potential ad campaigns highlights the enduring value that human visuals have in conveying authenticity, emotional connection, and artistic skill-attributes that AI-generated content currently fails to fully emulate. The preference for professionally taken photographs thus highlights the continuing importance of human intuition and creative judgement in creating compelling visual stories. It can be concluded that the research conducted is related to a sufficient level of

advertising literacy, particularly in the area of the ability to critically analyse and evaluate the visual content included in advertising campaigns. Advertising literacy includes an understanding of how advertisements are created, what techniques are used to influence audiences, and the ability to recognise potentially manipulative elements.

In addition to research at the UCM FMK, research has also been conducted at Slovak universities (University of Economics in Bratislava, Comenius University in Bratislava, University of Constantine the Philosopher in Nitra, University of Presov). They did not touch directly on advertising literacy, they mainly investigated the influence of advertising on the consumer. Hajduová et al. (2021) investigated children's (10-15 years old) experiences with advertising and the impact of advertising on them. The results showed that children have the most experience with advertising on social networks and up to 74% of children have advertising influence their purchase decision. Jantová et al. (2022), based on a questionnaire survey with a sample of 708 respondents, classified consumers into 4 main groups according to their attitudes towards advertising: ignorant, ad lovers, detractors and rational consumers. Nastišin et al. (2022) investigated the effectiveness of influencer marketing in Slovakia, Ukraine, Poland and the Czech Republic. The results showed that women perceived influencer marketing as a more effective marketing tool than men. Generations Y and Z showed a higher acceptance of influencer marketing, while older generations showed less interest in this communication channel. The most suitable segment for the implementation of influencer marketing is women of generations Y and Z, who show the greatest potential for return on investment. The influence of influencers on consumers was also confirmed by Igarová et al. (2022). They note that influencer marketing is more effective with younger consumers (Generation Z and Y) and appeals less to older respondents (Generation X). Related to influencer marketing is the research of Mikuláš and Shelton (2020). They examined the familiarity of celebrities in advertising and their association with the product they were promoting. The results showed a high level of spontaneous familiarity, with Slovak and international celebrities from sport, television, music and acting being the most frequently recalled. International celebrities such as David Beckham and Beyoncé appeared to have higher levels of familiarity than Slovak celebrities. Javořík (in press) looked at influencer marketing from the perspective of moral advertising literacy using the media diary method. The aim was to find out how Generation Z perceives influencer advertising from the perspective of moral advertising literacy and what factors and behaviours they consider immoral when it comes to transparency in collaboration with brands. Respondents in the Kooperativa ad (influencer Jovinečko) demonstrated the ability to critically evaluate the ethics and transparency of influencers' advertising campaigns. Their reactions to the campaign, which included an element of surprise and possible deception, show their sensitivity to the authenticity and sincerity of influencers.

In Slovakia, there is quite a lot of research that focuses on advertising literacy and analyses the impact of advertising on consumer behaviour. These studies examine how advertising influences consumer decision-making and attitudes. However, despite this rich research base, there is still a lack of published studies that focus on the impact of artificial intelligence (AI) on advertising literacy. AI, which is increasingly being applied to advertising through content personalisation, predictive analytics and targeting, has the potential to significantly impact the way consumers understand and respond to advertising. Therefore, there is now an urgent need to start addressing this issue and fill this research gap. Also, education in this field is needed.

AI can also have a positive impact on advertising literacy by opening up opportunities for consumer education and creating more transparent and meaningful advertising experiences. Here are the main positive impacts:

Artificial intelligence enables more precise targeting of advertising based on consumers' interests and needs (Malthouse & Copulsky, 2022; Mühlhoff & Willem, 2023) and

consequently reduces the number of irrelevant and intrusive advertising content. Consumers receive advertisements for products or services that better match their real interests, the advertisements do not annoy them, they may even be useful to them, and last but not least, they have a better experience of the advertisement.

Artificial intelligence can be used to create bots and chatbots that can interact with users on social media. Artificial intelligence is used to filter content on social media to remove inappropriate or dangerous posts (Davidson et al., 2017). Filtering content using AI can increase awareness of quality ads versus manipulative or harmful advertising practices. Advanced AI algorithms can detect misinformation or deceptive ads and protect users from their impact (Flores Vivar, 2019). This process helps users distinguish trustworthy advertising sources from those that are dubious or misleading in nature.

AI can help create tools that automatically flag or alert users to ads. Using algorithms, platforms can automatically identify and flag native ads or sponsored content, which can increase transparency. This makes it easier for consumers to distinguish editorial content from commercial content (Ezzat, 2024; Zelch et al., 2024). With AI, rigorous algorithms can be put in place to promote responsible advertising and protect consumers from overexposure to manipulation. An example would be regulating advertisements for products that may be inappropriate for certain consumers (e.g., restricting ads for quick loans to vulnerable groups). These positive aspects can lead to consumers becoming more informed, better able to analyse the content they consume and improve their ability to recognise and resist manipulation in advertising.

5 Conclusion

Based on a review of theoretical and empirical findings, the paper highlights the growing importance of advertising and AI literacy in the digital era. With the increasing sophistication of advertisements, which are increasingly personalised and tailored based on consumer data, it becomes imperative that consumers develop the ability to critically analyse and differentiate between authentic and commercial content.

Advertising literacy helps individuals recognize advertising, understand its goals and tactics that can be manipulative, and respond to it in an informed manner (Austin, 2016). At the same time, AI literacy is also important to enable consumers to understand the basic principles of artificial intelligence and its use in advertisements (Long & Magerko, 2020). Developing these literacies leads to consumers being better prepared to face the challenges of the digital environment and use technology in a responsible way.

In this paper, we analyse existing research on advertising literacy and the impact of advertising on consumer behaviour, focusing on how consumers understand advertising messages and are able to critically respond to commercial content. These findings suggest that advertising literacy significantly influences individuals' ability to recognize and critically evaluate advertising messages. At the same time, it is evident that with the advent of artificial intelligence, advertising campaigns are becoming more sophisticated and more effectively targeted, placing new demands on consumers. The data analysed shows the need for further research into the impact of AI on advertising literacy, so that consumers can better recognise the personalisation and manipulation techniques enabled by AI and approach ads with a higher level of awareness and critical thinking. The paper also highlights the need for education to support the development of advertising and AI literacy from an early age. It is important that educational institutions, but also advertising companies and platforms themselves, promote transparency and provide tools to distinguish advertising from other types of content. In this way, we can contribute to a more responsible and conscious use of digital media in a society where digital and advertising literacy is crucial for the modern consumer.

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THE USE OF ARTIFICIAL INTELLIGENCE IN FILM PROMOTION

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Abstract:

The paper is based on the theoretical foundations of promotion with a focus and promotion of the film. It characterizes the possibilities of promotion within film marketing through various tools and techniques. The objective of the contribution is to identify the benefits of using artificial intelligence (AI) in optimizing marketing strategies and personalizing content in film promotion. The author explores the potential of using artificial intelligence (AI) to streamline marketing strategies within film promotion through the creation of personalized, interactive and technologically advanced campaigns. Based on the analysis of secondary data and case studies, author offers several successful examples of the use of AI in film promotion and analyses the added value that AI brings to the field. The paper provides insights into the strategic application of AI to maximize the effectiveness of film marketing activities and offers direction for future developments in this rapidly changing field. By analysing the use of artificial intelligence (AI) in film promotion, the paper aims to identify its benefits in optimizing marketing strategies and personalizing content, as well as its impact on campaign effectiveness and audience engagement. The findings highlight the importance of balancing the automation that AI brings with human creativity for the need to maintain the cultural and emotional depth of film marketing outputs.

Key words:

Artificial Intelligence. Film Marketing. Film Promotion. Personalization. Optimization.

1 Introduction

In the paper, the author introduces the basic definitions of film marketing, discusses the basic prerequisites that a film must have to be successful in the market. She points out the historical development of the use of marketing communication in different forms and stages of film development, adding that the use of artificial intelligence is not a matter of 21s. It has been used in various forms and at various levels before. The paper provides a relatively large number of examples that illustrate the use of AI in film marketing. The goal of the paper is to explore the strategic use of Artificial Intelligence (AI) in film promotion, focusing on its potential to optimize marketing strategies, personalize content, and enhance audience engagement.

The use of artificial intelligence has generated excitement about the technology's ability to drive economic growth, but also concern about the fate of human employees in a world that may very quickly be replaced by artificial intelligence (Kagada, 2024). The same is true for the film industry. Artificial intelligence helps in the creation of films, their distribution and promotion. It's role is also important in audience analysis and targeting. AI can be used in collecting and personalizing campaigns (Kushnarevych & Kollarová, 2023) and helps in reducing costs, increasing revenue (Haleem et al., 2022).

According to Sun (2024), AI technology can greatly increase the efficiency of film script creation, it usually takes only one hour to write an AI script. It can quickly gather relevant facts and data, helping the writer uncover deeper plot hints and build a more compelling story. Siemon et al. (2022) note that AI inspires artists to explore more original creative concepts and create more accomplished works. This ability to inspire artists has also been confirmed by the research of Haase et al. (2023). The researchers argue that AI-generated art has unique properties that make it particularly effective in stimulating creativity,

even when compared to traditional associative material. However, the use of AI also has its drawbacks (Alawamleh et al., 2024). Particular audiences may feel that AI-created works lack human touch and depth due to the shortcomings of particular AI algorithms. In addition, AI creations in certain circumstances struggle to handle the complexity of characters' emotions and fail to properly capture human nature (Sun, 2024).

Through the analysis of secondary data, which includes the study of available literature sources, scholarly articles, publications and online materials, the author characterized the basic theoretical background and empirical data on the use of AI in film industry conditions. For a better understanding of the issues, the author also worked with case studies, in which she pointed out concrete examples of successful use of AI (e.g., the trailer of the movie *Morgan*, personalized recommendations of Netflix (n.d.) or the interactive chatbot of 20th Century Fox studio, which promoted the movie *Deadpool*) (Talkie., n.d.). The article also uses comparative analysis to compare traditional marketing methods with modern AI approaches. The author evaluates the effectiveness and performance of these techniques, highlighting how AI can automate processes, personalize content, and optimize campaigns. This approach is complemented by a descriptive analysis, which focuses on the historical development of film marketing and its tools, describing the transformation of marketing strategies in the context of the emergence of AI technologies.

2 Filmpromotion

The primary goal of film marketing is to “persuade viewers to spend their time watching a particular film out of the many activities they may engage in” (Cone, 2008, pp. 109-110). The process of film marketing begins before the actual production of a film, at the time “when the idea to create a film is born in the mind of the filmmaker and then continues throughout the film’s life cycle (production, distribution, exhibition)” (Kerrigan, 2010, pp. 9-10). However, it does not end when the product reaches the target audience in the cinema or is broadcast by television or streaming platforms, the marketing process then continues on websites, discussion forums, social media platforms, PR activities of the director and actors in the film.

Durie et al. define film marketing as “any activity that helps a film reach its target audience at any time during its lifetime” (2000, p. 5). At the same time, Kerrigan and Yalkin (2009) state film consumption does not stop when the film’s credits roll, as consumers may want to extend their consumption by visiting review websites, discussing the film with friends, or continuing their consumption of the film to related consumer films.

A film must meet two basic requirements to become successful in the marketplace. First of all, it must be positively received by the audience. The expectations that the audience had before seeing the film, based on its marketing campaign, should be fulfilled so that the viewer does not feel deceived. In order to be appealing to stakeholders, the film must first and foremost be easy to communicate to the audience. This means that if it is a film with benefits that will be easy to present to the audience during the marketing campaign, for example a film of a popular genre, with a good story, with an interesting cast, with big-name filmmakers, etc., it will also attract stakeholders. The first assumption is referred to in marketing jargon as playability, from the word play, or the potential to be played. The second assumption can be referred to as marketability, a term that refers to a film’s potential to create a good marketing strategy and gain a place in the marketplace (Kerrigan, 2010). The evaluation of media products has traditionally been associated with the perspective of the consumer and the producer. The functional, emotional, social and economic value of media products is valued and this factor is then adapted to media production (i.e. content and form preferences) (Pitoňáková, 2023).

From its inception in the late 19th century to the present day, film promotion has undergone significant changes reflecting the evolution of technology and audience needs. The early era of cinema was characterised by the first film posters, which appeared in France and were the work of Jules Chéret (Smith, 2021). The Lumière brothers played a significant role in the promotion of films through international tours and the use of media (Pruitt, 2023). During the Hollywood era (1910s – 1960s), the marketing of films focused on attractive posters, press materials, and spectacular premieres (Hale, 2024). The 1970s brought a change with the emergence of television commercials and merchandising as a tool for film promotion (Horváth & Gyenge, 2018). Subsequently, the modern era, with the rise of digital technology, has enabled the use of online marketing, social media and precision targeting to different audience groups. Today, the combination of traditional and digital marketing tools is important for successful film promotion. However, the current era is moving into the era of artificial intelligence in film promotion. In the following section of the paper, we will define the key areas where we see great potential for the use of AI in film promotion and also give examples of campaigns already implemented using AI.

In the past, much of the marketing budgets were concentrated on traditional advertising channels such as print media, radio stations and television networks (Xue, 2024). All traditional offline and digital forms of marketing communication can be used to promote a film. The basic tools of marketing communication, i.e. advertising, personal selling, sales promotion, public relations and direct marketing, can be selected from the basic tools of marketing communication for the promotion of film works (Kotler, 2017), and the online or offline techniques of each tool can be used. According to Radošinská et al. (2024), the most commonly used ones include: trailers, product placement, social media promotion, guerrilla marketing, public relations activities, television, radio, print and outdoor advertising, promotional materials (posters, brochures, leaflets), social media and websites.

3 Artificial Intelligence in Film promotion

If brands want to stand out and draw attention to themselves, they need to move beyond generic advertising and embrace the personalisation of marketing. This approach tailors messages and content to individual customer needs, preferences, and behaviours. Addula et al. (2024) state that personalization fosters deeper connections with consumers and allows messages and content to be tailored to individual customer needs, preferences, and behaviours. Artificial intelligence algorithms according to Adefemi et al. (2024) are able to analyse large data sets and reveal customer behaviours that were previously hidden.

AI can analyse large amounts of data about users, including their preferences, interests and shopping habits. Based on this data, a product can be targeted to a specific user through personalised content. For example, platforms such as Netflix use AI algorithms to recommend movies and series based on a viewer's previous behaviour (Dúbravská & Višňovský, 2023). Netflix started using AI to recommend movies back in 2013 for the series *House of Cards*, which Netflix wanted to target a large group of viewers. Based on the analysis of a large amount of data about its customers, Netflix created 10 kinds of different teasers. The viewer saw exactly what he liked. One group saw a teaser featuring their favourite actor, while another group saw a storyline (Carr, 2013).

Using AI, Netflix has also introduced a recommendation mechanism for movie selection. Netflix uses AI to identify what you watch, how many times you click on the same video and how long you watch it. Based on a user's initial preferences, Netflix identifies preferred types of movies and series using the following factors: the types of movies you've previously watched, what previous shows/movies you've finished watching, how quickly you've watched all episodes of a series, what movies and series users with the same

preferences are watching now. Artificial intelligence ranks the preferred shows and movies based on their popularity ranking to generate a list of recommendations on what to watch next. As in the previous step, new recommendations continuously appear in the playlist based on previous viewing history and similar popularity ratings (Simplilearn, 2024).

Netflix's recommendation system uses several machine learning algorithms, such as collaborative filtering and content-based filtering. Collaborative filtering recommends content based on the customer's viewing history and ratings; content-based filtering recommends content based on an analysis of titles that the customer has previously watched (Sarwar et al., 2001). Netflix also uses deep learning techniques such as convolutional neural networks to analyse visual and audio data in its content to provide recommendations based on customers' preferred genres, themes, and moods (Covington et al., 2016). An example of personalization is the involvement of chatbots in movie promotion. As an example, 20th Century Fox used a chatbot to promote the movie *Deadpool 2*. AI chatbots on social media interacted with those interested in the film, providing information, making humorous innuendos, quizzes and other interactive features, creating a "buzz" around the premiere and increasing fan interactions (YesChat., n.d.). This chatbot provided an authentic experience of interaction with the target audience. Through this chatbot, fans were able to ask questions, receive witty answers, and learn more about the film. As a result, social media interactions also increased.

Social networks also bring personalised content. Instagram and Facebook can provide tailored, targeted advertising. For example, if someone follows a particular actress on social media and frequently interacts with her posts, a production company will create a tailored ad for their next film starring the same actress.

Trailers are one of the basic communication techniques for film promotion. According to Kernan (2004), its basic aim is to arouse interest and attract viewers. We encounter the first trailer created with the help of artificial intelligence in 2016. In promoting the movie *Morgan*, 20th Century Fox studio used IBM's AI (Watson) to analyse and create the trailer. The AI scoured hundreds of existing horror trailers to understand what scenes evoked the most interest and emotion, and then selected scenes for the trailer for *Morgan*. Its task was to analyse the trailers, in terms of three main aspects: visuals, sound and composition. A job that would normally take 10 days now took 24 hours (Eyice Başev, 2024). In addition to IBM, researchers from the University of Edinburgh have also attempted AI-generated film trailers. They created a neural network that can generate movie trailers based on a graph-based machine learning algorithm. They analysed the narrative structure of the film and the sentiment required to produce, distribute and promote the film (Saskovec, 2022).

Nowadays, the use of AI in the creation of trailers is commonplace. There are several apps and platforms where anyone can create their own trailer using AI. Hundreds of tutorials on how to create trailers using AI can be found on the internet. However, what remains important is that trailers continue to perform their basic function, which is to draw audiences into cinemas. Universal Pictures has partnered with an AI platform to analyse social media and online discussions. The goal was to identify the core elements that audiences are most interested in and create a more effective trailer based on that (Lauron, 2024).

Generative AI is able to significantly reduce the cost of creating advertising content. Traditional methods of creating advertising content are quite lengthy and expensive (from writing text, designing posts and images). AI has the ability to automate much of this process. However, it is still true that the need for human labour is very important and irreplaceable (Gujar & Panyam, 2024). Although AI work is very effective, it still has gaps in building brand identity and keeping it consistent. According to Zhang and Gosline (2023), it can easily leave out typical elements that are associated with brand identity, e.g., specific humour, colloquialisms, or creating visuals that seem a bit "off" compared to established brand guidelines.

AI allows you to predict trends and analyse the effectiveness of advertising campaigns before they are launched. For example, big data analytics tools can identify which scenes or media formats are most likely to have successful product placements, saving time and resources. In addition, AI algorithms can track consumer behaviour in real time and change ad placements based on immediate feedback. AI can also predict a user's reactions to ad content based on their browsing and purchase history, as well as their demographics and their engagement on social networks (Kesharwani, 2020).

Warner Bros. is using AI to automate much of the filmmaking process. Specifically, the system will be used in the approval phase of film projects. The platform analyses the market and assesses how likely a film is to be (financially) successful. Based on the preferences and data collected, it will create a trailer that has the potential to reach the target audience (Bright & Kasperski, 2020). Sony Pictures implemented AI tools to analyse large amounts of audience data to help optimize movie ad campaigns on social networks. The AI predicted which creatives and content would have the greatest impact on specific target audiences (O'Brien, 2024).

4 Conclusion

The use of artificial intelligence in film marketing brings with it very many benefits, AI is able to personalize and optimize campaigns (Kushnarevych & Kollarová, 2023; Haleem et al., 2022). It also plays an important role in film content creation, reducing costs, saving time, delivering emotional experiences. Examples such as AI-generated trailers or chatbots that interact directly with fans show that technological innovations can enrich and extend the experience of films, increasing both interaction and engagement on social media. Despite these benefits, one should not forget to maintain authenticity and brand consistency to ensure long-term value and audience trust Zhang and Gosline (2023). The future of AI-powered film promotion presents enormous potential, but with the need to balance automation with the creative approach of human creators, thereby enhancing the overall effectiveness and cultural relevance of marketing campaigns.

Despite the many opportunities and improvements, the use of AI also brings with it many challenges and issues that need to be addressed. Critics point out that the outputs that are generated by AI can sometimes lack emotional depth and authenticity (Zhang & Gosline, 2023). Moreover, the full automation of creative processes entails the simplification of narratives and the risk of uniformity and similarity of content (Alawamleh et al., 2024). What the future of film marketing will look like also depends on how the technological capabilities of AI and human creativity come together. This hybrid approach will not only enable optimization of processes, but also preserve the artistic value and cultural relevance of films. As Kushnarevych and Kollarová (2023) state, it is essential to strike a balance between automation and human intervention in order for film marketing campaigns to retain their innovation and emotional impact.

In conclusion, AI offers a large number of opportunities to improve film promotion, but its implementation must be carefully managed with ethical and creative considerations in mind. Such an approach will ensure that technological innovation is not only a tool to increase profits, but also a means to enrich the film industry and its connection with audiences.

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CREATIVITY IN MARKETING COMMUNICATION: AI-GENERATED DESIGN AND TEXT VS. HUMAN FACTOR

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Abstract:

This study aims to explore respondents' preferences when evaluating creative practices in marketing communication, focusing on the comparison of book cover designs and texts created by humans and those generated by artificial intelligence (AI). The research includes identifying how respondents perceive the aesthetics and authenticity of individual book covers, while also mapping situations in which AI-generated content is seen as problematic. AI demonstrates the ability to produce highly optimized content tailored for specific target audiences, communication channels, and current trends, making it a valuable tool in marketing communication. Despite these qualities enhancing its efficiency, fundamental challenges remain, such as the risk of generating monotonous, inauthentic, or stereotypical content. This study explores the authenticity and aesthetics of book covers in the context of respondent evaluations.

Key words:

Artificial Intelligence. Authenticity. Automation. Creativity. Generated Content. Marketing Communication.

1 Creativity in Marketing Communication: Characteristics and Relationship

Creativity is a multidimensional phenomenon perceived as the ability to produce ideas that are relevant and appropriate within a specific context. It reflects an individual or group's capacity to solve problems in inventive and effective ways (Plucker et al., 2019).

The most general and widely used definition is from E. P. Torrance (1972, in Fichnová, 2013), who described creativity as the ability to detect problems, deficiencies, or gaps in knowledge, search for solutions, and formulate and test hypotheses. Torrance emphasized creativity as an active interaction between subject and object, during which the subject remodels their surroundings into something new with real utility – not just for the subject but also for the reference group or society, thereby adding meaningful value.

Macejka (2003, in Fichnová, 2013) defines creativity in marketing communication as the ability to find suitable means of communicating not always attractive product facts in an innovative and captivating manner. Fichnová (2013) underlines that creativity should not merely fulfill the condition of attractiveness – it should serve as a strategic tool aimed at influencing consumer perceptions and behavior. Creativity in marketing communication particularly hinges on originality (the ability to create something new) and appropriateness (contextual relevance), which are critical for distinguishing a product or brand from competitors. Creative marketing communication combines artistic elements with strategic planning, making creativity a tool for engaging audiences and achieving marketing goals.

Fichnová (2013) highlights the complex relationship between marketing communication and creativity. While its role in marketing communication is essential, creativity should not be the goal itself but rather a means to achieve specific marketing objectives. She states that a product of human activity is creative only if it meets the following conditions:

- it demonstrates novelty or originality (Rothenberg & Hausman, 1976, in Fichnová, 2013; Garrett, 1987, in Fichnová, 2013);

- it is useful;
- it has value.

According to J. Trough and S. Rivkin (2006, in Fichnová, 2013), creativity has never inherently equated to inventiveness because it lacked both value and utility. M. Zelina (1997, in Fichnová, 2013) adds that both criteria must be satisfied simultaneously. Thus, if a product is merely new (original) but not useful, valuable, or functional, it cannot be considered creative. Conversely, if a product is useful, valuable, and functional but not original (new), it also cannot be identified as inventive.

2 Artificial Intelligence in Marketing Communication – Characteristics and Applications

Artificial Intelligence (AI) represents a technology capable of gathering and clarifying information, answering questions, and evaluating its decision-making based on specific goals (Glikson & Woolley, 2020, in Magni et al., 2024). It is a technology that can mimic human intelligence and perform tasks such as learning, planning, and content creation.

Generative Artificial Intelligence (GenAI) is capable of automatically generating new content, such as texts, images, and videos, making it an increasingly utilized tool in the field of digital advertising (Campbell et al., 2021).

Generative AI tools, such as ChatGPT and MidJourney, operate based on so-called identified patterns. Machine learning models are employed to create texts, images, or music based on these identified patterns. These technologies function on the principle of prediction and result generation according to statistical regularities; however, they do not operate based on authentic and creative thinking. Studies comparing ideas created by AI and humans demonstrate that, while AI can produce a large number of proposals, human creativity often results in more original and unique concepts (Schwanke, 2024).

Bordas et al. (2024) argue that since the advent of artificial intelligence, generative AI has become a focal point of interest. AI tools capable of generating various types of multimedia content can be beneficial to numerous institutions and organizations and also help expand and stimulate human creativity. Doshi and Hauser (2023, in Bordas et al., 2024) state that using generative AI tools in creative activities tends to homogenize the level of creativity. Eapen et al. (2023, in Bordas et al., 2024) argue that generative AI also has the ability to support divergent thinking and overcome the so-called fixation effect – a tendency to adhere to established ideas and solutions, thereby limiting the ability to think divergently or explore new possibilities.

The key difference lies in the ability of these models not only to perform tasks but also to generate a new form of intelligence or awareness, emphasizing their potential to create new knowledge and data. This generative approach allows for the creation of new elements based on the structure of existing data, which could naturally integrate into the original dataset. Generative AI has the capacity to significantly transform industries and domains that rely on creativity, innovation, and knowledge work. It enables the use and functionality of pioneering applications in ways previously unimaginable or technically unfeasible. These include, for example, realistic virtual assistants, personalized education systems, services, and digital art creation (Feuerriegel et al., 2023).

2.1 Positives and Negatives of Using Generative Artificial Intelligence in Marketing Communication

Artificial intelligence (AI) and machine learning open new possibilities in marketing communication. Through AI, marketers can gather more data and analyze customer preferences to create various forms of personalized content. AI also aids in adapting content

using data such as popular topics, frequent search queries, or user location (Bilyk & Lavryk, 2023). With its ability to generate realistic images and texts, AI enhances the aesthetic value and authenticity of content, helping companies better resonate with target audiences.

The University of Leeds identifies additional strengths of generative AI (“Strengths and weaknesses of Gen AI”, n.d.):

- **Diverse outputs:** The ability to create original and varied content.
- **Equalizing opportunities:** Helps individuals with lower language proficiency.
- **Increased productivity:** Improves work efficiency through chatbots or content creation.
- **Content personalization:** Adapts content based on previous interactions.
- **Application integration:** Utilizes tools such as Grammarly or Microsoft Office Copilot.

However, Bilyk and Lavryk (2023) also point out the downsides of using artificial intelligence in marketing communication:

- **Privacy concerns:** Collecting and analyzing consumer data can infringe on their privacy; data must always be used with consumer consent.
- **Bias and stereotypes:** If the data used to train AI algorithms is biased, it can lead to the creation of skewed content. For instance, if AI uses an algorithm trained on data from only specific consumer groups, it may produce content that is not inclusive or representative of other groups.
- **Dependency on technology:** Overreliance on AI can lead to problems if systems fail or services are disrupted.

Wach et al. (2023) highlight additional issues, drawing on insights from various authors:

- **Ethical and societal risks:** Some AI models use data sourced from diverse textual inputs available on the internet. These may contain biased information and sensitive attributes related to various races, genders, religions, and more, potentially reflecting existing prejudices and discrimination (Hsu, 2022, in Wach et al., 2023).
- **Lack of regulation:** AI currently lacks comprehensive regulation, which can lead to various forms of misuse (Amariles & Baquero, 2023, in Wach et al., 2023).
- **Accountability and reliability:** Assigning responsibility to AI for its actions or outcomes is challenging, particularly in cases of faulty outputs (Amariles & Baquero, 2023).
- **Replacement of human labor:** People view their work as a meaningful activity, which may be threatened if AI takes over more creative roles. AI technologies have the potential to automate tasks currently performed by humans, potentially leading to job losses (Gruetzemacher et al., 2020, in Wach et al., 2023).
- **Disinformation and deepfake risks:** Technologies such as ChatGPT can create disinformation or deepfake content that is increasingly difficult to detect, undermining the credibility of outputs (Kietzmann et al., 2020, in Wach et al., 2023).

Rafner et al. (2023) discuss shortcomings in the collaboration between AI and humans, such as:

- **Environmental impact:** Increased use of AI can affect energy consumption and natural resources, which is a crucial consideration in assessing the ethicality and long-term sustainability of this technology.
- **Lack of knowledge about co-creativity:** There is currently insufficient understanding of the co-creativity of humans and machines. Questions arise about ownership of co-creative process outcomes and how to ensure fair distribution of rights.

2.2 The Creative Process of Output Generation and the Concept of Co-creativity in Collaboration between Humans and Artificial Intelligence

Computational Creativity encompasses processes in which computational systems (generative artificial intelligence) produce outputs that are evaluated as creative by either the systems themselves or by humans (Franceschelli & Musolesi, 2022, in Huang & Rust, 2024; Lamb et al., 2018, in Huang & Rust, 2024; Mateja & Heinzl, 2021, in Huang & Rust, 2024; Wiggins, 2006, in Huang & Rust, 2024; Wu & Miao, 2013, in Huang & Rust, 2024; Xiao et al., 2019, in Huang & Rust, 2024). For AI to be considered creative, it must be capable of processing inputs and generating outputs deemed creative. AI creativity consists of three components or stages: processing inputs (externally or internally provided stimuli and data), Generating outputs (various multimedia communications), and evaluating outputs (conducted by the AI system or by humans).

According to Rafner and Sherson (2023), recent advancements in the development of generative artificial intelligence reveal its increasing potential to engage in various creative fields. Researchers favor the so-called concept of co-creativity – a synergistic interaction and collaboration between human creativity and AI capabilities, where both parties complement and reinforce each other. The authors investigate whether AI can be considered creative in terms of qualitative differences and similarities between human creativity, AI creativity, and their collaboration. Within this approach, it is essential to distinguish between everyday creative activities and the development of new paradigmatic approaches requiring higher levels of human intervention. Such differentiation enables a better understanding of the levels of creativity that can be fully automated and those where the human factor remains indispensable. However, this collaboration between humans and artificial intelligence also presents challenges. It is not yet possible to determine where the boundary lies between creating co-creative systems by humans and artificial intelligence. Research on the interaction between human work and AI work is still insufficient. Rafner and Sherson (2023) therefore propose interdisciplinary collaboration in this field – integrating human and AI activities in areas such as business and management, linguistics and education, or developmental psychology. A critical goal of co-creativity research is the development of systems that can measurably enhance human creativity, with human oversight during the creative process remaining essential.

Humans have a natural tendency to evaluate their surroundings. Magni et al. (2023) explored how human biases affect the evaluation of creativity in outputs created by artificial intelligence compared to human efforts. Their research revealed that people tend to perceive generative AI products as less creative than those created by humans, based on the so-called effort heuristic. Effort became a key mechanism influencing the creator identity effect on creativity evaluations; however, it only partially explains the creator identity effect and thus acts as a partial mediator. Humans perceive AI-generated outputs as requiring less effort, which leads to lower evaluations of the creativity of the final product. Conversely, human outputs are often rated more positively because they are presumed to involve greater effort and skill. This finding directly confirms that humans hold biases toward the identity of the creator when evaluating creativity. Such perceptions, however, could lead to underestimating AI's capabilities in the realm of creativity, even though AI can effectively combine and innovate outputs based on data inputs. In this context, humans act as so-called guardians of creativity – evaluating the creativity of ideas and products is a key step toward innovation and raising awareness of this issue.

3 Methodology

This study focuses on identifying respondents' preferences when evaluating creative approaches in marketing communication. Particular attention is given to the comparison of book cover designs and texts created by humans and those generated by artificial intelligence (AI). The methodological approach includes identifying factors that influence the perception of creativity and authenticity in book covers, while also mapping situations in which AI-generated content is perceived as problematic by respondents. The study provides an overview of respondents' opinions on AI-generated content compared to human-created content, employing quantitative methods (questionnaire-based surveys) to gain deeper insights into the comparison of AI and human activity in creation texts and visual. The research sample consisted of 55 respondents (university students) aged 19 to 25 years old. The research material included two book covers – one created by a human using the Canva platform and the other generated based on a detailed prompt through the generative AI tool ChatGPT, specifically utilizing the free version of ChatOpenAI's DALL-E 2 model.

We subsequently formulated the main and specific research questions:

Main research question: What are the respondents' preferences when comparing book covers created by humans versus those created by artificial intelligence in terms of creativity?

- What are the respondents' preferences when comparing human-created book covers to AI-generated ones in terms of aesthetics?
- What are the respondents' preferences when comparing human-created book covers to AI-generated ones in terms of authenticity?
- What are young people's opinions on the use of artificial intelligence in marketing communication, particularly in the creation of design and text?

We also proposed the following hypotheses:

H1: Book covers created by humans will be rated as more aesthetically pleasing than those created by artificial intelligence.

H2: Book covers created by humans will be rated as more authentic than those created by artificial intelligence.

H3: Respondents will show more positive reactions to book covers created by humans compared to those created by artificial intelligence.

H4: Young people will express mixed or skeptical attitudes toward the use of artificial intelligence in the creation of design and text.



Figure 1: Research material no. 1 – book cover created by a human (Rosegracesalvatore, 2018)
Source: De Parth (2018)



Figure 2: Research material no. 2 – book cover generated by AI
Source: OpenAI (n.d.)

4 Results

Emotional impact of covers on respondents

The findings reveal that neither cover elicited extreme emotional reactions. A total of 43.6% of respondents considered the human-created cover to be emotionally neutral, compared to 34.5% for the AI-generated cover. However, the AI-generated cover evoked more positive feelings in 38.2% of respondents, compared to 34.5% for the human-created cover. Negative feelings were reported for the AI-generated cover by 12.7% of respondents, whereas only 10.9% reported negative feelings toward the human-created cover.

Creativity in design

A total of 58.2% of respondents identified the human-created cover as more creative. Additionally, 49% of respondents stated that AI cannot fully replace human creativity. Meanwhile, 23.7% could not articulate why the human-created cover seemed more creative to them. On the other hand, 41.8% of respondents regarded the AI-generated cover as more creative.

Aesthetics and authenticity

Among respondents, 50.9% considered the AI-generated cover more aesthetically pleasing, while 49.1% preferred the human-created cover. However, 72.7% deemed the human-created cover to be more authentic. Furthermore, 69.1% stated that authenticity is an important factor when selecting a book based on its cover.

AI as part of human creative work

A total of 58.2% of respondents expressed concerns that AI is replacing human work. Additional concerns included monotony in AI-generated content (14.5%), copyright violations (12.8%), and manipulation (7.8%). Only 1.8% were unconcerned about the growing use of AI. Regarding AI's role in creative processes, 40% of respondents agreed that AI could be part of cover design, while another 40% disagreed, and 20% were unsure. Notably, 80% of respondents emphasized the importance of collaboration between AI and humans in creative work. Moreover, 70.9% expressed a desire for AI-generated content to be clearly distinguishable from human-created content.

5 Discussion

The aim of this study was to determine respondents' preferences between content created by humans and content generated by artificial intelligence (AI), focusing on book covers as the research material. Our study analyzed various aspects, including respondents' emotional reactions, the aesthetic value, authenticity, and creativity of the covers, as well as attitudes toward the use of AI in the creative industry. In the first part of the research, we focused on the emotions evoked by the covers. We found that the AI-generated cover elicited more positive emotions (38.2%) compared to the human-created cover (34.5%). Conversely, negative emotions were stronger for the AI-generated cover (12.7%) than for the human-created cover (10.9%). The AI-generated cover may thus evoke stronger emotional reactions; however, most respondents found the human-created cover to be emotionally neutral (43.6%).

Regarding aesthetics, respondents' opinions were nearly balanced: 50.1% considered the AI-generated cover more aesthetically pleasing, while 49.1% preferred the human-created cover. In terms of authenticity, the results were more decisive: 70.2% of respondents perceived the human-created cover as more authentic. This significant difference can be attributed to a natural inclination toward human creation. Regarding creativity, 58.2% of respondents found the human-created cover to be more creative, while 41.8% favored the AI-generated one. We also found that respondents were most impressed by details such as the background, color composition, typography, and photographs on the human-created cover, which appeared more tangible. In contrast, the AI-generated cover was appreciated for its detailed design, confirming AI's ability to produce visually appealing outputs with a futuristic or fantastical aesthetic. However, some respondents pointed out textual errors on the AI-generated covers, indicating technical imperfections that negatively affected the overall impression.

The results also showed that 58.2% of respondents are concerned that AI may replace human labor in creative processes. These concerns were based on fears of monotonous AI-generated content (14.5%), copyright infringement (12.9%), and manipulation (7.8%). Only 1.8% were unconcerned about the growing use of AI. Respondents also acknowledged that AI is a suitable tool for generating covers (40%), but 20% stated that cover design should remain exclusively human work. Although respondents recognized the advantages of AI in creative production, they still preferred human activity. However, 80% of respondents supported collaboration between AI and humans in creative endeavors, and 70.9% stressed the importance of distinguishing AI-generated content from human-created content in marketing campaigns.

Before conducting the study, we formulated the following hypotheses:

H1: Book covers created by humans will be rated as more aesthetically pleasing than those created by artificial intelligence.

Both covers received nearly equal evaluations (50.9% and 49.1%), indicating that preferences were very balanced. However, more respondents rated the AI-generated cover as more aesthetically pleasing, disproving our hypothesis.

H2: Book covers created by humans will be rated as more authentic than those created by artificial intelligence.

A total of 72.7% of respondents considered the human-created cover more authentic. This significant difference supports the hypothesis that human-created covers are perceived as more authentic than AI-generated ones.

H3: Respondents will show more positive reactions to book covers created by humans compared to those created by artificial intelligence.

The AI-generated cover elicited more positive reactions (38.2%) than the human-created cover (34.5%). This finding disproves the hypothesis that the human-created cover would evoke stronger positive reactions. Additionally, 43.6% of respondents found the human-created cover emotionally neutral, reflecting a more balanced response to this cover. However, the AI-generated cover also elicited more negative feelings (12.7%) than the human-created one (10.9%). Overall, the results suggest that the AI-generated cover was better received by respondents, contradicting the assumption that the human-created cover would evoke stronger positive reactions.

H4: Young people will express mixed or skeptical attitudes toward the use of artificial intelligence in design and text creation.

A total of 58.2% of respondents expressed concerns about AI replacing human labor, and 80% supported collaboration between AI and humans. This result indicates that young people indeed have mixed or skeptical attitudes toward the full utilization of AI in creative processes within marketing communication.

In an article published by *Forbes*, its author Kapler (2024) also attempted to generate a magazine cover using ChatGPT. It should be noted that DALL-E cannot generate photorealistic images and produces lower-quality texts compared to other AI tools. While it is possible to refine the generated output (cover) through follow-up textual interaction, the model often fails to reliably follow instructions, even when provided with detailed prompts in English. For instance, when generating the *Forbes* cover, it refused to include the magazine's logo due to copyright issues. This limitation aligns with challenges we encountered during cover generation. ChatGPT is designed to be a safe tool for internet users, which prevents it from generating explicit scenes. This restriction was evident when it failed to accurately generate the book title *Dotyk smrti* [*Touch of Death*] (De Parth, 2018), rendering it incorrectly as *Dotyk smirti*.

The study also faced several additional, less significant limitations. For instance, evaluations of aesthetics and authenticity were often highly subjective, meaning the results largely depended on respondents' individual preferences. Additionally, the results are based on immediate reactions and do not account for how opinions may evolve over time. The limited selection of covers also constitutes a constraint.

Based on the study's findings, we conclude that although AI-generated covers received positive evaluations in terms of aesthetics, human-created covers were perceived as more authentic and creative. Respondents preferred AI to serve as a tool for collaboration in the creation of creative outputs rather than as a full replacement. These findings suggest that while AI can contribute to enhancing the efficiency of creative processes, the human factor remains crucial. Collaboration between AI and humans may lead to better outcomes in text and design creation within marketing communication, where transparency and authenticity are essential.

6 Conclusion

This study compared book covers created by humans with those generated by artificial intelligence, focusing on emotional reactions, aesthetics, authenticity, and creativity. The results showed that human-created covers were considered more authentic and creative, while AI-generated covers elicited more positive emotional reactions. Although concerns about AI replacing human labor persist, the majority of respondents support collaboration between AI

and humans. The findings suggest that AI can be a valuable tool in the creative industry, but its use should be accompanied by human intervention and transparency. In conclusion, authenticity and creativity remain values that respondents associate with human work.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN NEUROMARKETING: A COMPARATIVE ANALYSIS OF AI-DRIVEN AND TRADITIONAL METHODS

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Abstract:

This study explores the efficacy of AI-driven tools such as NEURONS AI and REAL EYE in analyzing consumer behavior, contrasting their performance with traditional neuromarketing methods. While AI enhances data processing speed and accuracy, our findings indicate that it often falters in understanding nuanced cultural and linguistic contexts, especially in localized markets. Through detailed case studies, we reveal that classical neuromarketing techniques often outperform AI tools in these settings, providing deeper insights into regional consumer dynamics. This discrepancy is attributed to AI's limitations in recognizing and interpreting the subtleties of local languages and cultural references, which can lead to significant misunderstandings. Moreover, the study emphasizes the importance of integrating qualitative research methods with AI analyses to better capture the complexities of consumer emotions and preferences. The ethical implications of relying solely on AI-driven tools are also examined, highlighting risks associated with generating misleading results due to inadequate training on diverse datasets. In conclusion, although AI presents promising advancements in neuromarketing, traditional methods remain essential for effective consumer analysis, particularly in culturally diverse markets.

Key words:

Artificial Intelligence. Consumer Behavior. Ethical Implications. Neuromarketing. Regional Differences. Tools. Traditional Methods.

1 Introduction

With the advent of artificial intelligence (AI), marketing has transformed significantly (Murár et al., 2024; Čábyová et al., 2024), including in the context of neuromarketing (Darázs, 2023; Darázs & Šalgovičová, 2019; Krajčovič & Darázs, 2021). In this era where technology enables fast and efficient analysis of consumer behaviour, traditional neuromarketing methods that involve long and difficult research with real people may seem outdated and ineffective. These approaches, while valuable, require manual data processing, which can slow down the speed of response in dynamically changing markets.

On the other hand, there are modern AI tools that can generate heatmaps based on machine learning and predict consumer behaviour, which until now has been provided by neuromarketing. These innovations offer promising opportunities for brands looking to maximize their effectiveness and accuracy in marketing campaigns (Ahmed et al., 2022)

However, neuromarketing as such has many aspects of machine learning in it. For example, emotional responses, which were introduced by Paul Ekman, are used as the basis for training software that is able to recognise emotions based on a large database of samples. Newer software attempts to take these technologies even further and automate the evaluation process, increasing their usefulness in marketing applications (Alvino et al., 2020; Kakaria et al., 2023).

Despite these advances, however, the question of the effectiveness of AI tools remains open, especially when context is taken into account. Many of these technologies still struggle with the problem of understanding nuances in language and cultural context. For example, AI tools that rely on text analytics may confuse keywords such as “action” and “murder” for no good reason when presented in the same format and font size. This biases the results, which can have a major impact on consumer perception (Hsu & Chen, 2020).

This article focuses on examining how AI tools are impacting neuromarketing, and evaluates their ability to replace traditional methods of analyzing consumer behavior. Particular attention is paid to issues such as analyzing specific messages, differences between consumer groups, and evaluating results in the context of current political and economic conditions. In this way, we aim to contribute to a deeper understanding of the dynamics of the interaction between AI, neuromarketing and consumer behavior.

Adding to the situation is the factor of a rapidly changing technological environment, where new trends such as virtual and augmented reality are beginning to influence the way consumers respond to marketing stimuli. This creates another layer of complexity that needs to be taken into account when analysing consumer behaviour. This research aims to identify how AI tools, when applied to neuromarketing, can improve understanding of consumer needs and preferences, but also highlight their limitations and the risks they pose.

The study will also focus on ethical issues that are inherent in the modern marketing environment. Given the increasing role of AI, it is important to discuss transparency, accountability, and potential biases that may affect the results of the analyses. Our goal is to develop a comprehensive view of how AI can push the boundaries of neuromarketing and how this technology should be integrated into broader marketing strategies that respect consumer psychology and ethical standards.

This article is therefore a step towards understanding the complex and dynamic relationship between AI and neuromarketing, which is proving crucial to the success of marketing campaigns in the 21st century.

2 Methodology

This research focuses on evaluating the effectiveness of neuromarketing tools that use artificial intelligence, such as NEURONS AI and REAL EYE. The methodology combines literature review and case study analysis, focusing on identifying the strengths and weaknesses of these tools in different regional contexts. It is important to note that classical neuromarketing proves to be much more effective than AI tools in small local markets.

In our literature review, we examined key studies on the applications of AI in neuromarketing. Publications such as Ahmed et al. (2022) highlight that existing tools such as NEURONS AI may have difficulty analyzing languages that are underrepresented in training data. Tavishi (2024) also state that under-training on specific language variations can affect the accuracy of analyses and decisions made by marketing teams.

Analysis of case studies provides empirical evidence on the effectiveness and limitations of AI tools. Our studies showed that tools such as NEURONS AI and REAL EYE failed to adequately process Slovak language and interpret cultural contexts. Our observations are supported by the work of Hsu & Chen (2020), who suggest that incorrect processing of linguistic cues leads to biased results and inaccurate marketing strategies.

We have identified significant contextual challenges facing AI in the analysis of linguistic data. Regional differences in the perception of marketing messages are key to effective analysis of consumer behavior. Our findings suggest that classical neuromarketing, which focuses on local specifics, can provide more accurate and relevant results in smaller markets compared to AI tools that may inaccurately interpret linguistic nuances.

As part of our methodology, we considered the ethical issues associated with the application of AI in neuromarketing. We critically assessed how inaccuracies in the analysis may affect marketing teams' decision making and strategies. Darázs (in print) emphasizes that transparency and a responsible approach to interpreting results are essential to minimize potential negative impacts on consumers and marketing practices.

3 Results

In order to effectively discuss the impact of artificial intelligence (AI) on neuromarketing, it is important to first explore the potential benefits of the discipline. The integration of AI into neuromarketing represents a significant shift that opens up new dimensions in understanding consumer behavior. AI can not only increase the accuracy and speed of analysis, but also provide deeper and more valuable insights that are derived from neuromarketing tools.

Potential benefits of future AI in neuromarketing also based on experimental experience from NEUROLAB FMK UCM in Trnava:

1. **Increased Accuracy:** AI algorithms can analyze neuroimaging data with high accuracy, reducing the likelihood of errors and bias in interpreting results. In this way, marketing teams can gain more accurate information about how consumers respond to different marketing stimuli. AI enables more efficient processing and analysis of complex data, leading to more accurate mapping of consumer preferences. Machine learning algorithms can identify behavioral patterns that human analysts might overlook.

2. **Real-time analytics:** Thanks to AI, data collected from neuromarketing tools can be analyzed in real-time, providing immediate insights into consumer reactions. This is particularly useful for dynamic marketing campaigns where you need to react quickly to changes in behavior. Rapid analysis allows ads and marketing strategies to be adapted without unnecessary delays. The ability to adapt campaigns in real time can significantly increase their effectiveness and impact. Real-time data analytics empowers decision-making in marketing teams.

3. **Predictive analytics:** This predictive approach is extremely valuable as it allows marketing teams to prepare for changes in consumer preferences and adapt their strategies in advance. Predictive analytics can also enable market segmentation based on anticipated reactions, improving campaign targeting. Marketing teams can use AI predictions to optimize product offerings.

4. **Expanded understanding of emotional reactions:** AI technologies enable the analysis of emotional responses to marketing stimuli through sophisticated algorithms. These technologies can process data from multiple sources such as facial expressions, tone of voice, and physiological responses. In this way, researchers can gain a deeper understanding of the emotional dynamics that influence consumer decision-making. AI can analyze emotional responses with high accuracy, leading to a better understanding of consumer preferences.

Examples of existing AI integration in neuromarketing research:

- **Emotion recognition software:** AI is used to analyse facial expressions (recorded via video) to gauge emotional responses to ads and products. This way, marketers can tailor their campaigns to better reach their target audience.
- **AI in eye-tracking:** by combining eye-tracking technology with AI, researchers can track what consumers are looking at and determine the emotional and cognitive impact of what they see. Data collected in this way can provide valuable insights into how effectively ads capture attention.
- **Deep learning for consumer insights:** Deep learning models are used to analyse complex layers of data obtained from EEG and fMRI studies, revealing consumers' unconscious preferences and decision-making processes.

Key success stories:

- **Automotive Campaigns:** AI analysis of emotional reactions and physiological responses during car ads helped identify key emotional triggers that influenced purchase intent.

- Retail brand strategy: a retail brand used AI to analyze EEG data and found that certain color schemes evoked subconscious stress in customers. This finding led to a rebrand that significantly improved customer engagement and increased the amount of time customers spent in the store.
- Movie Trailer Effectiveness: The entertainment company used AI to interpret audience reactions to various movie trailers. The AI-assisted analysis helped identify elements that captured attention and elicited positive emotional reactions, thereby guiding the marketing strategy for the film's premiere.

While AI can bring significant benefits in the field of neuromarketing, using it to predict consumer behavior, especially in heatmap generation and eye path analysis, can be dangerous. In particular, AI models may not be sufficiently trained for the linguistic and cultural nuances that are essential in such research. This can lead to inaccurate or skewed results, which is especially critical when sensitive or emotionally laden words are used in visuals.

For example, if an AI system like Neurons AI analyzes a visual that says the word “murder” in some less common language, it may give the same result as if the word “action” were there, because it can't discern the context and emotional weighting of those terms. Neurons AI is proving very popular, especially in the commercial sphere, because the results are attractive and easy to sell. However, this approach can lead to serious problems when evaluating marketing campaigns, where accuracy and sensitivity to words is key. Another problem may be situations for which it is not trained, and not only in linguistic or cultural contexts, for example, if some new forms of communication were to be developed, such as interactive web banners or virtual banners, the tools may not be sufficiently trained for such applications.

In support of the idea of AI challenges in neuromarketing, we can note that many AI tools, including Neurons AI, are trained on historical data that may be incomplete or inadequate for specific cultural contexts. This can be a problem because perceptions of marketing communications change very rapidly over time, for example as research by Darázs (2024) from Slovakia showed that people reacted very differently to the same advert aimed at combating misinformation when the research was conducted during the Liberal government of Ľudovít Ódor, and very differently during the bench government of Róbert Fico, with a time difference of only 3 quarters between the two researches. Without sufficiently diverse and representative data, AI can easily make mistakes that will affect the decision-making of marketing teams. This phenomenon suggests the need to critically evaluate the use of AI in neuromarketing and develop strategies to minimize potential negative impacts.

When evaluating the results of neuromarketing studies, it appears that even experienced researchers may have difficulty recognizing the different contexts that influence consumer responses. Although these professionals are trained to analyze emotional and behavioral data, some nuances and cultural factors may escape their attention, resulting in misinterpretations.

In my recent work presented at the DOKBAT 2024 conference, I pointed out that when applying neuromarketing techniques, care must be taken to consider the various factors that can influence research. For example, in the case of higher emotions such as empathy, it is important to include qualitative research that can provide in-depth insights into consumer psychology (Darázs, in press).

The case studies I have conducted clearly show that not only automated systems but also locally trained humans can provide inaccurate results if the subjective representations and emotional nuances of individual viewers are not taken into account. For example, in a study analysing COOP Jednota Slovakia brand advertising, we found that women responded more positively to the emotional aspects of the ad, while men focused more on jokes and clear visual

cues. Such differences suggest that the effectiveness of AI may vary significantly depending on gender, age, or cultural contexts (Darázs, 2024).

Another example is the analysis of the impact of colour schemes on consumer reactions. Neuromarketing tools that identified certain colours as positive proved to be insufficient when participants reported in interviews that certain colour combinations triggered feelings of anxiety. This discrepancy between physiological and subjective responses points to the need for in-depth analysis that can reveal nuances that are overlooked by automated tools (Darázs, 2024; Hsu & Chen, 2020).

Combining technology solutions with expert analysis and human intuition is key to achieving accurate and effective results in neuromarketing. Kakaria et al. (2023) emphasize that even with advanced technologies such as AI and machine learning, it is imperative that experts combine technological analysis with knowledge and experience to interpret complex consumer responses.

4 Discussion

The integration of artificial intelligence (AI) into neuromarketing is transforming the way consumer behaviour is analysed and marketing strategies are created. This development is supported by a wide range of literature that examines in detail the benefits, challenges and applications of AI in neuromarketing.

AI brings accuracy and efficiency to neuromarketing that traditional methods cannot provide. These technologies enable the processing of large volumes of data, which increases the speed of analysis and reduces the risk of errors that can occur with manual data processing. AI can analyze consumers' emotional and cognitive responses to marketing stimuli and provide valuable insights that are essential for optimizing marketing strategies.

On the other hand, as state in their article "AI in Neuromarketing: A Review of Current Applications and Future Directions", AI technologies such as emotion recognition and eye-tracking are proving to be extremely valuable for understanding what consumers are feeling and how they react to different stimuli. These applications are able to provide real-time analysis of consumer reactions, helping brands quickly adapt to changing preferences and emotional states.

Despite the many benefits, there are also potential risks to consider. One of the biggest concerns is that AI systems, such as Neurons AI, may have difficulty interpreting linguistic and cultural nuances. This can lead to inaccurate or skewed results, as we mentioned earlier. As Hsu and Chen (2020) suggest, AI may overlook important emotional responses if trained on limited or inappropriate data.

Additionally, the literature suggests that current AI applications often fail to capture the complexity and variability of emotional responses in different cultural contexts. A review by Kakaria et al. (2023) notes that many machine learning models are trained on historical data that may not be representative of current consumer trends and preferences. Such inaccuracies can lead to serious errors in the interpretation of consumer behavior and decisions by marketing teams.

To improve the accuracy and efficiency of the analysis, it is essential to combine technological approaches with qualitative research. As stated by Darázs (2024), the integration of qualitative methods such as interviews and discussions can complement quantitative data collected through AI. The results obtained will thus be more accurate as they will also take into account emotional nuances and cultural factors.

Case studies on the impact of color schemes and different demographic groups on marketing stimuli show that consumers' emotional responses are often complex and require in-depth analysis (Darázs & Šalgovičová, 2019). Similarly, suggest that higher emotions such as empathy are complex and difficult to interpret without sufficient context, indicating the need to seek a balance between technology and expert analysis.

5 Conclusion

In the conclusion of this study, we focused on evaluating the effectiveness of AI-based neuromarketing tools, such as NEURONS AI and REAL EYE, and their ability to respond appropriately to consumer behavioral dynamics. Our findings show that although AI technologies offer new opportunities in the field of consumer behavior analysis, their effectiveness varies significantly depending on context, cultural nuances, and language variations.

One of the main findings is that classical neuromarketing, which relies on a deep understanding of local markets and cultural factors, remains far more effective than AI tools in smaller and local markets. The reasons for this are varied, but key factors include a lack of training AI models on specific linguistic and cultural contexts, leading to inaccurate interpretations and biases in the analysis of consumer responses. We also found that AI's ability to recognize and process consumers' emotional reactions is not always sufficient, underscoring the need to combine technological approaches with qualitative methods.

Our analysis also confirmed that AI can have difficulty in selecting between different cohorts, particularly in small local markets where regional differences in perceptions of marketing messages are key. These challenges highlight the need for further research and development in training AI models on diverse and representative language samples.

Overall, this study suggests that while AI offers many promising tools and technologies that can enrich neuromarketing, traditional methods remain essential to effectively analyze and understand consumer behavior, especially in locations with different cultural contexts. We recommend that marketing teams continue to rely on the integration of AI with traditional approaches and qualitative research to achieve more accurate and relevant results. In this way, they can better respond to dynamic consumer needs and optimize their marketing strategies.

Our findings also suggest that the future of neuromarketing will require greater synergistic collaboration between technologists and psychologists, marketers and ethics committees. This multidisciplinary collaboration is key to ensuring that AI tools are designed with ethical standards and cultural sensitivity in mind. Therefore, marketing teams need to invest in the training and development of their staff so that they can effectively integrate AI tools into their processes and retain the human touch in consumer behavior analysis.

In addition, we believe that future research should include more detailed analyses of how different demographic factors, such as age, gender, and cultural background, influence responses to marketing stimuli. In this way, we can gain a more comprehensive view of the dynamics of consumer decisions and ensure that marketing strategies are effective and relevant to different groups of consumers.

At the same time, marketing strategies should adapt to current social and technological trends, such as the increasing importance of sustainability and ethical marketing. Consumers increasingly expect brands not only to respond to their needs but also to demonstrate responsibility and commitment to wider societal issues. In this context, traditional neuromarketing methods that focus on an in-depth understanding of consumer psychology are proving to be invaluable in designing marketing campaigns that are ethically focused and culturally relevant.

In conclusion, the integration of AI into neuromarketing presents an exciting opportunity for improving marketing strategies, but also requires careful examination of its ethical considerations and limitations. The ultimate goal should be to create a marketing environment that not only harnesses technological innovation, but also respects and understands the complexities of human psychology and culture. In this way, we can ensure that marketing strategies are not only effective but also valuable to consumers and society as a whole.

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NEUROMARKETING RESEARCH OF AI CONTENT: CASE STUDIES FROM NEUROLAB AT FMK UCM IN TRNAVA

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Abstract:

This study explores the use of neuromarketing techniques in analyzing consumers' subconscious responses to content created by artificial intelligence (AI). Three case studies, conducted in the NEUROLAB laboratory at the FMK UCM in Trnava, investigate the perception of visual, textual and audio content created by AI using eye tracking, galvanic skin response (GSR) and facial expression analysis. The aim is not to present specific results, but to demonstrate proven methodological approaches and best practices for investigating consumer reactions to AI-generated content. When analyzing visual content, we found that it is essential to compare stimuli at the same level of creative quality to avoid biasing participants' reactions. Textual analysis, including PR articles, showed the importance of declaring the role of humans in the AI text generation process, as awareness of the origin of the text can influence consumer perceptions. For audio content, we found that it was crucial to ensure optimal listening conditions to minimize distractions to the perception of human and AI voices. The goal is to highlight that neuromarketing provides deeper insights into attention, emotional engagement, and consumers' overall perception of AI-generated content. The integration of eye tracking, GSR, and facial expression analysis enables a comprehensive understanding of consumer responses and provides practical recommendations for research and use of AI in marketing communications. In this way, the study demonstrates how neuromarketing approaches can contribute to the effective application of AI in marketing strategies.

Key words:

Artificial Intelligence. Biometric Analysis. Consumer Behavior. Emotional Engagement. Marketing Communication. Neuromarketing. Subconscious Reactions.

1 Introduction

With the development of Artificial Intelligence (AI), there are significant changes in marketing and communications that are fundamentally changing the way consumers create and perceive content. AI is becoming an integral part of the media production process, from generating text to creating visuals and audio. Alongside this evolution is a growing need to understand how AI is influencing consumer reactions and perceptions of content, particularly in the context of creativity and emotional engagement. Understanding these reactions is important for the effective use of AI in marketing strategies and for optimizing customer communications at multiple levels.

Neuromarketing, which combines insights from neuroscience with marketing techniques, offers unique insights into how consumers subconsciously respond to different types of content (Plassmann et al., 2015; Morin, 2011). By measuring physiological and neurocognitive responses such as eye tracking, galvanic skin response (GSR) measurements, or facial expression analysis, neuromarketing provides in-depth insight into how consumers perceive and respond to human- and AI-generated content. These methods go beyond traditional market research, which relies on conscious responses from respondents and often fails to capture subtle subconscious reactions (Lee et al., 2007).

Although the literature on the impact of AI on creative processes and consumer responses is growing, there are still gaps in understanding how AI as a content creator influences consumers' unconscious responses. This is because creativity is a multidimensional concept that manifests itself not only in aesthetic and visual representation, but also in content

originality and emotional context (Boden, 1994). Differences in perception between human-created and AI-generated content can manifest in various forms including emotional response, engagement and memorability (Ananthakrishnan & Arunachalam, 2022).

In this paper, we demonstrate the research opportunities offered by neuromarketing in exploring the interaction between consumers and AI-generated content. Through three case studies conducted in the NEUROLAB laboratory at the Faculty of Mass Media Communication of the University of St. Cyril and Methodius (FMK UCM) in Trnava, we explore different aspects of consumer reactions to AI and its use in marketing communication. In the first study, we focus on differences in neurocognitive responses to human-generated content compared to AI-generated content. The second study analyzes how consumers perceive PR articles written by humans versus those created in collaboration with AI. The third study focuses on listeners' emotional reactions to radio presenters and examines differences in reactions to human and potentially AI-generated presenters.

The main aim of the article is to demonstrate the possibilities of neuromarketing methods at the FMK UCM in Trnava when exploring the use of AI in marketing communication. The results of these three case studies show how subtle subconscious reactions of consumers to AI-generated content can be revealed through biometric measurements such as eye tracking, galvanic skin response (GSR) or facial expression analysis. This opens up new possibilities for the effective application of AI in marketing and communications.

This work is intended to contribute to the understanding of how consumers unconsciously cope with new forms of creative content generated by AI, while highlighting the opportunities that neuromarketing offers for AI research and its applications in marketing.

2 Methodology

This methodology integrates the best research practices of neuromarketing in the study of responses to content created by artificial intelligence (AI) and presents case studies conducted in the NEUROLAB laboratory at the FMK UCM in Trnava. The aim of the article is to demonstrate the possibilities of research through neuromarketing techniques in the context of AI. The case studies serve as demonstrations of the practical application of these techniques and are not a detailed discussion of the results, as each of the studies already exists as a separate research article. Thus, the article focuses attention on the possibilities of the laboratory and on linking theory to practice.

Case studies are a convenient way to examine specific phenomena in their natural context (Yin, 2017). They provide an opportunity to combine different research methods and their subsequent analysis, allowing for a comprehensive understanding of the phenomenon under study. As the aim of this article is to demonstrate the research possibilities of neuromarketing in the context of artificial intelligence, case studies were chosen as the optimal approach to illustrate the application of research techniques and results.

The selection of individual case studies was guided by the principle of selecting “information-rich” cases (Stake, 1995) to enable the widest possible understanding of the problem under investigation from a variety of perspectives. The three case studies selected cover different forms of media content: visual, textual and audio. Each study focuses on a different aspect of exploring the impact of AI on consumer responses and allows the diversity of neuromarketing techniques to be demonstrated.

The design of each case study is based on the principles of mixed methods research, combining both qualitative and quantitative methods (Creswell & Plano Clark, 2017). This approach allows for a detailed understanding of unconscious responses that traditional survey methods would fail to capture (Lee et al., 2007). In mixed-methods research, biometric and

physiological methods such as eye tracking, GSR, and face reading are effective ways to capture cognitive and emotional responses to AI-generated content.

2.1 Neuromarketing Techniques Used in the Case Studies

Eye tracking is one of the most commonly used techniques in neuromarketing, providing insight into how participants visually process stimuli (Krajčovič & Darázs, 2021; Chyrgin et al., 2024). Using eye tracking, we can determine which content elements elicit the most attention and for how long, allowing us to identify key areas of interest. In the context of AI, this method is effective in examining AI-generated visual and textual stimuli, providing detailed insights into consumer behavior.

The galvanic skin response (GSR) measures changes in electrodermal activity, which is closely related to sympathetic nerve activity and emotional arousal (Boucsein, 2012). Within neuromarketing research, GSR is used to measure emotional engagement, with higher GSR values indicating higher levels of arousal and engagement (Venkatraman et al., 2015). This method provides immediate data on emotional reactions to AI-generated content.

Facial expression analysis (Face Reading) uses the Facial Action Coding System (FACS), which is widely used in psychology and neuromarketing to measure emotional valence (Ekman & Friesen, 1978). Through this technique, the subtle movements of facial muscles that reflect the emotional states of the participants can be detected. This is particularly useful in identifying positive and negative reactions to AI-generated content.

2.2 Overview of the Case Studies

Case Study 1: Visual Content (2022)

This study examined participants' responses to visual content created by artificial intelligence compared to human-created images. The research involved 20 respondents, aged between 20 and 25, who were exposed to a variety of images. Their responses were monitored using eye tracking, GSR, and facial expression analysis to determine differences in visual attention and emotional responses to AI and human-created content.

Case study 2: Textual Content (2023 – 2024)

The second study focused on the perception of textual content, specifically PR articles created either by humans or artificial intelligence, or a collaboration of both. This study involved 25 participants whose reactions to reading different types of articles were measured using eye tracking, GSR, and facial expression analysis. The goal was to determine if and how emotional and cognitive responses changed based on whether the text was created by an AI or a human author.

Case Study 3: Audio Content (2024)

The third study examined emotional reactions to audio content, specifically radio presenters who presented different types of news (news, sports, weather). The sample consisted of 16 participants who listened to recordings of different presenters and their reactions were measured using GSR and facial expression analysis. Although the study did not directly compare AI-generated audio with human speech, it provided a basis for exploring potential emotional differences in reactions to AI-generated audio content.

2.3 Data Collection and Analysis

Data collection took place in the controlled environment of the NEUROLAB laboratory using specialized equipment for eye tracking, GSR and facial expression analysis. Participants were exposed to a variety of stimuli and their physiological and emotional responses were captured and processed using software tools such as iMotions. Results from

eye tracking were interpreted using heatmaps and data from GSR and facial expression analysis were analysed to identify emotional responses.

Quantitative data analysis was conducted using non-parametric statistical tests, namely Friedman's test and Wilcoxon signed rank test (Conover, 1999). These tests are suitable for repeated measures experiments where there is no need to assume a normal distribution of the data (Field, 2018). These statistical methods allow for comparison of differences between stimuli (AI-generated and human-generated content) and provide reliable data on participants' emotional and cognitive responses across experiments. This approach is particularly useful for examining specific differences in physiological responses to AI-created versus human-created stimuli, providing deeper insights into consumer behavior and responses to new types of content.

The methodology chosen for these studies in the NEUROLAB laboratory effectively demonstrates the opportunities presented by the combination of neuromarketing techniques in the study of AI and its impact on consumer behaviour. The integration of eye tracking, GSR and facial expression analysis allows for detailed insights into subconscious and conscious responses to content, while providing practical examples of research approaches. These studies illustrate how various neuromarketing techniques can complement traditional surveys and provide an in-depth understanding of the emotional and cognitive aspects when interacting with AI-generated content.

In line with the literature (Plassmann et al., 2015), the methodology emphasises the need to use a combination of qualitative and quantitative research methods to capture a comprehensive picture of consumer responses. The results from the case studies suggest that such an approach is highly effective in exploring AI in the context of marketing communications and media.

3 Results

This section presents the results of three case studies carried out in the NEUROLAB laboratory at the FMK UCM in Trnava, which demonstrate the possibilities of using neuromarketing techniques in the study of artificial intelligence (AI). Although each of these studies represents separate research with specific results, the main aim of this article is to highlight the research potential of neuromarketing and to show how this approach can help to better understand consumer responses to AI. It is important to note that each of the studies was conducted at a different stage of AI development, and the lessons learned from their implementation have provided key insights for future research.

Case Study 1: Visual Content – Experience with the Selection of Comparable Creative Objects

The first study focused on analyzing neurocognitive responses to AI-generated visual content compared to human-generated content. The implementation of this study showed how important it is to properly compare visual objects based on their creative level before including them in research. This is because selecting objects with different creative value could affect the results and make measures of attention or emotional engagement not comparable.

The results showed that participants spent considerable time exploring imperfections in the AI-generated images. Eye tracking revealed that these imperfections attracted their attention and caused longer “visual exploration” compared to human-generated images, which were more visually coherent. The imperfections became the focus of attention and participants often wondered about their meaning or origin, which provided valuable insight into how participants focus on unusual details when analyzing AI visual content.

Case Study 2: PR Articles – Declaring the Role of Humans in AI Content Creation

The second study examined differences in the perception and readership of PR articles that were either written by humans or generated by AI, or produced in collaboration between the two. One of the important findings during the conduct of this study was the understanding that even when text is AI-generated, there is often a human behind the process, creating prompts or directing the generation of the text. Therefore, it is essential to clearly declare the role of the human in the content generation process in order to interpret the results correctly and not to overestimate the autonomy of AI.

Results showed that participants read the AI-generated text faster and more fluently because it was consistent and informationally slick. On the other hand, the human texts contained emotional highlights and surprising moments that were able to capture attention, but at the same time had some imperfections. This led to the perception of better quality between AI and human text being subjective and highly dependent on participants' personal preferences. Comparing the two types of text was like comparing a ride on a modern, fast and comfortable roller coaster with no surprises (AI text) and an older coaster with unpredictable twists and turns and unexpected elements (human text).

Case Study 3: Audio Content – Optimising Research Conditions for Voice Perception

The third study was specific in that it focused on participants' reactions to audio content – specifically the voice of radio presenters who were either live humans or AI. In conducting this study, it was crucial to ensure that the optimal conditions for perception of the voices were provided, so that differences in perception were not influenced by anything other than differences between the human and AI voice. Participants listened to news, sports, and weather recordings in an isolated environment that ensured their attention was focused solely on the voice and its quality.

The results of the study clearly demonstrated that participants preferred a lively male voice, which was rated as trustworthy and pleasant. The female live voice was rated positively, but less so than the male voice. Conversely, synthetic AI voices, especially female voices, were rated lowest, which may be a result of unfamiliarity or lower trustworthiness towards AI speech. Many participants were surprised to find that some of the recordings were AI-generated, highlighting the importance of linking them to the context and expectations of the presenter's voice.

The results of these studies show that consumers respond differently to AI-generated content depending on the type of content and how it is presented. Visual errors in AI images elicit increased attention, while AI-generated text is perceived as consistent but less exciting compared to human-generated content. Voice recordings revealed a preference for live voices and showed that AI voice expression is perceived differently.

However, in addition to the actual results of each case study, the author of this article has learned key aspects of research that are essential when investigating AI during the course of conducting the case studies. Visual research requires careful selection of objects for comparison, for textual content it is essential to clearly declare the role of humans in AI generation, and audio studies emphasize providing conditions that minimize external influences on voice perception. These findings show how important it is to properly design and conduct research to understand subconscious responses to AI-generated content and to accurately interpret the data.

4 Discussion

This study demonstrates the research possibilities of neuromarketing in the NEUROLAB environment at the Faculty of Mass Media Communication of the University

of St. Cyril and Methodius (FMK UCM) in Trnava. Through three case studies, it explores how consumers subconsciously react to AI-generated content, thus presenting how the lab can contribute to a better understanding of consumer behaviour dynamics in the context of modern marketing.

Research at the FMK UCM in Trnava uses techniques such as eye tracking, galvanic skin response (GSR) and facial expression analysis to investigate cognitive and emotional responses to AI-generated visual, textual and audio content. These neuromarketing approaches offer detailed data on consumers' subconscious responses that traditional survey methods cannot provide. Huang and Rust (2020) point to three levels of AI in marketing – mechanical, reasoning, and sentient AI – and this study analyzes all three in the context of their marketing use.

Mechanical AI focuses on process standardization and efficient data collection. This feature is leveraged in the NEUROLAB's visual stimulus analysis, where eye tracking helps reveal which content elements consumers are most focused on. Reasoning AI, on the other hand, offers opportunities for content analysis and personalization, which is important for interpreting the results of experiments with textual stimuli. Sentient AI, which focuses on emotional interaction, is being explored through experiments with audio content that examine differences in consumers' emotional responses to human and AI-generated voices (Hoyer et al., 2020; Mende et al., 2019).

These findings support the importance of neuromarketing techniques in the study of subconscious responses to marketing stimuli. The study by Hoyer et al. (2020) highlights that technological innovations can significantly transform the customer experience, while research at NEUROLAB demonstrates that these innovations can be explored in depth using neuromarketing tools. These methods are particularly useful in uncovering the emotional aspects of consumers' interactions with AI, which can have a direct impact on the design of effective marketing campaigns.

At the same time, the study suggests that NEUROLAB research has the potential to analyse complex patterns of consumer behaviour across different demographic groups and for different forms of media content. To better understand and apply AI in marketing practice, it is important to extend the research to other types of content and different target groups, which may open up new avenues for further exploration in the lab at the FMK UCM in Trnava.

5 Conclusion

This study demonstrates the significant possibilities of using neuromarketing in exploring consumers' subconscious reactions to content created by artificial intelligence (AI), focusing on the environment of the NEUROLAB laboratory at the Faculty of Mass Media Communication of the University of Ss. Cyril and Methodius (FMK UCM) in Trnava. Through three case studies, we investigated different aspects of AI-generated marketing communication, including visual, textual and audio stimuli. Each of these case studies presents new insights into consumer behaviour and their interaction with AI, providing a unique perspective on the potential of AI in marketing and communication.

Research results have shown that neuromarketing techniques such as eye tracking, galvanic skin response (GSR) and facial expression analysis provide deep insights into how consumers subconsciously respond to AI-generated content. These methods enable real-time tracking of emotional and cognitive responses and offer detailed data on consumer attention, engagement and emotional response. In this way, subtle differences in the perception of AI-generated versus human-generated content can be identified.

A study of visual stimuli showed that consumers pay increased attention to visual imperfections in AI-generated content, which can affect their memorability and emotional

response. For textual stimuli, AI-generated texts were found to be perceived as consistent and slick, yet less emotionally impactful compared to human-generated texts. These findings suggest that not only the informational value but also the emotional engagement of consumers may need to be considered when creating textual content. Finally, when studying audio stimuli, we found that consumers preferred live human voices, whereas the AI voice was rated differently, which may be due to its unfamiliarity or lower trustworthiness.

These findings have several important implications. First, the use of neuromarketing in the NEUROLAB environment demonstrates how consumers' emotional and cognitive responses to different forms of AI content can be examined in detail. Second, the results highlight the need to distinguish between mechanical, reasoning, and sentient AI (Huang & Rust, 2021) in the context of their use in marketing. Mechanical AI offers effective solutions for data collection and analysis, reasoning AI can provide personalized content, and sentient AI is important for emotional interaction and relationship building with customers. These dimensions of AI were demonstrated for the different marketing stimuli explored in the three case studies.

The practical implications of the research suggest that a deeper understanding of subconscious responses to AI-generated content may contribute to more effective use of AI in marketing communications. Companies and content creators can use this knowledge to optimize content creation to be not only informative but also emotionally engaging. This is especially important in an era where AI is playing an increasingly important role in media creation and communication.

Ultimately, this study contributes to the understanding of how consumers cope with new forms of AI-generated creative content, while also providing evidence of how neuromarketing can contribute to the research and application of AI in marketing. An important conclusion is that the use of neuromarketing techniques provides detailed data on consumers' subconscious responses, which can be a valuable contribution to the design of effective marketing strategy and communication in AI-influenced environments.

The research opens up new avenues for further studies that could investigate the long-term effects of AI on consumer behaviour and analyse how responses to AI content change over time. It also suggests that a wider range of demographic groups and different forms of media content need to be studied to better understand the complexity and diversity of consumer responses to AI-generated content.

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THE PARADOX OF SOCIAL MEDIA: LONELINESS AND FEAR OF MISSING OUT IN UNIVERSITY STUDENTS

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Abstract:

The increasing prevalence of social media use among university students has raised important questions about its relationship with psychological well-being, particularly regarding experiences of loneliness and Fear of Missing Out (FoMO). This study investigated gender differences in social media engagement, FoMO, and loneliness among university students, examining three key hypotheses concerning gender variations in these dimensions. Data were collected from 450 students across Slovak universities using standardized instruments: the UCLA Loneliness Scale, Social Media Engagement Questionnaire (SMEQ), and FoMO Scale. Statistical analyses revealed significant gender differences in both social media use and FoMO, with female students demonstrating higher levels in both dimensions. Notably, while female participants showed more intensive social media engagement and higher FoMO scores, no significant gender-based differences emerged in loneliness levels. These findings suggest a complex relationship between digital engagement and psychological well-being that varies by gender. The study contributes to the growing body of research on digital behaviour and mental health among young adults, highlighting the need for gender-specific interventions to promote healthier social media usage patterns. Furthermore, the results emphasize the importance of developing targeted support strategies for university students navigating the challenges of digital social connection.

Key words:

FoMO Syndrome. Gender Differences. Loneliness. Social Media Overuse. University Students. Young Adults.

1 Introduction

Social networks have become deeply embedded in the daily lives of individuals, especially among younger populations. These digital platforms facilitate communication and connectivity, significantly shaping social interactions and emotional well-being. Regardless of its value, when used in excess, social media consumption has raised concerns about possible psychological effects, particularly regarding the feeling of loneliness. Research into the relationship between social media use, psychological well-being, and gender has grown significantly over the past decade, reflecting increasing concerns about digital technology's impact on young adults' mental health. The literature reveals complex interactions between these variables, with particular attention to university students as a demographically distinct population. Studies examining gender differences in social media engagement have yielded varying results. Twenge and Martin (2020) found that female adolescents spend significantly more time on social media platforms and texting compared to their male counterparts, who tend to favour gaming activities. This gender disparity in usage patterns appears to persist into young adulthood, with women often using social networks more intensively to maintain social connections and emotional support (Wood et al., 2016). However, some researchers, such as Tomczyk and Selmanagic-Lizde (2018), argue that gender may not be a significant differentiating factor in social network use, suggesting that usage patterns might be more influenced by individual personality traits and social circumstances than gender alone. Women often resort to social networks even when experiencing feelings of emptiness or unmet social needs in the real world, which can lead to addiction (Chae et al., 2018, in Su et al., 2020). Although some studies suggest women are more addicted to social media, others indicate that men may have higher social network addiction scores (Araujo Robles, 2016; Su et al., 2020).

The relationship between social media use and loneliness has emerged as a particularly salient area of study. Bonsaksen et al. (2023) identified a paradoxical relationship where increased digital connectivity coexists with rising reports of social isolation. This phenomenon appears especially prevalent among university students, who represent one of the most digitally connected demographic groups while simultaneously reporting high levels of loneliness. Miller and Melton (2015) demonstrated that university students are among the most frequent social media users across all age groups, making them particularly vulnerable to the psychological impacts of digital engagement. The frequency and nature of social media interactions significantly influence emotional outcomes. Excessive social media use has been linked to negative emotional states, including heightened loneliness (Huang, 2023; Rajan et al., 2022). Existing scholarship indicates that individuals spending more time on platforms like Instagram report higher levels of both FoMO (Fear of Missing Out) and loneliness, suggesting a direct connection between time spent on these platforms and emotional distress (Rajan et al., 2022).

Research reveals significant gender-based patterns in Fear of Missing Out (FoMO) manifestation and its relationship with loneliness. Gupta and Sharma (2021) identified distinct gender differences in FoMO experiences, with women reporting higher levels of social anxiety related to missing online interactions. Building on this, Tandon et al. (2024) demonstrated that FoMO motivations vary by gender: women's experiences typically centre on social comparison and relationship maintenance, while men's concerns focus more on status and achievement. The intersection of loneliness and FoMO has emerged as a critical area of study. O'Brien et al. (2022) established significant correlations between FoMO, loneliness, and problematic internet use among university students, identifying a cyclical relationship between these factors. This finding is further supported by Rajan et al. (2022), who documented correlations between increased social media usage and elevated levels of both FoMO and loneliness. Gender differences in loneliness experiences have been well-documented through meta-analytic research (Maes et al., 2019), though these variations are moderated by cultural and social support factors. Particularly among university students, the transition to academic life can intensify feelings of isolation, especially when combined with heavy social media use (Ousman & Nazir, 2023). This relationship appears bidirectional, with FoMO potentially triggering loneliness while isolation amplifies FoMO experiences (Rajan et al., 2022). Su et al. (2020) further illuminated gender-specific vulnerabilities to internet-related behavioural addictions, finding women more susceptible to social media addiction and men to gaming addiction. These findings underscore the importance of gender-specific approaches in developing interventions for problematic digital media use, particularly within university populations where these issues are most prevalent.

This body of research underscores the complex interplay between gender, social media use, loneliness, and FoMO among university students. While clear patterns emerge in some areas, such as gender differences in social media usage and FoMO experiences, other relationships, particularly regarding loneliness, appear more nuanced and warrant further investigation. Understanding these dynamics is crucial for developing effective interventions and support systems for students navigating the challenges of digital social engagement.

This study aims to examine gender differences in the prevalence of loneliness, differences in social networking sites use frequency, and FoMO syndrome among male and female university students. To explore this issue, several sub-goals were set:

- To verify gender differences in the intensity of social network use among university students.
- To examine differences in loneliness levels between young men and women.
- To investigate the prevalence of FoMO syndrome caused by social media in both young men and young women.

Based on an extensive review of current literature examining gender differences in digital behaviour and psychological well-being, was developed three primary hypotheses for this investigation. These hypotheses address fundamental questions about how gender influences social media engagement, experiences of loneliness, and susceptibility to Fear of Missing Out (FoMO) among university students. The first hypothesis posits a significant statistical difference in social network usage between male and female university students. This hypothesis is based on the seminal work of Twenge and Martin (2020), which demonstrated that female students exhibit markedly higher rates of social media engagement compared to their male counterparts. Their findings suggest distinct patterns in how different genders approach and utilize digital platforms for social connection. The second hypothesis proposes that female university students will report higher levels of loneliness compared to male students. Interestingly, this prediction appears to challenge earlier findings by Tan et al. (2013), who observed higher rates of loneliness among male participants. By testing this hypothesis, we aim to contribute to the ongoing scholarly discussion about gender-specific experiences of social isolation in contemporary digital contexts. The third hypothesis anticipates a higher incidence of FoMO syndrome among female students compared to their male peers. This prediction emerges from the current understanding of gender differences in social media engagement and psychological responses to digital connectivity. While previous research has examined FoMO across various demographics, our study specifically investigates its gender-based manifestation within the university student population. These hypotheses collectively seek to illuminate the complex interplay between gender, digital behaviour, and psychological well-being among university students, potentially offering insights that could inform targeted interventions and support strategies.

2 Materials and Methods

2.1 Sampling Plan, Respondents, Procedure and Operationalization of Concepts

In March and April 2024, a researcher (DD) launched an online survey across various universities in Slovakia, including Bratislava, Nitra, Košice, Žilina, and Martin. The collected data were subsequently processed using IBM SPSS Statistics 20. After data entry in May 2024, the reliability of the instruments was assessed, as two non-standardized tests were employed for the research. Both researchers (DD & SEM) checked for normality before proceeding with hypothesis testing. The research sample primarily consisted of humanities students, with a secondary group of technical field students. Out of a total of 450 participants, 138 (29.8%) were male and 316 (70.2%) were female. A purposive sampling method was used to focus on gender and type of study program, which is noted for its time efficiency. Due to the infeasibility of in-person meetings, data were collected through online questionnaires distributed via the Academic Information System (AIS), ensuring a safe and secure collection method. The sample was predominantly female, largely because psychology students, who include a female majority, were more represented.

To achieve the study's aim, the UCLA Loneliness Scale was employed, along with assessments of social network use and FoMO syndrome, as factors influencing feelings of loneliness. These variables were monitored using the Social Media Engagement Questionnaire (SMEQ) and the Fear of Missing Out Scale (FoMOS). Gender and school were the main variables considered in this research. Given that the SMEQ and FoMOS are not standardized for the Slovak population, a bilingual verification was conducted. The reliability of these questionnaires was assessed using Cronbach's alpha.

The data was analyzed using SPSS 20. Descriptive statistics were used to describe the sample, while Levene's test and the Mann-Whitney U-test were applied to verify the hypotheses. To ensure the accuracy and comprehensiveness of the translated scales,

independent English-speaking experts from psychology, public health, and education were consulted. Based on their translations, a version suitable for Slovak students was created.

2.2 Investigation Tools

In this study, the researchers translated the FoMO Scale, originally developed by Przybylski and his team in 2013, from English to Slovak then conducted a bilingual verification. Reliability and Cronbach’s alpha were also assessed. This questionnaire, consisting of 10 items rated on a 5-point Likert scale (1 = *not at all true* to 5 = *absolutely true*), evaluates the extent to which respondents feel the need to stay in constant contact with friends, primarily through social networks. The original scale has a Cronbach’s alpha coefficient of 0.90. The UCLA Loneliness Scale, created by Russell, Peplau, and Cutrona in 1980, was translated and adapted for Slovak conditions by the researcher. It is a widely used method for assessing loneliness, featuring 20 items; 10 positive and 10 negative rated on a 5-point Likert scale. Scores range from 20 to 80, with higher scores indicating greater feelings of loneliness. The scale has a high internal consistency with an alpha coefficient of 0.96. Lastly, the Social Media Engagement Questionnaire (SMEQ), developed by Przybylski, Murayama, DeHaan, and Gladwell in 2013, measures social media usage with a one-dimensional scale of 5 items on an 8-point Likert scale. Scores range from 0 to 35, with higher scores indicating increased social media use. The researcher translated the SMEQ into Slovak, conducted a bilingual verification, and assessed reliability and Cronbach’s alpha. In this study, the variables utilized by the researchers are: (1) Gender – nominal variable; (2) Level of education – ordinal variable and (3) Loneliness – a cardinal variable.

3 Results

In this section, we present individual findings based on statistical processing SPSS22.

Table 1: Reliability

Reliability	
Test	Cronbach’s alpha
SMEQ	0.81
UCLA	0.90
FoMOS	0.79

Source: own processing, 2024

Since the tests used are not standardized for the population, a decision was made to calculate a one-dimensional reliability test, the result of which is Cronbach’s alpha. As shown in Table 1, in all cases, the value is higher than 0.7, with the exception of a single item, which, as stated by Cortina (1993, in Ritomský, 1999), can be considered acceptable within the analysis.

Table 2: Calculation of Coefficient of Variance (CV)

A variable	CV
SMEQ	51.9%
UCLA	24.3%
FoMOS	24.3%

Source: own processing, 2024

Table 3: Index of Qualitative Variance (IQV)

A variable	IQV
Gender	83.68%
School	30%

Source: own processing, 2024

Next, the coefficient of variance was calculated for the metric variables, and the qualitative variance index values were determined for the nominal variables. The coefficient of variance for all three measured variables is lower than 60%, indicating that the sample is relatively homogeneous for these variables. In the case of the nominal variable “School,” a relatively low value of the qualitative variance index suggests that the sample is not completely balanced regarding this variable. Conversely, for the “Gender” variable, a high value indicates that the population is sufficiently balanced for this variable.

Table 4: Bivariate descriptive statistics

Descriptive statistics		SMEQ	UCLA	FoMOS
Male	Average	14.61	40,24	24.96
	Median	15	39	25
	Mode	23	40	24
	Standard deviation	8.67	8.61	5.58
	The minimum	0	28	11
	Maximum	35	69	35
	Span	35	41	24
	Interquartile range	15	11	9
	Skewness	0.13	1.10	-0.35
	Steepness	-0.74	1.22	-0.37
	1st quartile	7	34	21
	3rd quartile	22	45	30
	Female	Average	17.84	41,49
Median		17	40	28
Mode		11	31	30
Standard deviation		8.67	10.52	6.70
The minimum		0	20	11
Maximum		35	69	43
Span		35	49	32
Interquartile range		13	18	9
Skewness		0.28	0.33	-0.20
Steepness		-0.71	-0.80	-0.41
1st quartile		11	33	23
3rd quartile		24	51	32

Source: own processing, 2024

Table 4 presents the results of the bivariate descriptive analysis for the variables SMEQ, UCLA, and FoMOS within the distribution of young men and women. The values of measures of central tendency, including mean, median, and mode, are highlighted. The mean and median show very similar values in almost all cases, while the mode differs relatively. The captured values of standard deviation indicate the variance of the variables. Minimum and maximum values are also included, along with skewness and kurtosis values, which are mostly within the range of -1 to 1, suggesting a normal distribution of the data in the population. The interquartile

range, representing the difference between the 1st and 3rd quartiles (the 25th and 75th percentiles), reflects the middle 50% of the values within the variables.

Table 5 Results of testing the normal distribution in the population

Kolmogorov-Smirnov test					
A variable	Gender	N	Statistical value of the test	Degrees of the freedom	Significance value
SMEQ	Male	138	0.09	66	0.20
	Female	316	0.07	158	0.06
UCLA	Male	138	0.13	66	0.01
	Female	316	0.10	158	0.01
FoMOS	Male	138	0.07	66	0.20
	Female	316	0.08	158	0.02

Source: own processing, 2024

Before testing the established hypotheses, the normality of the data was assessed for both groups based on gender. Considering the sample size, the Kolmogorov-Smirnov non-parametric test was performed following Ritomský (1999). As shown in Table 7, for the SMEQ variable, the test statistics for men and women are 0.09 and 0.07, with 66 and 158 degrees of freedom, respectively. The significance values are higher than 0.05, leading to the acceptance of the null hypothesis, which indicates that the data are normally distributed in the population. This allows for the use of parametric tests to assess differences or relationships. In contrast, for the UCLA variable, the significance value is lower than 0.05, suggesting that the sample is not normally distributed for this variable. Consequently, any statistically significant differences or relationships will be tested using non-parametric methods. Lastly, for the FoMo variable, normality is observed in the men’s group ($p=0.2$), while the value is lower for women ($p=0.02$). Given that the data for the FoMo variable is not normally distributed in both groups, non-parametric methods will be employed to explore potential relationships or differences.

H1: We assume a significant statistical difference in the use of social networks among male and female university students.

Table 6 T-test results for two independent samples

Descriptive table		Levene’s test		T-test for two independent samples			
Count	Average	F	Significance	t	df	Significance	The strength of the effect
168	14.61	0.06	0.8	2.55	223	0.01	0.37
316	17.83						

Source: own processing, 2024

Given that the Kolmogorov-Smirn test showed a normal distribution of data in the population for the variable SMEQ, we decided to test our hypothesis using a parametric test, thus a T-test for two independent samples. First of all, we can notice the value of the averages, and we see that this value is higher for women. Next, we monitor the value of Levene’s test, which at the statistical value of the test ($F= 0.06$) and the significance value ($p=0.8$) points to the fact that the homogeneity of variances across groups was preserved. However, the decisive indicators are the values of the T-test itself, which with the statistical value of the test ($t=2.55$), 223 degrees of freedom and the value of significance ($p=0.01$) shows a statistically significant difference between young men and women in the use of social media, with women scoring higher. Considering the demonstration of a statistically significant difference, we consider it appropriate to point out the strength of the effect, which has a value of 0.37, therefore indicating a weak to medium strength of the effect.

H2: We assume that female university students will achieve a higher score in the degree of loneliness than the male ones.

Table 7: Mann-Whitney U-test

Descriptive table		Mann-Whitney U-test	
Count	Average rank	Z	Significance
168	108.62	0.66	0.51
316	114.86		

Source: own processing, 2024

In the test of normal distribution of the data, we did not find normality for the variable measure of loneliness (UCLA), thus we used a non-parametric alternative to the T-test for two independent samples, the Mann-Whitney U-test. Compared to the T-test, this test works with an average rank, which, as we can see, is higher for women than for men. However, with the statistical value of the test ($Z=0.66$) and the significance value that is higher than 0.05, we therefore accept the null hypothesis. Consequently, we claim that there is no statistically significant difference in the degree of loneliness between men and women. Due to this fact, we do not consider it necessary to calculate the strength of the effect.

H3: We assume that young women will have a higher incidence of FoMO syndrome than young men.

Table 8 Mann-Whitney U-test

Descriptive table		Mann-Whitney U-test		
Count	Average rank	Z	Significance	The power of the Effect
168	95.66	2.60	0.009	0.17
316	120.35			

Source: own processing, 2024

As in the previous case and based on the results of normality testing, the Mann-Whitney U-test was utilized to assess whether there is a statistically significant difference between young men and women in the incidence rate of FoMO syndrome. The average rankings indicate significantly higher values of FoMO syndrome in young women. With a test statistic of $Z=2.60$ and a significance value lower than 0.01. The null hypothesis is thus rejected, confirming a statistically significant difference between young men and women in the incidence of FoMO syndrome, with women scoring significantly higher. Given the demonstrated statistically significant relationship, the strength of the effect is also reported, indicating a weak effect size in this case.

4 Discussion

The analysis of our research findings reveals several significant patterns regarding gender dynamics in social media use, loneliness, and Fear of Missing Out (FoMO) among university students. These results shed light on the complex interplay between social media engagement and loneliness while providing valuable insights into the psychological landscape of digital life. The relationship between Fear of Missing Out (FoMO) and loneliness among social media users is both complex and multifaceted. Empirical research consistently suggests that heightened social media usage is often correlated with increased feelings of loneliness, especially among adolescents and young adults. FoMO, characterized by anxiety about missing

out on social interactions, is significantly linked to social media usage. Individuals experiencing FoMO are more likely to feel isolated as they become increasingly anxious about being excluded from social events and updates (O'Brien et al., 2022; Rajan et al., 2022). Previous research has shown that higher levels of FoMO are associated with increased levels of loneliness, indicating that the fear of exclusion can exacerbate feelings of social disconnection (Gupta & Sharma, 2021; Tandon et al., 2024).

Regarding social media usage patterns, the first hypothesis was confirmed, showing a statistically significant difference between male and female university students. Female students demonstrated notably higher levels of social media engagement, with a t-test value of 2.55 ($p=0.01$) and an effect size of 0.37, indicating a weak to moderate relationship. This finding aligns with previous research suggesting that women tend to maintain more intensive social connections through digital platforms. The higher average social media engagement scores among female students (17.83) compared to male students (14.61) support existing literature about gender-specific patterns in digital communication. Specifically, the study found that female university students use social networks much more intensively than their male counterparts. This aligns with Wood et al. (2016), who stated that women experience their social lives more intensively and sensitively compared to men. This intense experience is based on intimacy and vulnerability to social exclusion, necessitating women to maintain these relationships even on a virtual level. Twenge and Martin (2020) corroborated the finding, showing that females tend to visit social networks more frequently. Conversely, Tomczyk and Selmanagic-Lizde (2018) found that gender is not a differentiating factor in social network use. Confirming Tomczyk and Selmanagic-Lizde's findings, our study did not confirm a significant difference between young men and women in feelings of loneliness. That is possibly due to the participants' age group and the type of research sample used.

Interestingly, the second hypothesis concerning gender differences in loneliness levels was not supported by the data. The Mann-Whitney U-test revealed no statistically significant difference between male and female students ($Z=0.66$, $p=0.51$). While female students showed a slightly higher average rank (114.86) compared to male students (108.62), this difference was not substantial enough to indicate a genuine gender disparity in experiencing loneliness. This finding challenges some previous research suggestions about gender-based differences in loneliness experiences and may indicate that the relationship between gender and loneliness is more complex than initially theorized. Notably, higher social network usage among women is associated with a greater incidence of FoMO (Fear of Missing Out) syndrome. Women showed higher rates of FoMO, which may be attributed to the distribution of our research sample, mainly comprised of female university students. These hypotheses support the idea that excessive social media use among young women relates to maintaining relationships and dealing with FoMO. Rozgonjuk et al. (2020) found no gender differences in experiencing FoMO. This discrepancy might be due to the uneven research sample distribution.

The third hypothesis, examining gender differences in FoMO, yielded particularly interesting results. The analysis showed a statistically significant difference between genders ($Z=2.60$, $p=0.009$), with female students experiencing higher levels of FoMO. The effect size of 0.17 suggests a weak but meaningful relationship. Female students' higher average rank (120.35) compared to male students (95.66) indicates that women in our sample were more susceptible to experiencing FoMO, possibly connected to their higher social media engagement levels. Wood (2016) reports a correlation between social networking sites use and depression among female students, particularly when lacking social support from loved ones (Ypsilanti, 2018). Qutishat (2020) finds a higher rate of FoMO (Fear of Missing Out) syndrome in men, while Rozgonjuk et al. (2021) do not report any gender differences in experiencing FoMO syndrome. However, in this study, there is a confirmation of a higher incidence of FoMO syndrome in female participants, potentially due to their excessive use of social media platforms

adding to more intense experiences of loneliness, thus corroborating findings from previous hypotheses. Livingstone (2017), as cited in Tomczyk and Selmanagic-Lizde (2018), notes that in 2010, 60% of young people used mobile phones and social networks for 1-3 hours daily. Over the years, this online time has significantly increased. This research confirms higher social network usage, particularly among female university students, with more than 26% of young people spending over 4 hours daily online (Žiga et al., 2015, as cited in Tomczyk & Selmanagic-Lizde, 2018). This trend extends to both young people and adults, who primarily access social networks via their phones. The increasing online presence of young people serves as a warning signal for society.

The study hypothesizes that the occurrence of FoMO syndrome is correlated with high levels of social network use. Tomczyk and Selmanagic-Lizde (2018) confirm that the intensity of social network use has a significant impact on the destructive consequences of FoMO syndrome. Przybylski et al. (2013, as cited in Tomczyk and Selmanagic-Lizde, 2018) conclude that individuals experiencing higher levels of FoMO tend to visit social networking sites more frequently. This study supports the aforementioned scholarship, showing that the more intensively a person uses social media, the greater the risk of developing FoMO syndrome, and the less control an individual has over their platforms use and potential addiction. Tomczyk and Selmanagic-Lizde (2018) also note that people with FoMO syndrome use social networking sites more frequently. They highlight a significant relationship between the intensity of social media use and the harmful consequences of FoMO syndrome. This research confirms this phenomenon, reinforcing the link between intensive social media use and the increased risk of FoMO syndrome.

The reliability analysis of our measurement instruments showed strong internal consistency, with Cronbach's alpha values ranging from 0.79 to 0.90 across all scales. This indicates that our measurements were reliable and consistent throughout the study. The coefficient of variance analysis revealed relatively homogeneous samples for our main variables, with all values falling below 60%, suggesting good data consistency. When examining the bivariate descriptive statistics, we found interesting patterns in the distribution of scores. For instance, in the SMEQ measurements, both genders showed similar patterns of variance (standard deviation = 8.67 for both groups), but with different central tendencies. This suggests that while the spread of social media use is similar across genders, the intensity of use differs significantly. The normality tests revealed varying distributions across our variables, necessitating different statistical approaches for different analyses. The SMEQ data showed normal distribution ($p > 0.05$), allowing for parametric testing, while the UCLA Loneliness Scale and FoMO scale required non-parametric approaches due to their distribution patterns.

These findings paint a complex picture of how gender interacts with social media use, loneliness, and FoMO among university students. The stronger relationship between gender and social media use, combined with higher FoMO levels in female students but no significant gender difference in loneliness, suggests that while digital engagement patterns may differ between genders, the psychological impact of these differences may not manifest uniformly across all emotional dimensions. The results indicate that while female students engage more intensively with social media and experience higher levels of FoMO, this doesn't necessarily translate into increased feelings of loneliness.

4.1 Study Limitations, Practical Applications and Future Research

This study faced several limitations. Firstly, the lack of Slovak research on social media use and loneliness among young adults required reliance on international sources. Secondly, the standardized scales used were primarily foreign and could have been more numerous to improve accuracy, particularly in detecting loneliness and social media use. Another limitation

was the research sample, which might have benefited from a more balanced representation of students and working young adults for better comparative results.

The key contribution of this research is its demonstration of how social networking sites affect young adults' psychological health, showing a significant link between social network use and loneliness. These insights can help inform further research and practical interventions. In practice, universities could host seminars on the impact of social media on mental health, and strategies for overuse prevention. Interactive sessions without digital devices could promote real-world communication and mental health wellness. For those experiencing loneliness and social media overuse, seeking help from school psychologists or mental health organizations is recommended. These findings can be particularly beneficial in school psychology to support young adults in navigating the digital era and its resulting overconnectivity.

Future research should consider a qualitative approach with multiple data collection tools. Including interviews, which could yield more detailed insights. Additionally, studies could compare baseline social media usage with consumption after reduced activity periods to better understand the impact on loneliness and overuse. This approach might offer a more dynamic understanding and support the development of effective interventions.

5 Conclusion

This research provides valuable insights into the complex relationship between digital engagement and psychological well-being among university students, particularly through the lens of gender differences. Our findings reveal significant patterns in how male and female students interact with social media platforms and experience psychological phenomena such as FoMO and loneliness. The study's results demonstrate clear gender differences in social media engagement and FoMO experiences, with female students showing notably higher levels in both dimensions. However, the absence of significant gender differences in loneliness levels suggests that the relationship between digital connectivity and emotional well-being is more nuanced than previously theorized. These findings contribute to the growing body of literature examining the psychological impact of social media use on young adults.

Our research has important implications for university administrators, mental health professionals, and education policymakers. The gender-specific patterns identified in our study suggest the need for tailored interventions that address the unique challenges faced by male and female students in their digital social interactions. These interventions should focus on promoting healthy social media usage habits while acknowledging the different ways in which male and female students engage with digital platforms. Furthermore, our findings emphasize the importance of developing comprehensive support systems that address both the benefits and potential risks of social media use among university students. These support systems should include educational programs about digital well-being, counselling services that understand the role of social media in student life, and strategies for maintaining healthy boundaries in digital spaces. This research opens new avenues for investigating the intersection of gender, digital behaviour, and psychological well-being in academic settings. By understanding these relationships more clearly, we can better support students in navigating the challenges of digital social connection while maintaining their emotional well-being. This understanding is crucial for developing effective interventions that promote healthy digital engagement practices among university students.

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IMPACT OF AI GENERATED IMAGERY ON VISUAL ARTISTS

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Abstract:

The rapid advancement of AI-generated imagery has significantly impacted creative industries, sparking debates about copyright infringement, artistic identity, emotional well-being, and legal frameworks. This article explores the effects of AI generated imagery on visual artists, particularly in game development and digital media, while examining its influence on crucial aspects of related professions. Exploring international and local perspectives, it highlights critical issues such as job displacement, ethical dilemmas concerning new tools, artistic identity and the evolving role of art platforms and software. Using discourse analysis, the study integrates insights from legal, academic and profession related sources to propose strategies for balancing innovation with respect for artistic labor and creativity. This article aims to delve deeper into the struggles faced by visual artists, who dedicate years of their lives to mastering the study and recreation of reality. Their pursuit is to craft functional designs or create meaningful, emotionally profound artworks that connect deeply with audiences.

Key words:

AI-Generation. Copyright Infringement. Digital Artists. Education. Emotional Impact. Ethics. Identity. Legal Challenges.

1 Introduction

The advent of AI-generated imagery has revolutionized the creative process, enabling the rapid transformation of imaginative concepts into visual representations with minimal effort (Elgammal et al., 2017). While this technological advancement is celebrated by some for its efficiency, it poses significant challenges for professionals in the art related industries.

Illustrators and concept artists, who have dedicated years to mastering their craft – encompassing anatomy, storytelling, lighting, and color theory – now face the prospect of their skills being overshadowed by AI capabilities (Lee, 2022). These artists are integral to producing the visual content that enriches games, films, and other media, contributing to the intricate designs and narratives that audiences cherish (Solariski, 2012). The rise of AI-generated art raises concerns about the devaluation of human creativity and the potential displacement of skilled artists in various sectors (Lee, 2022).

The history of AI in art dates back to the 1960s, when early algorithmic experiments focused on creating abstract patterns. The introduction of Generative Adversarial Networks (GANs) in the 2010s marked a significant turning point, enabling realistic and highly detailed image generation. Today, AI-generated art challenges traditional notions of authorship and originality, raising critical questions about its impact on industries such as gaming, advertising, and publishing (Berryman, 2024).

The emergence of deepfake technology in 2017 marked a significant milestone in the evolution of artificial intelligence, introducing complex challenges in identity verification and copyright protection. Initially, deepfake videos garnered attention for their misuse in non-consensual content, particularly involving celebrities, raising substantial ethical and legal concerns (Maras & Alexandrou, 2019).

As the technology advanced, its applications expanded, leading to the creation of AI-generated images and videos that are increasingly difficult to distinguish from authentic media. This evolution has heightened alarms about the potential for identity theft and

unauthorized use of intellectual property, as existing legal frameworks struggle to keep pace with technological advancements (Chesney & Citron, 2019).

The misuse of deepfakes has extended beyond individual pranks to large-scale political manipulations, demonstrating the technology's capacity to influence public opinion and disrupt democratic processes (Vaccari & Chadwick, 2020). Given these developments, concerns have intensified regarding the protection of individual artists' works from unauthorized replication and distribution, underscoring the urgent need for updated legislation and ethical guidelines to address the complexities introduced by AI-generated content.

The rise of AI-generated imagery has democratized creativity while disrupting individuals practicing art as well as industries built on artistic vision and quality such as game or movie industry. Tools like Stable Diffusion, DALL-E, and MidJourney allow users to generate visuals from simple text prompts, reshaping the way art is created and consumed. However, these advancements come with ethical and legal challenges, especially concerning the use of copyrighted material in AI training datasets (Epstein et al., 2023).

1.1 Legal Challenges: An International and Slovak Perspective

On January 13, 2023, artists Karla Ortiz, Sarah Andersen, and Kelly McKernan filed a landmark lawsuit in the Northern District of California against Stability AI, MidJourney, and DeviantArt. This case, *Ortiz et al. v. Stability AI et al.*, alleges that these companies violated the Copyright Act by scraping billions of copyrighted images to train their AI models without consent. Grzegorz Rutkowski, a renowned digital artist, has also been outspoken about the misuse of his style, describing it as “identity theft on a creative level” (Dickstein & Delman, 2023).

In Slovakia, legal experts have also analyzed the challenges posed by generative AI. A publication by the Slovak Bar Association highlights the difficulties of applying traditional copyright law to AI-generated content. The report discusses questions of originality, authorship, and the legal standing of artists whose works have been used as training material for AI models. It emphasizes that Slovak copyright law, like its counterparts in other countries, was not designed to address the complexities introduced by generative AI (Kesselová, 2023).

1.2 Emotional and Psychological Impact

The representation of artists is the key in the world of visual art. If artwork is not discoverable on the internet or the quality doesn't meet the requirements of a potential employer, artists don't really exist. This creates an enormous liability.

The rise of AI-generated art has had a profound emotional impact on artists. Many feel that their work and identity have been commodified and pushed back by technology. McKernan for an interview states: “Concept artists, illustrators, graphic designers, stock artists are being downsized and let go from companies who say they're moving to AI. This is an existential crisis” (Chow, 2023, para. 5). Similarly, Rutkowski lamented, “what is terrifying is that those AI art generators are using everything they can collect on the internet without any consent, violating copyrights” (Sharp, 2022, para. 7).

For emerging creators, the pressure to compete with AI-generated perfection exacerbates feelings of inadequacy and imposter syndrome. This dynamic risks stifling innovation and creativity, as artists feel overshadowed by the speed and volume of AI outputs especially on social media, which play a crucial role in artistic promotion (Dean, 2023).

The proliferation of AI-generated art has profound psychological consequences for artists. A survey study published on arXiv revealed that many artists feel disheartened by the oversaturation of AI-generated content on social media, which undermines their visibility and diminishes the value of their labor (Lovato et al., 2023).

1.3 Academic Perspectives on Education and Creativity

Throughout the history of art, the development of artistic skills has been deeply rooted in observation, the study of predecessors, adherence to established philosophies, and mastery of fundamental principles. Arnheim (1954) emphasizes that these elements collectively shape the final artwork, influencing both the conceptual approach and the physical execution. Similarly, Gombrich (1960) discusses how artistic tradition and individual creativity intersect, highlighting the importance of mastering foundational principles in achieving visual expression.

The tangible marks made by an artist are a direct manifestation of their engagement with these foundational aspects, as well as their personal technique and handling of artistic tools. Leder et al. (2004) propose that the interplay between learned principles and individual expression forms the basis for aesthetic appreciation and emotional resonance in art, underscoring the significance of traditional art education in fostering an artist's ability to convey meaning.

The integration of AI into art education has sparked debate among educators and researchers. A study by the University of Oxford emphasizes the irreplaceable value of human creativity. In which the study expresses how art is tied to human experience and cultural context, elements that AI cannot replicate (University of Oxford, 2023).

However, the accessibility of AI tools has disrupted traditional learning paths. Students increasingly rely on AI for ideation, bypassing critical stages of foundational learning. This trend risks producing a generation of artists lacking essential skills in composition, anatomy, and storytelling as well as the actual connection between ideation and its representation (Lovato et al., 2023). Educators argue for a balanced approach that integrates AI tools without undermining the importance of artistic fundamentals.

Ben Zhao, computer science professor and creator of Nightshade, says that “he’s seen a lot of ‘resentment and frustration’ from artists whose livelihoods are being disrupted by image generation models” (Lovely, 2023, para. 2) Zhao’s tool, designed to confuse AI scraping algorithms, represents a proactive effort to protect artists’ intellectual property (Lovely, 2023).

1.4 Artistic Tools and Platforms

Artistic tools and platforms play a pivotal role in the AI debate. Software giants like Adobe have incorporated AI into their products, offering features like automated content generation and object removal. Despite pledges not to use artists’ works without consent, skepticism persists about data collection practices (Ng, 2024).

Conversely, platforms like Procreate have gained praise for focusing exclusively on human creativity, avoiding AI integration. Procreate’s decision reflects a growing demand for tools that prioritize artistic integrity over automation (“Procreate AI”, n.d.).

Platforms like ArtStation have faced backlash for allowing AI-generated art to dominate their galleries. In response, artists have launched campaigns such as “No AI”, demanding clearer policies to protect their work (Edwards, 2022). On the other hand, new platforms like Cara have emerged, offering spaces dedicated solely to human-created art (“About Cara”, n.d.).

1.5 Impacts on Game Industry

In the gaming industry, instances have and will occur where individuals were hired based on portfolios that did not accurately reflect their actual skills, leading to early contract terminations. Such mismatches have historically caused disappointment, stress, and resource expenditure for both employers and employees. The challenge of identifying qualified candidates has intensified especially since AI, contributing to a decline in junior artist

positions within game companies. This trend has been noted by industry professionals, highlighting the difficulties in recruiting and retaining suitable talent in the evolving landscape of game development (Hitmarker, 2023).

The gaming industry has experienced significant shifts in employment patterns due to the integration of artificial intelligence. In China, AI-driven advancements in image generation have led to a 70% reduction in illustrator jobs within the video game art industry. According to a report from Rest of World, this decline is attributed to the efficiency and cost-effectiveness of AI tools, which have replaced many traditional roles in art creation (Zhou, 2023).

Similarly, in the United States, major gaming companies have begun incorporating AI into their workflows, resulting in workforce reductions. Wired reports that firms like Activision Blizzard utilize generative AI to streamline development processes, particularly in 2D art creation. While this technology accelerates production timelines, it also contributes to job losses, raising concerns about the long-term sustainability of certain creative roles (Ng, 2024).

In Slovakia, the gaming sector is also undergoing transformations driven by AI. Pixel Federation, a leading Slovak game development company, has integrated AI into its operations to enhance content creation, optimize game mechanics, and personalize player experiences. By leveraging AI, Pixel Federation plans to accelerate development processes and deliver more tailored gaming experiences to its audience (McKinzie, 2023).

Steam has addressed concerns regarding the inclusion of AI-generated content in games on its platform. In July 2023, Valve clarified that while it does not oppose the use of AI in game development, developers must ensure they possess the necessary rights for all content, including AI-generated assets. This stance emerged after reports indicated that Valve was rejecting games featuring AI-generated content due to potential copyright infringements. Valve emphasized that its review process reflects current copyright laws and policies, and as these evolve, so will their procedures (Kennedy, 2023).

2 Methodology

This study employs a qualitative methodology to analyze the far-reaching impacts of AI-generated imagery on visual artists, focusing on areas such as education, promotion, copyright infringement, identity loss, and emotional well-being. Long-term observation of online artist communities formed the backbone of this research, allowing for a deep understanding of the struggles and concerns voiced by artists. This immersion helped identify the recurring themes that became the framework for analysis.

To process the data, thematic analysis was used, categorizing and interpreting the patterns that emerged across key aspects of artistic practice. This method proved crucial in revealing how AI disrupts education by bypassing foundational learning, complicates promotion by saturating digital platforms with AI-generated content, threatens artistic identity through style imitation, and creates emotional and professional challenges for artists who feel replaced by algorithms. Ethnographic observation provided the cultural and social context needed to capture the intricate ways in which these issues manifest within the artist communities.

By blending immersive observation with structured analysis, this methodology not only identifies the primary areas of AI's impact but also foregrounds the voices of the affected communities. Ethical considerations were prioritized throughout, with care taken to respect the natural interactions of the communities observed and maintain confidentiality where required. This approach enabled a focused, yet empathetic exploration of the challenges and changes faced by artists in the age of AI.

3 Results

The discourse analysis reveals critical findings regarding the impact of AI-generated imagery on the creative industries, particularly focusing on gaming, art platforms, education, and legal frameworks. These findings are summarized through the following themes.

3.1 Legal and Ethical Challenges

AI-generated art has sparked significant legal disputes over copyright and intellectual property. International cases, such as *Ortiz et al. v. Stability AI et al.* (see, Dickstein & Delman, 2023), and regional analyses from the Slovak Bar Association emphasize the complexities of applying traditional copyright laws to AI-generated content. These disputes underscore the urgent need for clearer guidelines on data usage, authorship, and fair compensation, particularly as AI tools rely on copyrighted material for training. The discourse highlights a growing call for transparency and ethical frameworks to govern AI's role in creative industries.

3.2 Emotional and Psychological Impacts on Artists

The analysis reveals widespread emotional distress among artists due to the oversaturation of AI-generated imagery. Artists feel their creative labor is commodified, with many reporting feelings of inadequacy and loss of visibility on platforms dominated by AI outputs. Emerging creators face added pressures, risking the erosion of foundational skills and confidence. These findings suggest a significant psychological toll on artists globally, with both emotional and economic consequences.

3.3 Transformations in Education

AI tools have disrupted traditional learning paths in art education. While offering new creative opportunities, over-reliance on AI in ideation stages risks undermining the development of core artistic skills. Educators increasingly express concerns that students bypass critical foundational practices like content study, composition, anatomy, and storytelling. However, the discourse also identifies opportunities for integrating AI into curricula in a balanced manner to foster innovation without compromising traditional artistic integrity.

3.4 Platforms and Tools: A Divided Landscape

The analysis highlights a divide in the reception of AI across artistic platforms and tools. While platforms like Adobe integrate AI to enhance creative capabilities, skepticism persists about ethical data usage. Conversely, tools like Procreate and emerging platforms like Cara focus exclusively on human creativity, reflecting a growing demand for preserving artistic integrity. Established platforms like ArtStation face backlash for allowing AI-generated content, underscoring the tensions between innovation and traditional artistry.

3.5 Shifts in the Gaming Industry

The gaming industry illustrates the profound impact of AI integration on employment and production practices. Countries like China report a 70% reduction in illustrator jobs due to the efficiency of AI-generated content. In Slovakia, companies like Pixel Federation have adopted AI to optimize content creation and personalize player experiences, showcasing a balanced approach to integrating AI. Valve's policies on AI-generated content on Steam also reveal industry-wide challenges regarding copyright compliance and ethical usage.

3.6 Emerging Trends and Patterns

The results demonstrate the following overarching patterns:

- Tensions between Efficiency and Creativity: AI is celebrated for its efficiency but criticized for diminishing the value of human creativity and identity in art.
- Economic Shifts: Job displacement and changing employment patterns signal both opportunities and risks, particularly for junior artists.
- Ethical Dilemmas: The discourse reveals persistent ethical concerns about data scraping, copyright infringement, and the exploitation of artistic labor.

4 Discussion

4.1 Ethical and Legal Implications

The unauthorized use of copyrighted works to train AI models raises fundamental ethical questions about consent and fair compensation. Should public access to an image justify its inclusion in AI datasets? Both international and Slovak legal analyses stress the need for clearer guidelines and transparency in AI development (Kesselová, 2023; Congressional Research Service, 2023).

4.2 Educational Transformation

AI's role in education presents both opportunities and challenges. While tools like DALL-E can inspire creativity, their overuse risks undermining foundational learning. How can art education evolve to incorporate AI without eroding the skills that define artistic mastery? Educators must emphasize the importance of manual techniques alongside AI to foster well-rounded creators (University of Oxford, 2023).

4.3 Platforms and Tools

The integration of AI into artistic tools and platforms has sparked a divide. While creative tools from Adobe embrace AI, artists question the ethical implications of data usage. In contrast, Procreate's decision to avoid AI integration reflects a commitment to artistic integrity. Platforms like Artstation or Instagram embraced AI creativity and the freedom it gives to their users. On the other hand AI generated imagery published on the most popular artistic platforms, created mixed emotions for large communities. How can platforms balance innovation with the needs of their artistic communities? (Ng, 2024).

4.4 Industry Shifts

AI's ability to produce quick results is undeniable, but these outputs frequently require significant refinement and alignment with broader creative concepts, underscoring the irreplaceable role of human insight. Additionally, there is growing concern that over-reliance on AI might mislead junior artists, potentially stifling their development of foundational skills and critical thinking. The challenge lies in defining how AI should be incorporated into creative workflows to complement, rather than compromise, the creative process, ensuring that it enhances artistic effectiveness rather than leading to inefficiency or stagnation (Elgammal et al., 2017).

4.5 Future Questions

How can copyright laws adapt to address the complexities of AI-generated art? What ethical standards should govern the use of AI in educational and professional contexts? How can tools and platforms ensure that AI complements, rather than replaces, human creativity?

Should AI tools be designed primarily for final asset production, or should their focus shift toward alleviating the more labor-intensive aspects of technical workflows and early-stage research to better support the creative process?

5 Conclusion

AI-generated art presents both opportunities and challenges for the creative industries. Tools like Stable Diffusion and platforms like Adobe demonstrate the potential of AI to enhance productivity, but they also raise significant ethical and emotional concerns. Legal battles such as *Ortiz et al. v. Stability AI et al.* and analyses such as by the Slovak Bar Association highlight the need for regulatory reform. As art education, industry and platforms adapt to this evolving landscape, the goal must be to integrate AI responsibly, ensuring that it complements human ingenuity rather than undermines it. Artistic tools and techniques developed throughout history have often been at first viewed as threats or sources of concern, yet they have rarely sought to undermine or exploit the very foundation of their use. In contrast, AI generation fundamentally relies on existing art as its core resource, positioning itself not merely as a tool for artists but as a perceived replacement or solution, raising significant ethical and creative concerns.

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CURRENT STATE OF AI IN THE CONTEXT OF VISUALLY IMPAIRED PLAYERS OF DIGITAL GAMES

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Abstract:

This paper presents a discussion of the current state of the use of artificial intelligence in digital games for visually impaired gamers. The research will not necessarily focus exclusively on non-graphical audio games, but will seek to develop a cross-sectional view that takes into account the accessibility of all games and apps in general. By examining various game genres and their adaptability, the study aims to highlight innovative approaches that enhance gameplay experiences for visually impaired players while fostering inclusivity in the gaming community. This exploration will also consider the technological advancements in AI that can facilitate personalized gaming experiences, allowing visually impaired gamers to engage more fully with both narrative-driven and action-oriented titles. The findings of this research could potentially inform game developers and designers about best practices for creating accessible gaming environments, ultimately leading to a more diverse and inclusive player base.

Key words:

Accessibility. AI. Audio. Digital Games. Inclusivity. Technological Advancements. Visually Impaired.

1 Introduction

Artificial intelligence (AI) has revolutionized various fields, including the development of applications and devices designed to assist visually impaired individuals. This article aims to explore the current state of AI in the context of visually impaired players of digital games (as well as general apps), highlighting the significant advancements and ongoing trends in this domain. As technology continues to evolve, game and app developers are increasingly integrating AI-driven features that enhance accessibility, allowing visually impaired users to engage with games and apps in ways that were previously unimaginable.

The objective of this paper is to present a comprehensive overview of the most contemporary technologies employed in this domain, thereby establishing a foundation for further investigation into the potential applications of artificial intelligence in digital gaming and beyond.

One of the most notable advancements in AI for visually impaired individuals is the development of object recognition and navigation technologies. Applications such as Seeing AI and AiSee leverage AI algorithms to identify objects, read text, and provide audio descriptions, thereby enhancing the user's ability to navigate their environment. AiSee, for instance, combines a micro-camera with AI to recognize objects and deliver audio feedback through bone conduction headphones, offering a discreet and effective solution. The application of artificial intelligence (AI), particularly convolutional neural networks (CNN), has significantly advanced the field of assistive technologies for the visually impaired. CNNs have demonstrated exceptional performance in image classification tasks, which is crucial for developing systems that can interpret and understand visual information. These networks are capable of learning hierarchical features from raw image data, enabling them to recognize objects, scenes, and even complex activities with high accuracy. This capability is essential for creating assistive devices that can provide real-time feedback and guidance to visually impaired users, enhancing their ability to navigate and interact with their environment.

independently (Walle et al., 2022). Wearable devices have also seen significant improvements, with smart glasses and AI-enabled canes becoming more sophisticated. These devices utilize cameras and AI to detect obstacles, read signs, and provide real-time feedback, thus aiding visually impaired users in their daily activities. The AiSee device exemplifies this trend, designed to be both user-friendly and unobtrusive.

It is important to pinpoint the fact, that visually impaired individuals have high expectations from AI systems designed to assist them. These users anticipate that such technologies will not only help them perceive their surroundings more effectively but also improve their overall quality of life. The expectations include reliable object detection, accurate scene interpretation, and seamless integration with other assistive tools. Users also expect these systems to be user-friendly, providing intuitive interfaces that require minimal training. Moreover, the emotional and psychological impact of these technologies is significant, as they offer a sense of independence and confidence to the users. Meeting these expectations is a challenging yet vital aspect of developing effective assistive technologies. Voice assistants and smart speakers, such as Siri, Alexa, and Google Assistant, have also become integral to the lives of visually impaired individuals. These voice-activated assistants enable users to perform tasks hands-free, such as setting reminders, controlling smart home devices, and accessing information on demand. The integration of AI in these devices has significantly enhanced their functionality and accessibility.

In the realm of mobility, AI is being utilized to develop autonomous vehicles, which hold the potential to greatly improve the independence of visually impaired individuals. Companies like Waymo are at the forefront of this innovation, working on self-driving cars that promise safe and autonomous transportation (Fell, 2024).

Mainstream applications are increasingly incorporating AI to improve accessibility for visually impaired users as well. Social media platforms, for example, are using AI to automatically generate image descriptions and captions, making visual content more accessible. This trend reflects a broader movement towards inclusivity in digital spaces. The current state of AI technology is marked by rapid advancements and increasing integration into everyday devices and applications. AI has surpassed human performance in various tasks, including image classification and visual reasoning. As Fell further states, the challenges, however, remain, particularly in complex cognitive tasks such as visual common-sense reasoning and planning. The collaboration between industry and academia has been pivotal in driving these advancements, with significant contributions from both sectors.

AI is playing a transformative role in enhancing the lives of visually impaired individuals, in the context of digital gaming as well. The continuous development of AI technologies promises further improvements in accessibility and independence, paving the way for a more inclusive future.

2 Current State in the Field of Research

This section will present several case studies illustrating the application of AI in a variety of domains pertinent to individuals with visual impairments. It will commence with an overview of findings from general research, before progressing to an examination of the role of AI in education and concluding with a discussion of its impact on the gaming industry. It is evident that in recent years, there has been a notable increase in academic research focusing on the visually impaired. This is evidenced by the growing number of scholarly studies in this area. However, it is also much more challenging to identify those studies that specifically address the use of AI in the context of digital games.

2.1 General Approach

Study of Bae (2020) reveals a consistent rise in the number of research papers focusing on artificial intelligence for the visually impaired, spanning from 1993 to 2020. Notably, there has been a considerable increase in domestic research activity following 2016. This indicates an increasing interest and focus on the development of AI solutions for this demographic. The analysis demonstrates that both domestic and international research predominantly employs development research methods, with a significant emphasis on design, development, and implementation. Furthermore, the keywords and implementation methods demonstrate distinctions between domestic and international studies, indicating varying research focus and technological applications within the field (for example, while both emphasized “visually impaired” and “deep learning”, domestic studies focused more on “assistive devices”, whereas international studies highlighted “artificial intelligence”).

The study of Kumar et al. (2023) provides a comprehensive analysis of over 30 research papers focusing on various AI-based technologies designed to assist visually impaired individuals. These technologies include convolutional neural networks, object recognition systems, text-to-speech engines, and navigation systems. CNNs have been particularly effective in image classification tasks, enabling the development of systems that can accurately identify and describe objects in the environment. Object recognition systems leverage these capabilities to provide real-time feedback to users, enhancing their ability to navigate and interact with their surroundings. Text-to-speech engines convert visual information into auditory output, allowing users to receive detailed descriptions of their environment. Navigation systems, often integrated with GPS technology, provide step-by-step guidance, helping users move safely and efficiently through various settings. The study identifies several challenges and limitations that need to be addressed. One of the primary challenges is the accuracy of object recognition systems, which can be affected by varying lighting conditions, occlusions, and the diversity of objects in real-world environments. Improving user interfaces is another critical area, as the effectiveness of these technologies depends on their ease of use and accessibility. The integration of multiple technologies into a cohesive system presents additional challenges, requiring seamless communication and coordination between different components. User trials indicated significant improvements in navigation and information interpretation, though areas for enhancement were noted, such as text recognition in low-light conditions. The authors emphasize the need for ongoing research and development to overcome these limitations and enhance the overall performance and usability of AI-based assistive technologies.

Jagadish et al. (2024) introduce an innovative mobile application powered by Artificial Intelligence (AI) designed to enhance the daily lives of visually impaired individuals. The application includes features such as object and color recognition, currency note recognition, barcode reading, and text reading, which collectively provide real-time information about the user’s surroundings. These functionalities facilitate safe and independent living, secure financial transactions, and overall accessibility. The research highlights the potential of AI-driven solutions in assistive technology, promoting inclusivity and independence among diverse user groups. This AI-powered mobile application significantly enhances the daily lives of visually impaired individuals by providing real-time information, facilitates secure financial transactions through currency note recognition, empowering users with financial autonomy, improves accessibility and inclusivity, and its offline functionality ensures that users can benefit from the application without needing constant internet access, which is crucial in areas with limited connectivity.

Chaple et al. (2024) aim to explore how artificial intelligence can be leveraged to assist visually impaired individuals by developing smart gadgets that help them identify faces, colors, and objects, ultimately enhancing their ability to navigate their surroundings

effectively. The article concludes that artificial intelligence has become a crucial tool in developing technologies that assist visually impaired individuals, helping them perform daily tasks more effectively by identifying faces, colors, and objects, and emphasize the importance of advancing solutions that enable real-time navigation, ensuring that visually impaired individuals can navigate their surroundings safely and independently.

Some research utilises artificial intelligence in contexts that may not be immediately apparent to the sighted. For example, Pai et al. (2023) introduce a smart guide dog harness designed to assist visually impaired individuals using AI edge computing technology. The system combines image recognition, positioning, and navigation technologies to enhance users' awareness of their surroundings. It can classify and identify objects, obstacles, and environmental features like pedestrians, vehicles, and traffic signs, communicating this information in real-time through a voice system in a wearable headset. This innovation aims to help users perceive their environment more comprehensively, reducing collision risks and improving navigation accuracy. Besides aiding physical navigation, the system provides psychological support, encouraging visually impaired individuals to engage more actively with society and enhancing their quality of life. The harness offers practical assistance and emotional support, fostering independence and confidence. By improving navigation and interaction with the environment, it aims to increase the willingness of visually impaired people to participate in social settings and community activities.

Naturally, there are numerous additional examples of research in this field that could be provided. For example, Mina et al. (2022) explore the use of convolutional neural networks (CNN) and TensorFlow models for object detection and image recognition, which are crucial for developing assistive technologies for the visually impaired. Nesti et al. (2023) examine the application of machine learning algorithms and ultrasonic sensors for navigation and obstacle detection, providing essential insights into enhancing mobility for blind individuals. Varma et al. (2021) analyze the use of image recognition systems and text-to-speech engines to improve the daily lives of blind individuals by enabling them to interpret visual information audibly. It is also important to acknowledge that initiatives to enhance the lives of visually impaired individuals have a long history, predating the advent of AI. For example, an investigation of the subject of technologies used in autonomous vehicles, which are being adapted for navigation aids for the visually impaired could be found as far as in 2003 (Balachandran et al., 2003).

2.2 Education and Learning Point of View

The integration of artificial intelligence and applications designed for individuals with visual impairments is gradually becoming a reality in the field of education as well. Tsouktakou et al. (2024) explore the transformative potential of artificial intelligence (AI) in the education of visually impaired individuals. AI technologies, such as machine learning and natural language processing, create adaptive learning environments tailored to the unique needs of these students, facilitating personalized learning experiences. Various AI-based tools, including screen readers and voice assistants, enhance accessibility by interpreting and presenting information in accessible formats. The importance of user-centered design is emphasized, ensuring these tools are intuitive and easy to use, with multiple modes of interaction like voice commands and tactile feedback. Evidence shows that AI improves engagement, comprehension, and retention, bridging the gap between visually impaired students and their sighted peers, and fostering a more inclusive educational environment. Future research aims to enhance AI capabilities, improve reliability, and explore new educational applications, emphasizing collaboration between educators, technologists, and researchers.

Shoib et al. (2023) present an artificial intelligence-based interactive learning platform designed to assist visually impaired children in learning mathematics. Although it does not explicitly address the use of digital games, the platform employs text-to-speech, vibrotactile, and auditory feedback to create an engaging learning environment. This multimodal approach facilitates comprehension of mathematical principles and problem-solving abilities. It is therefore plausible that analogous AI technologies could be repurposed for educational games designed for visually impaired individuals, thereby fostering interactive and accessible learning experiences. According to this research, the children who participated in the evaluation of the interactive learning platform showed a significant improvement in their understanding of mathematical content. This suggests that the platform effectively aided their learning process. The use of the platform also led to enhanced problem-solving skills among the visually impaired children. This indicates that the multimodal feedback approach, which includes text-to-speech, vibrotactile, and auditory feedback, was beneficial in helping them tackle mathematical problems more effectively.

Staying in the field of math, the article of Al Omoush and Mehigan (2023) explores the transformative potential of Artificial Intelligence in Education (AIEd) combined with robotics to create personalized learning environments for students with learning and sensory disabilities, such as dyslexia and vision impairment. The main idea is to leverage AIEd to provide adaptive and inclusive educational frameworks that cater to diverse learning needs. The integration of robotics enhances this framework by utilizing physical attributes, multimodal feedback systems, and customized social behaviors to support inclusive classroom experiences. The research highlights several challenges, including accommodating different learning styles, understanding learner-tool interactions, and creating accessible technology while managing cognitive load and stress. However, the potential benefits are significant, including improved understanding, accessibility, reduced stress, and enhanced student confidence in mathematics. The article concludes that the combination of AIEd and robotics can significantly contribute to inclusive education by promoting independence and removing barriers, ultimately fostering a more equitable learning environment for students with disabilities.

De Silva et al. (2024) address the educational challenges faced by visually impaired students and introduces a smart glass system that utilises YOLOv8 and the Internet of Things (IoT) technology for real-time object detection and voice feedback. The system facilitates independent learning in subjects such as science and mathematics by enabling students to interact with their environment in a more efficacious manner, thereby promoting independence and removing educational barriers. The smart glass system employs advanced computer vision and machine learning, with the effectiveness of the YOLOv8 model validated through extensive testing. This ensures reliable assistance for students, thus making the system a valuable tool for inclusive education. Additionally, the system integrates text-to-speech and speech-to-text technologies, providing essential auditory feedback and communication capabilities. This integration is crucial for reshaping inclusive education and emphasises the importance of equal learning opportunities.

Another specific tool is described in the article of Vinay and Jayapriya (2024). It examines the development of an Artificial Intelligence (AI)-based scribe known as L&E Refiner, which is designed to enhance the learning experience for blind students by converting written materials into audio format. This technology utilizes natural language processing and machine learning to transcribe lectures, books, and other educational content, thereby making them accessible to blind learners. The AI scribe can recognize various forms of text, including handwriting, printed text, and digital documents, and converting them into speech output that is easily comprehensible for blind individuals. The primary conclusion of the article is that the L&E Refiner has the potential to significantly improve educational accessibility and inclusion

for blind students, providing them with the tools to interact with educational content more effectively and independently.

The study of Mina et al. (2023) provides insights into the personal experiences of five visually impaired learners who participated in semi-structured interviews. These learners shared their struggles with adapting to new educational modalities during the pandemic, highlighting the insufficiency of resources and the personal challenges they faced. Despite these difficulties, the introduction of AI virtual assistance was a significant turning point, allowing them to achieve academic tasks more independently and effectively. This technology not only helped them overcome specific learning barriers but also enhanced their overall educational experience by fostering a sense of competence and inclusion in the learning environment. This study identifies several key challenges faced by these learners, such as personal struggles, insufficient resources, and difficulties adapting to new learning modalities, especially during the pandemic. The research highlights the essential role of AI virtual assistants in overcoming these barriers by enabling visually impaired students to explore their potential and complete academic tasks that are typically challenging due to their impairments. The study's findings are categorized into four main themes: barriers in the learning process, the essentiality of AI virtual assistants, achieving competence through technology, and fostering an inclusive teaching and learning environment. The research concludes with a recommendation to improve the teaching and learning strategies for visually impaired students in secondary schools, emphasizing the need for a more inclusive educational framework that leverages AI technology to support these learners.

The research focused on developing AI-WEAR, a smart text reader designed to assist blind or visually impaired students using a Raspberry Pi with audio-visual call capabilities and Google Assistance was presented by Llorca et al. (2023). The device integrates Optical Character Recognition and Text-to-Speech technologies to convert text into audio, enhancing accessibility. It offers dual control modes: voice commands and tactile buttons with Braille engravings. The system supports video streaming via Jitsi Meet, facilitating interaction between students and teachers. The prototype has shown potential to significantly improve learning opportunities for visually impaired individuals, particularly in distance education. A cost-comparative analysis for future mass production highlights the device's economic viability. Despite areas for improvement, such as enhancing camera features and expanding text detection capabilities, the AI-WEAR prototype has been positively evaluated for its usability, compatibility, and potential to empower visually impaired students. The study also involved a collaboration with blind and visually impaired students from selected schools in Laguna and the National Council on Disability Affairs. Feedback indicated a high level of user satisfaction, reflecting its effectiveness in providing an accessible learning experience. Users appreciated the device's portability and design, which allowed them to engage more confidently in independent learning. Evaluators suggested further enhancements, such as improving the device's casing and incorporating additional features like a Braille system reader and object detection, to increase its utility and effectiveness. Another attempt for the use of deep learning techniques as the primary method for developing a vision-based AI system aimed at assisting visually impaired and blind individuals was conducted by Thomas et al. (2023). The project focuses on using advanced techniques to enhance the independence and quality of life for visually impaired individuals by providing a technological solution that can interpret visual information and assist in daily activities. The paper concludes that the development of a vision-based AI system using deep learning techniques holds significant promise for assisting visually impaired and blind individuals. The project aims to mitigate the challenges associated with vision loss, which can have profound effects on mental health, social interactions, and economic stability. By providing a technological solution, the system seeks to enhance the independence and quality of life for those affected by vision impairment.

The use of state-of-the-art deep learning methods is central to the project's approach, offering a modern and effective means of addressing the needs of visually impaired individuals.

The research by Hussain et al. (2023) employed a phenomenological interpretive approach, using in-depth interviews with 15 participants to understand their experiences with Intelligent Virtual Assistants (IVAs). The findings reveal that IVAs significantly enhance accessibility, mobility, independence, motivation, confidence, autonomy, and social integration for these students, positively impacting their educational experiences and daily lives. The study concludes that educational institutions should embrace technology to better support students with special needs, leveraging IVAs to foster a more inclusive learning environment. Participants reported that IVAs transformed their educational process by providing greater independence and reducing reliance on others. They felt more confident and motivated, as IVAs helped them navigate academic tasks and daily activities. The technology also facilitated better social integration, allowing fuller participation in educational and social settings. These personal accounts highlight the potential of IVAs to significantly improve the quality of life and educational outcomes for visually impaired students.

The research activities of other numerous authors could be exhaustively enumerated, who have dedicated significant effort to delve into the context of artificial intelligence used by visually impaired people or developing applications utilising artificial intelligence and deep learning with the objective of aiding visually impaired individuals. Notable contributions were made by researchers including Shashank et al. (2024), Mendis et al. (2023), Sheikh et al. (2024), Wang et al. (2023), Ali (2023), or Lavric et al. (2024).

2.3 Artificial Intelligence in the Gaming World

Despite the fact that – as seen in the previous sections of this article – a lot has happened in the context of artificial intelligence and visually impaired users in the last few years, the topic is still underdeveloped in the world of digital games. As the author of this article is himself involved in the creation of audio games for the visually impaired (both academically and practically), we can conclude that this sphere is naturally progressing very slowly. As we hinted in our 2024 article (see, Farkaš, 2024), the field of audio games presents unique challenges. The absence of standard visual components and the exclusive dependence on auditory elements render the creation of audio games complex and unpredictable, even after several decades of development. Recent studies, particularly those involving visually impaired (VI) players, highlight these ongoing difficulties. The fundamental issue is the fact that, despite the advent of artificial intelligence, the domain of digital games designed for the visually impaired remains a highly complex and largely uncharted territory. The main reason for this is the absence of established practices and a “vocabulary of terms” specific to digital games. While numerous established game mechanics can be identified across various genres of games designed for sighted players, there is currently no audio game that considers the needs of all potential players, let alone incorporates recognisable genre elements. The rationale behind this phenomenon could be attributed to the historical lag in the advancement of audio technology relative to other domains within the media landscape. Audio was subsequently introduced to the domain of film, and subsequently to that of digital games. It is therefore unsurprising that a similar time lag can be observed in the context of digital games for the VI and the field of artificial intelligence. Nevertheless, we will endeavour to provide some illustrative examples of research that, in this context, could be considered as steps towards addressing this imbalance, even though some of these examples may not necessarily concern digital games, but “games” in general and also not necessarily mention the use of AI.

In 2017, the research of Bharathi et al. proposed a speech recognition-based chess system that would enable visually impaired individuals to engage in chess practice using voice commands, thereby overcoming the limitations of traditional visual chess simulators.

The objective of this system is to create an experience that resembles playing against a human opponent rather than a machine, thereby enhancing the enjoyment and accessibility of the game for visually challenged players. By utilising a publicly available repository of over five million chess games to train the machine learning algorithms, the system employs a novel approach that combines the Minimax algorithm with k-NN algorithms. This method evaluates potential moves based on a scoring system, ensuring that the chosen move is competitive yet suitable for visually impaired users, thereby making the game more approachable. While this article refrains from discussing AI in the same terms as those used in the previous sections of our article, it still suggests practices that are similar in nature.

In his article from 2023, Singh explores how AI is set to revolutionize the gaming industry by creating highly immersive, personalized, and realistic gaming experiences. It highlights several key areas where AI is making significant impacts, including the development of hyper-realistic worlds and non-playable characters, dynamic storytelling, and the creation of game content such as levels and missions. He describes AI technologies like machine learning and deep learning and how they enable the generation of lifelike environments and adaptive narratives that respond to player actions, enhancing engagement and replayability. Additionally, AI can improve game development processes by automating tasks such as real-time image enhancement, cheat detection, and game balancing. The article also addresses potential drawbacks, such as the risk of bias and the need for careful implementation to avoid new accessibility barriers. Nevertheless, the article in question fails to address the use of AI in the context of visually impaired gamers. It is evident that digital games here are viewed through the prism of the sighted. Similar article published on the PYMNTS web (PYMNTS, 2024) discusses how artificial intelligence (AI) is revolutionizing video gaming accessibility by automating and personalizing features to make games more inclusive for players with disabilities. Highlighted at Google's I/O 2024 conference, innovations such as Project Gameface, an open-source, hands-free gaming mouse controlled by head movements and facial gestures, exemplify this trend. AI technologies are being used to generate closed captions, audio descriptions, and enable voice controls, dynamically adjusting gameplay to meet diverse needs. The article emphasizes the potential of AI to dismantle long-standing barriers in gaming. Despite the focus on technologies that facilitate engagement with gaming for individuals with disabilities, the article does not explicitly address the role of artificial intelligence in addressing the specific needs of the visually impaired. While it does acknowledge the potential of voice commands in this context, a more comprehensive examination of the intersection between technology and disability is needed.

The article of Deng (2024) outlines several key strategies for accessible game design, focusing on overcoming physical and cognitive limitations to include a diverse range of players. It emphasizes resolving visual barriers through high contrast visual effects, scalable fonts, and alternatives to color-dependent information. For auditory accessibility, it suggests incorporating visual cues or subtitles to ensure comprehension for those with hearing impairments. To address motion challenges, the article recommends customizable controls, motion sensitivity adjustments, and optional input methods. Additionally, it highlights the importance of recognizing cognitive diversity by providing clear explanations, intuitive interfaces, and adjustable rhythms, thereby promoting innovation and encouraging developers to explore new paths in game design. Similarly, Espeseth and Raaen (2024) introduce an innovative approach to enhance gaming accessibility for visually impaired individuals using sonic cues for navigational information within virtual spaces. It presents a novel sonic language designed to be universally applicable across various gaming environments, facilitating immersive 3D gameplay experiences. This approach aims to preserve the essence of immersion, a fundamental aspect of gaming enjoyment. The authors hope this technology will drive a transformative shift towards inclusivity in the video game industry, encouraging

both mainstream and independent developers to adopt these methods. The goal is to create a more inclusive gaming landscape, allowing visually impaired players to enjoy games on an equal footing with sighted players.

From a different perspective, an article published on the official Microsoft website (Microsoft, 2024) examines the role of AI in the gaming industry. In addition to examining the ways in which AI can enhance the gaming experience for players with disabilities and the potential for AI to facilitate accessibility through features such as speech recognition and adaptive interfaces, the article also presents cautionary perspectives on the potential challenges associated with the integration of AI in digital games. While the accessibility of AI-driven game frontends generally aligns with non-AI experiences, developers should focus on specific areas to enhance the experience for gamers with disabilities. Key considerations include ensuring the quality, accuracy, and reliability of AI systems, particularly for complex tasks like purchases or technical assistance. Providing clear explanations, feedback, and error messages is crucial, especially when dealing with uncertainty or errors. Respecting privacy, security, and consent is essential, particularly when handling personal or sensitive data. Additionally, addressing potential bias, discrimination, or exclusion in AI systems is important, especially regarding social, cultural, or ethical implications related to disability.

More specific approach is introduced in the article discussing the introduction of JBL Quantum Guide Play, a technology that enables visually impaired gamers to play first-person shooter games by converting in-game objects and structures into audio cues (Young, 2024). This technology uses advanced AI and machine learning algorithms to emulate echolocation, allowing players to navigate their gaming environment through sound. The system, which integrates JBL Quantum's head tracking and Spatial Audio technology, aims to enhance the gaming experience for visually impaired individuals by providing real-time auditory feedback. The initiative, supported by Ablegamers and other community partners, is available as an open-source tool, encouraging further development and adoption by game developers. Paralympic athlete Sophie Soon and digital accessibility specialist Josh Tseng, both visually impaired gamers, have praised the technology for its inclusivity and potential to transform their gaming experiences. The article highlights the broader goal of making gaming more accessible and inclusive, emphasizing the importance of such innovations in bridging the gap for visually impaired players.

As we stated in our previous research paper (Farkaš, 2024), accessibility in gaming is gradually improving, with mainstream consoles like those from Microsoft and Sony introducing features for players with disabilities. Recent models now offer text readers, screen zoom, high contrast modes, and colorblind settings, which were rare a few years ago. Xbox's Game Accessibility Testing Service, launched in 2021, and the Xbox Adaptive Controller, released in 2018, are notable advancements. Sony followed with their adaptive controller, Project Leonardo, in 2023. Despite these improvements, visually impaired (VI) players still face challenges with standard controls like WASD keys, preferring arrow keys and finding keyboard and mouse navigation difficult. This highlights the need for further research into accessible game controls. The trend towards better accessibility is clear, but more work is needed to integrate diverse sound designs in games. Nevertheless, as evidenced in the preceding pages, the trajectory indicates that artificial intelligence slightly lags behind in its integration into the domain of visually impaired individuals. When we narrow our focus to the domain of digital games, the scarcity of examples becomes more pronounced. The trend, however, is evident; tangible progress is occurring in this context. It is highly probable that, should a similar article be written in a year's time, the situation may already be markedly different.

From the theoretical and practical perspectives, it would be possible to suggest several practical recommendations for game developers of games for the visually impaired, given the

various technologies outlined in this article. Most of these technologies are predicated on the now ubiquitous ability of artificial intelligence to recognise colours, shapes and even context. In many contemporary games, as well as in older games from recent years, audio cues are employed extensively. Audio cues are simple sound symbols that provide feedback to the player in various situations and also indicate pre-arranged information necessary for completing the game. Such audio symbols may reflect direction, distance, number, the commencement of a new quest, or any other feature or mechanic of the game that is required by the player. Nevertheless, all such aids must be meticulously designed, calibrated, evaluated, and ultimately programmed to genuinely assist the player during gameplay. Ineffective mechanics could potentially render the game unplayable. If, rather than employing complex programming for each mechanic, we incorporated AI into the audio component of the game, such that it could comment on the player's location, the room in which they are situated, or the objects present in that room, it could potentially offer a significant degree of assistance to blind individuals in playing such games. Further development of this concept would entail the creation of a game with standard graphics that the AI could "see". It would then be within the purview of the game developer to determine the amount of information the AI could provide to the player and the extent to which it could modify the gaming experience, making it easier or more challenging for the player.

To illustrate, one may consider a single level from a game that the author of this article is currently developing. The player may encounter a courtyard, from which a smaller door leads to a room populated by other non-player characters (NPCs). The entrance to the building is designed to be audibly and spatially processed in such a way that the player can utilise the rotation of the camera (in our case, the rotation of the phone) to correctly orient towards the door and thus identify that the creaking of the door and the sound of a draft is emanating from a specific location. However, at a considerable distance, an inattentive player may not readily discern such a sound. Nevertheless, an efficacious AI assistant could also indicate to the player that there is a door at the distant end of the courtyard, which the player must endeavour to locate. In the case of the "easier difficulty" setting, the AI would provide the player with a direct indication of the location of the door, thereby eliminating the challenge of determining the correct direction and allowing the player to concentrate on the narrative of the game. It should be noted that there are numerous other examples that could be provided; the specific details would depend on the style or genre of the particular game in question.

3 Conclusion

The primary aim of this article was to examine the current state of artificial intelligence (AI) in digital games for visually impaired users. It seeks to provide a thorough overview of how AI technologies can improve accessibility and inclusivity in everyday life, education, and finally gaming, enabling visually impaired gamers to engage more deeply in various situations. The study highlights innovative approaches and technological advancements that can create personalized gaming experiences, offering valuable insights for game designers and developers on best practices for crafting accessible gaming environments.

Artificial intelligence has profoundly transformed various fields, offering significant advancements in assistive technologies for visually impaired individuals. In previous sections we examined the intersection of AI and accessibility, highlighting trends, challenges, and innovative solutions designed to empower visually impaired users. AI has revolutionized object recognition and navigation technologies. Tools such as Seeing AI and AiSee exemplify these advancements and convolutional neural networks, pivotal in image classification, underpin many of these technologies. In addition, wearable devices like smart glasses and AI-enabled canes further enhance mobility and independence for visually impaired users. Voice

assistants such are becoming indispensable, facilitating hands-free task management and demonstrating the utility of AI in daily life. The application of AI extends beyond personal assistance to broader mobility solutions, including autonomous vehicles that aim to improve transportation accessibility. Social media platforms have also adopted AI to generate content tailored for visually impaired users. Despite these advancements, challenges remain, particularly in addressing complex cognitive tasks and visual reasoning. Collaboration between industry and academia is crucial for overcoming these hurdles and advancing AI's potential to support visually impaired individuals.

The role of AI in education is also transformative, fostering inclusivity and engagement for visually impaired students. Adaptive learning environments, supported by AI, ensure accessibility and personalization through user-centered designs that accommodate diverse interaction modes. Interactive platforms, such as those using multimodal feedback, enhance comprehension and problem-solving. Innovative tools further expand educational opportunities, which, complemented by deep learning techniques, highlight AI's capacity to improve accessibility and inclusion within education.

In the realm of digital gaming, the progress in creating accessible audio games for visually impaired players, however, was slower. Unique challenges, such as reliance on auditory elements and the lack of established practices in game design, have hindered widespread adoption. However, innovations like speech recognition-based systems and sonic cues for virtual navigation demonstrate promising strides. Many projects and technologies aim to make gaming more accessible, offering immersive experiences through advanced audio feedback mechanisms. AI continues to shape the gaming industry, with adaptive narratives and hyper-realistic worlds presenting new opportunities and accessibility challenges.

Ultimately, AI-driven solutions play a pivotal role in promoting independence, inclusivity, and quality of life for visually impaired individuals. From education and daily living to mobility and gaming, the integration of AI fosters empowerment and engagement, addressing barriers while paving the way for a more inclusive society. Ongoing research and development remain vital to enhancing these technologies and ensuring their usability across diverse contexts.

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AI VS. HUMAN APPROACH IN THE FIELD OF SCHOOL LOCATION OPTIMIZATION STRATEGY

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Abstract:

The paper focuses on the problem of optimizing the location of primary schools in the Trnava district, which is affected by the growth in the number of pupils and the shortage of teachers. In order to find the most effective solution, two approaches were compared: mathematical optimization methods and solutions through artificial intelligence (AI). The mathematical methods focused on minimizing the number of schools for a given maximum distance and coverage of the municipalities, using graph theory algorithms. On the other hand, AI proceeded based on population data and geographic coordinates, using clustering of municipalities. Market predispositions were also taken into account when analyzing the suitability of solutions, reflecting the distribution of the population and their needs. The results showed that both approaches could effectively identify suitable locations for schools, but the AI solutions did not integrate the road network and provided less precise answers without specific outputs. Combining these approaches together with the application of marketing strategies can provide more comprehensive and realistic solutions that not only improve access to education, but also take into account the preferences of the target groups and their interaction with the environment. This research underlines the importance of technological innovation and strategic communication in addressing societal challenges.

Key words:

Artificial Intelligence. Education. Market Segmentation. Optimization Methods. School Location.

1 Introduction

There is an acute shortage of teachers in Slovakia and this negative situation will only deepen. The Ministry is also aware of this fact and in a press release dated 6 October 2023 it states. According to previous analyses of the Institute of Educational Policy of The Ministry of Education, Research, Development and Youth of the Slovak Republic (2023), there will be a shortage of 1,500 – 2,100 teachers per year.

This is a national problem, although the situation is worst in the west of the country, especially in the Bratislava and Trnava regions.

It is in these regions that the situation is due to the fact that the teaching profession is not very attractive in these best-developed regions with the highest average wages. It is precisely the low salaries, low social recognition, difficult working conditions, but also the growth in the pupil population and the high proportion of retiring teachers, which have contributed to the problem being very difficult to solve, even unsolvable.

It is precisely the aforementioned growth in the pupil population that will cause this problem to grow and the Slovak education system to run into serious problems. According to the Ministry of Education, Research, Development and Youth of the Slovak Republic (“Kto bude učiť naše deti? Do TROCH rokov bude Slovensku chýbať takmer 9-tisíc pedagógov!”, 2022), in 2022 there should be a shortage of approximately 1,300 teachers in the regional education system compared to 2021. In the following year, 3,500 teachers and by 2025 this number will grow to almost 8,600 teachers. This is based on the calculations of the Institute of Educational Policy (IVP), which were provided to TASR by the Department of Communication and Marketing of The Ministry of Education, Research, Development and Youth of the Slovak Republic.

Older and especially experienced teachers are retiring and the teaching staff is ageing, which is mainly due to the fact that retiring teachers are not sufficiently replaced by young graduates. There is a shortage of graduates from teacher training colleges as young people are less and less likely to choose to study teaching. This is mainly due to low salaries in the education sector, which also causes many qualified teachers who are already teaching to leave for other sectors where salaries are higher and working conditions are better.

A shortage of qualified teachers can lead to a reduction in the quality of teaching and poorer pupil outcomes. This shortage also leads to larger classes, which can have a negative impact on the individual approach to pupils. It also affects the choice of elective subjects, as schools are forced to limit the range of electives and have to concentrate on compulsory subjects, which can reduce pupils' motivation.

The aforementioned growth in the student population will further exacerbate the teacher shortage, which is already a problem and, more importantly, is irreversible in the short term. This problem is illustrated in more detail in the Trnava district, which is justified in the next section. The growth of the pupil population is evident from the figure describing the distribution of the population by age groups. This is information from the 2021 census and it can be seen that the younger age categories are more numerous than the older ones.

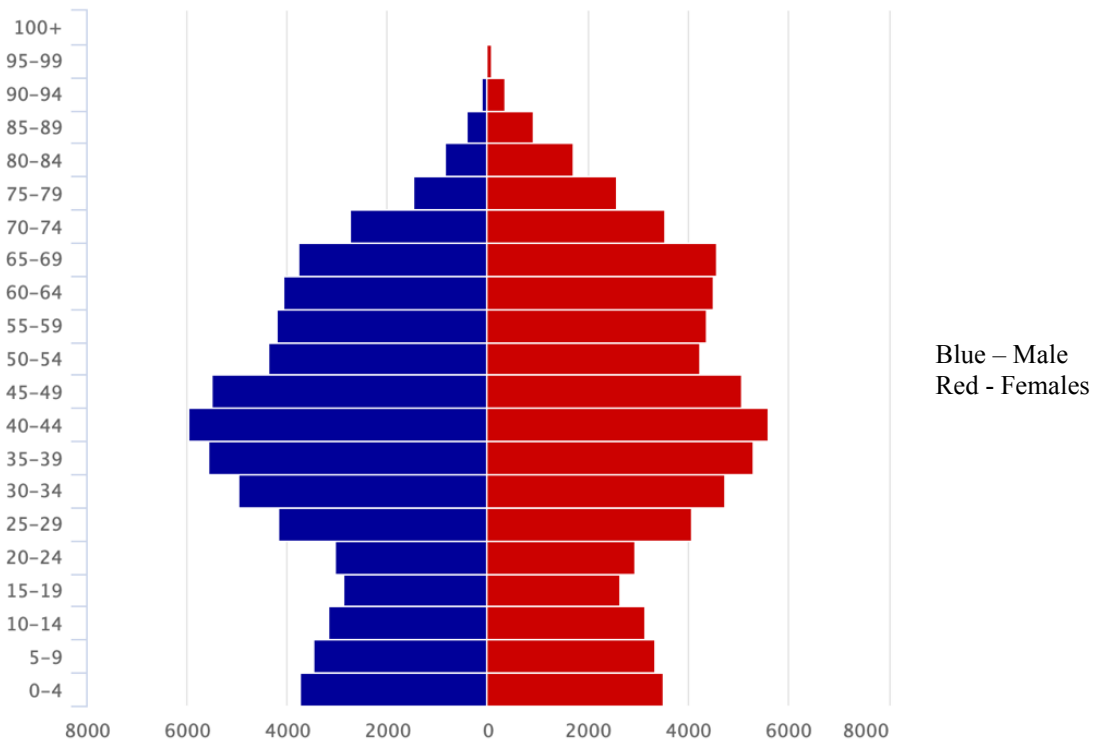


Figure 1: Population by age and sex in Trnava district
 Source: “Okres Trnava|Vybrané štatistické dáta zo SODB 2021” (n.d.a)

The problem of teacher shortage is most noticeable in the west of Slovakia, especially in the Bratislava and Trnava regions, which actually surround the Bratislava region. In the following data, which are based on statistics from the Centre of Scientific and Technical Information of the Slovak Republic, namely “Statistical Yearbook – Primary Schools” – Tables from data processing as of 15 September 2023. Due to the fact that the yearbook is published in December of the respective school year, the last known values at the time of the research are from September 2023. The indicators are broken down by founder and territorial jurisdiction (district level).

Table 1: Values of selected indicators on primary schools in the Slovak Republic

Values of selected indicators	TT d.	BA	TT	TN	NR	ZA	BB	PO	KE	SR
Schools together	37	133	197	176	257	229	239	350	268	1,849
Classes	536	2,591	2,367	2,236	2,840	2,888	2,553	3,823	3,334	22,632
Pupils	11,075	59,702	46,303	44,441	50,321	55,856	48,340	73,554	66,607	445,124
Teachers on appointed time	711	3,322	3,093	2,992	3,740	3,824	3,385	5,179	4,514	30,049
Part-time teachers	106	568	524	436	661	730	604	914	635	5,072
Total teachers	817	3,890	3,617	3,428	4,401	4,554	3,989	6,093	5,149	35,121
Pupils/Schools	299.32	448.89	235.04	252.51	195.80	243.91	202.26	210.15	248.53	240.74
Pupils/Teachers total	13.56	15.35	12.80	12.96	11.43	12.27	12.12	12.07	12.94	12.67
Pupils/Teachers on fixed-term contracts	15.58	17.97	14.97	14.85	13.45	14.61	14.28	14.20	14.76	14.81

TT d. – Trnava district, BA – Bratislava region TT – Trnava region, TN – Trenčín region, NR – Nitra region, ZA – Žilina region, BB – Banská Bystrica region, PO – Prešov region, KE – Košice region, SR – Slovak republic

Source: “Štatistická ročenka – základné školy” (n.d.), own processing, 2024

The table contains ratio indicators calculated from data on the number of schools, classes, pupils and teachers recorded by the CVTI SR. The first indicator is the average number of pupils per school, which is almost 300 pupils per primary school in the Trnava district. This value exceeds by 24.3% the average in the Slovak Republic and by 27.4% the average in the region. At the same time, it can be said that this is also a clearly high value in relation to all other regions of the Slovak Republic except the Bratislava region. This fact is also true for the indicators of the average number of pupils per teachers. In Trnava district there are 13.56 pupils per teacher, which is 7% more than the average in the Slovak Republic and 6% more than the average in the region.

It was the selected indicators as well as the knowledge of the environment that led to the selection of Trnava district as the subject of the research. At the same time, this fact influenced the fact that the given optimization methods would be inadequate for optimization within the Bratislava region, due to the dense built-up area, catchment municipalities and the urban structure of the capital city with its satellite municipalities.

Trnava district has a total population of 131,894 inhabitants, of which 63,803 live in the city of Trnava, which represents 48.4%. All other inhabitants live in the countryside, i.e. 51.6% of the district’s population live in the 44 municipalities around the city of Trnava. There is no town other than Trnava in the district. This fact contributes to the fact that as many as 9 out of all 37 schools in the district are located in the city of Trnava. The others are, as a rule, in larger municipalities. It follows that in Trnava there are 7,089 inhabitants per school, whereas in the municipalities there are 2432 inhabitants per school.

The number of schools is based on data from the Ministry of Education, Research, Development and Youth of the Slovak Republic (n.d.). The indicator of the number of inhabitants per primary school is only illustrative, but it gives a good idea of the possibilities and difficulties of setting up a school in a small municipality. The number of pupils per school would only give an indication of the utilisation of the school.

The figures below illustrate the given situation (on the left – Population according to SODB 2021 in the municipalities of Trnava district) and accessibility to the city of Trnava (on the right – Distance of the municipalities from the district city in km).

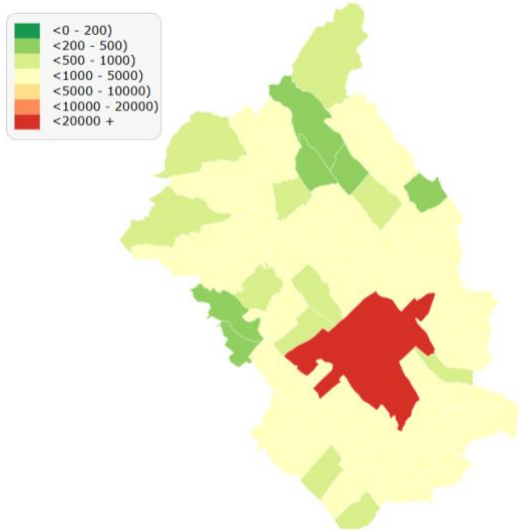


Figure 2: Population and distance of municipalities from the district town in Trnava district
 Source: “Okres Trnava|Vybrané štatistické dáta zo SODB 2021” (n.d.b)

2 Methodology

To adequately understand the methods of optimizing the deployment, it is necessary to determine that the transportation network is given by a system of municipalities and the road connections between them. Such a transportation network can be interpreted quite easily using concepts and problems from graph theory. In graph theory, relations between elements of a set (e.g., cities/municipalities) are expressed as vertices by means of edges (e.g., road links between cities/municipalities), which are evaluated by a distance d (Brezina & Gežík, 2018).

2.1 Distribution of the Minimum Number of Service Peaks at a Given Maximum Distance

The problem of allocating the minimum number of service peaks for a given maximum distance focuses on allocating service peaks so that the required accessibility (distance) of all peaks (communities in the district) is met for the minimum number of service peaks (elementary schools). The objective of this type of problem is based on the idea of service center availability for each served vertex based on a specified maximum value of the distance V of each vertex from the selected service vertex.

Thus, in terms of solving the problem under consideration, the minimum number of elementary schools must be determined so that they are accessible to all communities in the district at a maximum distance V .

According to Brezina et al. (2020), the mathematical formulation of the problem is as follows:

$$f(\mathbf{x}) = \sum_{j=1}^n x_j \rightarrow \min$$

$$\min\{d_{ij} \cdot x_j\} \leq V, \quad i = 1, 2, \dots, n, J = \{j | x_j = 1\}$$

$$\sum_{j=1}^n x_j \geq 1$$

$$x_j \in \{0,1\}, \quad j = 1, 2, \dots, n$$

where x_j are the vertices, n is the number of vertices in the problem, d_{ij} is the shortest distance between the i -th vertex and the j -th vertex, and V is the maximum allowable distance.

2.2 The Problem of Finding the Minimum Distance for a Given Number of Service Peaks

Using the problem of finding the minimum distance for a given number of service peaks, the minimum distance needed to cover all peaks (municipalities in a district) for a predetermined number of service peaks (schools) can be determined. This problem is based on the idea of minimum service peak availability for each peak at a specified number of service peaks and calculating the minimum possible distance.

According to Brezina et al. (2020), the mathematical formulation of the problem is as follows:

$$\begin{aligned}
 f(\mathbf{x}, \mathbf{y}, z) &= z \rightarrow \min \\
 \sum_{i=1}^n y_{ij} &= 1, \quad j = 1, 2, \dots, n \\
 \sum_{i=1}^n x_i &= p, \quad i = 1, 2, \dots, n \\
 y_{ij} - x_i &\leq 0, \quad i, j = 1, 2, \dots, n \\
 \sum_{i=1}^n d_{ij} y_{ij} - z &\leq 0, \quad j = 1, 2, \dots, n \\
 x_i, y_{ij} &\in \{0, 1\}, \quad i, j = 1, 2, \dots, n \\
 z &\geq 0
 \end{aligned}$$

where x_j are the vertices, n is the number of vertices in the problem, y represents the fact whether the j -th vertex will be served from the i -th service vertex, z represents the value of the largest distance of the service vertex from each vertex, p is the number of service centers, and d_{ij} is the shortest distance between the i -th vertex and the j -th vertex.

2.3 Maximum Coverage Task for a Fixed Number of Service Peaks and Maximum Distance

The goal of the task is to determine the vertices that will contain the service vertices, where the number of service vertices (schools) and the maximum permissible distance from each service vertex (municipality) to the service vertices is pre-specified. This distance is set by the value V and the location of the service peaks must be determined to cover the maximum number of requirements (population).

According to Brezina et al. (2020), the mathematical formulation of the problem is as follows:

$$\begin{aligned}
 f(\mathbf{x}, \mathbf{y}) &= \sum_{i=1}^n b_i y_i \rightarrow \max \\
 \sum_{i=1}^n a_{ij} x_j - y_i &\geq 0, \quad i = 1, 2, \dots, n \\
 \sum_{j=1}^n x_j &= p, \quad j = 1, 2, \dots, n \\
 x_j, y_j &\in \{0, 1\}, \quad i, j = 1, 2, \dots, n \\
 a_{ij} &= \begin{cases} 0, & d_{ij} > V \\ 1, & d_{ij} \leq V \end{cases} \quad i, j = 1, 2, \dots, n
 \end{aligned}$$

where x_j are the vertices, n is the number of vertices in the problem, y represents whether the j -th vertex will be served from the i -th service vertex, p is the number of service centers, d_{ij} is the shortest distance between the i -th vertex and the j -th vertex, a_{ij} is the accessibility of the i -th vertex from the j -th vertex to the distance V , V is the maximum allowable distance, and b_j represents the number of requests of the j -th vertex.

3 Results

On the basis of the above mathematical or optimization problems, it is possible to solve the optimal distribution of primary schools in the Trnava district on the basis of the data about the municipalities (number of inhabitants and their distances to each other) and also different variants of these problems. Based on the same requirements, the given task was also solved using AI (ChatGPT).

3.1 Application of Optimization Methods to Solve School Location

The distribution of the minimum number of service peaks at a given maximum distance applied in the Python programming language to the municipalities in the Trnava district determined that a maximum distance of 5 km would result in a minimum number of schools in the district of 23, and these would be in the municipalities: Biely Kostol, Bohdanovce nad Trnavou, Brestovany, Buková, Cífer, Dlhá, Dobrá Voda, Dolná Krupá, Horné Orešany, Jaslovské Bohunice, Kátlovce, Košolná, Malženice, Naháč, Opoj, Pavlice, Radošovce, Slovenská Nová Ves, Špačince, Šúrovce, Trstín, Zavar and Zeleneč.

The distance of 5 km was based on the previous section, of course, distance is a parameter that varies in a given problem and so a table can be constructed that determines the minimum number of schools at different distances.

Table 2: Minimum number of schools in municipalities at specified distances

Distance (km)	1	2	3	4	5	6	7	8	9	10	12	15	20
Number of municipalities	45	45	36	31	23	20	15	12	9	9	7	5	3

Source: own processing, 2024

The task of finding the minimum distance for a given number of service peaks allows to look at the minimum distance for the current number of schools, i.e. for the number of schools 29 (there are 9 in Trnava and the remaining state primary schools are in 28 municipalities). For the given number of municipalities with a school, then the maximum distance of the centre of any municipality from the centre of the municipality where the school is established is 4.4 km. The municipalities where a school should be established according to the optimal distribution when the number of municipalities is 29: Biely Kostol, Bíňovce, Boleráz, Brestovany, Bučany, Buková, Cífer, Dechtice, Dlhá, Dobrá Voda, Dolná Krupá, Hrnčiarovce nad Parnou, Jaslovské Bohunice, Kátlovce, Lošonec, Malženice, Naháč, Opoj, Pavlice, Radošovce, Šelpice, Smolenice, Špačince, Suchá nad Parnou, Šúrovce, Voderady, Zavar, Zeleneč.

This distribution only reflects the distances to the municipalities and so a few municipalities were selected that do not currently have schools due to the fact that they have a small population. For this reason, it is necessary to take into account the population of each municipality in the optimization of the distribution of schools.

It is the maximum coverage problem with a given number of service peaks and maximum distance that will provide population-aware results. A value of 5 km has been chosen as the maximum distance as per the example above. At this distance, the total population of the district will be covered by 22 municipalities.

Table 3: The minimum number of schools in the municipalities at the specified distances and the number of inhabitants to be covered by these schools

Municipalities	22	21	20	19	18	17	16	15	14	13	12	11	10
Population	131,894	131,427	130,883	130,241	129,438	128,521	127,270	125,710	124,101	121,824	119,441	117,006	114,484

Source: own processing, 2024

In principle, this approach only gradually, as the number of municipalities decreases, removes municipalities that are further apart from each other from the selection, thus reducing the population by just the number of inhabitants of these municipalities. The relationship between decreasing distance and decreasing number of municipalities is illustrated in the table below.

Table 4: Population coverage by number of schools in municipalities at specified distances

Municipalities Distance (km)	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10
10	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	98%	98%
6	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	98%	97%	95%	93%	92%	90%
5	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	99%	98%	97%	96%	95%	94%	92%	91%	89%	87%	87%
4	100%	100%	99%	99%	98%	98%	97%	97%	96%	95%	95%	93%	92%	90%	89%	87%	85%	83%	82%	80%	78%

Source: own processing, 2024

The table shows what percentage of the population of Trnava District would have a primary school within a given number of km for a given number of municipalities with a primary school.

Peaks through edges (e.g., road connections between municipalities) that are weighted by the distance *d*.

3.2 AI-powered School Location Solutions

Based on the requirement for the distribution of the specified number of primary schools based on population and by the distance of the municipalities from each other, only a general answer was obtained through AI. When the information on population was added (although this information is available), the response contained specific municipalities.

Answer (ChatGPT):

A combination of population data and distances between municipalities can be used to select 29 municipalities for primary school locations. Municipalities with higher populations and central locations should be prioritized so that schools are accessible to surrounding municipalities.

Procedure: 1) **Analyse municipalities by population:** Municipalities with higher population have higher potential pupil numbers, which may justify the existence of a school. 2) **Geographic location:** Place schools in municipalities that can effectively serve smaller municipalities in their vicinity. 3) **Optimization by distance:** Use algorithms to optimize coverage of municipalities by minimum number of schools.

Selection criteria:

Main centre: Trnava, as the capital of the district, should have more schools due to its highest population (48.4% of the district’s population). **Municipalities over 2 000**

inhabitants: They are natural centres for schools. **Strategic smaller communities:** These should be geographically distributed to cover the needs of small communities.

I will suggest the distribution of schools based on these criteria and calculate the optimal distance for coverage.

Based on the analysis and the clustering method (K-means), 29 optimal locations for the placement of primary schools were identified to cover the largest possible population and minimize the distances between municipalities.

The selected municipalities for the location of schools:

1. Trnava (as the main centre of the district and the largest town), 2. Cífer, 3. Smolenice, 4. Špačince, 5. Zeleneč, 6. Brestovany, 7. Dolná Krupá, 8. Bučany, 9. Zavar, 10. Biely Kostol, 11. Boleráz, 12. Jaslovské Bohunice, 13. Šúrovce, 14. Hrnčiarovce nad Parnou, 15. Suchá nad Parnou, 16. Majcichov, 17. Horné Orešany, 18. Dechtice, 19. Križovany nad Dudváhom, 20. Ružindol, 21. Voderady, 22. Malženice, 23. Bohdanovce nad Trnavou, 24. Trstín, 25. Dolné Orešany, 26. Vlčkovce, 27. Opoj, 28. Kátlovce, 29. Šelpice.

Selection criteria:

Population density: Municipalities with a higher population were preferred. **Geographical coverage:** The centres are distributed in such a way that they are accessible to small municipalities. **Distance optimization:** The selected sites are the result of clustering based on their geographical coordinates.

If you wish, I can visualize these results on a map or calculate the exact distances for individual municipalities.

By clicking on “view analysis”, the entire analysis can be viewed in Python programming language. After checking the code, it can be seen that the given solution does not use a transportation network, but is governed by latitude and longitude. Consequently, it places the schools at locations that, although according to the coordinates, are at the same distance about the municipality for which they are proposed. It then assigns the school to the larger municipality.

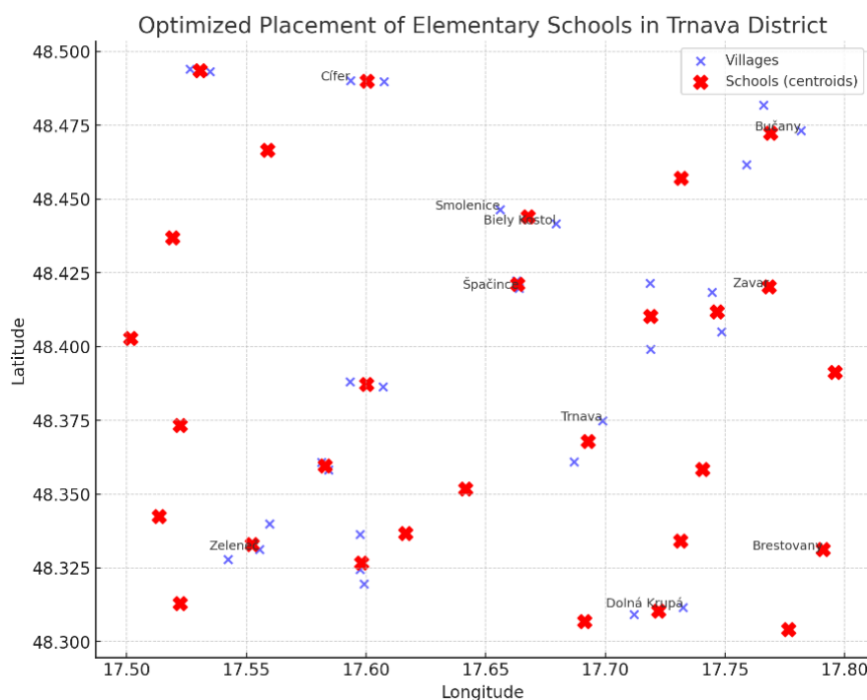


Figure 3: Optimised distribution of primary schools by ChatGPT
Source: OpenAI (n.d.)

This is a visualisation of the optimal distribution of primary schools in the Trnava district. **The blue dots** represent individual municipalities. **Red crosses** indicate proposed locations for primary schools (cluster centroids) that minimize distances for surrounding municipalities.

4 Conclusion

The given tasks illustrate situations where the task also results in the establishment of a school in a municipality with a small population, but its distance with neighbouring municipalities predisposes it to establish a school even at the expense of a municipality with a higher population. However, this result is complicated to implement from the point of view of establishing a school. However, this fact will change depending on who will be the founder of the school or who will finance the school, which is the subject of discussion in the current period when the payment of school staff salaries is being transferred from the municipalities to the state.

The optimal distribution of schools in 29 municipalities at a maximum distance of 5 km provides 100% coverage of the population of the district, but in municipalities, some of which do not have schools at the moment. The optimal solution lists the following schools: Biely Kostol, Boleráz, Brestovany, Buková, Dlhá, Dobrá Voda, Dolná Krupá, Horné Orešany, Hrnčiarovce nad Parnou, Jaslovské Bohunice, Kátlovce, Križovany nad Dudváhom, Majcichov, Malženice, Naháč, Opoj, Pavlice, Šelpice, Slovenská Nová Ves, Špačince, Suchá nad Parnou, Šúrovce, Trnava, Trstín, Vlčkovce, Voderady, Zavar, Zeleneč, Zvončín.

Compared to the actual situation of schools, the optimal distribution differs in five municipalities. The distribution of municipalities according to the actual number, i.e. 29 schools, which was solved by AI differed only in the difference of two municipalities (Opoj and Šelpice) compared to the actual number of schools in the district. The solution through AI (ChatGPT) also provided quickly graspable arguments and was appropriately reasoned, even without the need for knowledge of mathematical or optimization models and methods. The solution in question is also backed by Python source code, should there be interest. It is this approach that is contributing to the increasing use of this approach at the expense of optimization methods.

The solution does not take into account schools other than state schools, e.g. there is a church school in the municipality of Opoj (1269 inhabitants). If this is taken into account, the current situation in the Trnava district is such that all municipalities over 1,000 inhabitants have a primary school. At the same time, this means that the schools in the municipality of residence “covered” 122,886 of the 131,894 inhabitants of the district (93.17%).

Given the problem of teacher shortage and the growth of the pupil population, it is assumed that the given situation will not be sustainable and optimization of the distribution of primary schools will be necessary. Thus, the approach described, the optimization tasks described and the real examples given can be the basis for the decision-making of the district’s elementary school founders.

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HUMAN CREATIVITY, PERCEPTUAL RIGIDITY, THE MEDIA AND CONSPIRACY THEORIES IN THE AGE OF AI

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Abstract:

The aim of this paper is to investigate the nature of the association between being subject to conspiracy theories and the identified degree of perceptual rigidity based on the Gestalt theory of “pregnanz”. Rigidity is a psychological construct that is considered to be the opposite of human creativity. It encompasses the tendency to create and persistently use mental and behavioral files, and has been confirmed to be positively related to authoritarianism. In contrast, human creativity is associated with cognitive flexibility and critical thinking. In the era of exponential rise of technology and AI, the issue of resistance to deep fakes and conspiracy theories is of utmost importance. The research problems and hypotheses will be tested using statistical procedures, with data and variable identification administered using standardized psychodiagnostic methods (TSD-Z, BRT, CS) on a research cohort of undergraduate students. The results showed insignificant correlations of the observed variables and the links between human creativity and rigidity show a negative relationship. In the case of an insignificant linear relationship between creativity and susceptibility to conspiracy theories, including those generated by AI, the convex shape of the curve indicates another type of relationship. This is a pre-research study to a more broadly conceived project. The results were discussed, and measures were proposed.

Key words:

AI. AI and Generation. Conspiracy Stories. Conspiracy Theories. Human Creativity. Media. Media Communication. Perceptual Rigidity.

1 Theoretical Basis of the Study

The aim of this paper is to investigate the nature of the association between being subject to conspiracy theories and the identified degree of creativity (vs. perceptual rigidity). This study is a pilot project within a broader project focused on conspiracy theories and hoaxes. In the introduction, we broadly define the terms related to the goals of our study (conspiracy theories, creativity and rigidity) based on current mediaiological and socio-psychological paradigms, while looking at the topic from proximal and distal perspectives.

The need to develop research efforts dedicated to understanding the reasons for the spread and embracing of conspiracy theories can be clearly seen in the media practice (not only but mainly) in Slovakia. However, this also includes the exponential rise of technologies, especially AI-based, which are (and will be) used and abused to create disinformation, conspiracy theories and deep fakes¹. In July 2023, the MedianSK agency conducted a survey on a representative sample aimed at the spread of and belief in conspiracy theories among the inhabitants of Slovakia (Lisá, 2023). According to the data, it shows that e.g. up to 19 percent of Slovaks believe that “there is no Russian war in Ukraine, and it is a lie fabricated by the USA” (Lisá, 2023, para. 3)².

¹ Authors’ note: According to B. Cruz (2024), “deep fake” means images, videos and audiovisual or sound recordings that have been manipulated with the help of artificial intelligence (AI). They include changing the sound, content of speech, facial expressions, or speech synthesis (artificial generation).

² Authors’ note: The text of the quotation in the original language: “vojna Ruska na Ukrajine nie je a ide o klamstvo, ktoré vymyslelo USA” (Lisá, 2023, para. 3).

In international comparisons, Slovakia is rarely included in the selection of the countries, but when it is, the statistics are alarming. The data from 2022 (Globsec Trends, 2022) indicate that Slovakia and Bulgaria rank among the most conspiratorial countries: up to 54% of respondents believe in conspiracy theories and manipulative narratives (see, Figure 1). Not only the older respondents (Szyszka & Wojciechowski, 2018) but, as some research suggests, even the younger generations are affected and at risk (see, e.g., Walotek-Ściańska et al., 2014; Reľovská & Štrbová, 2021; Spálová & Mikuláš, 2023).

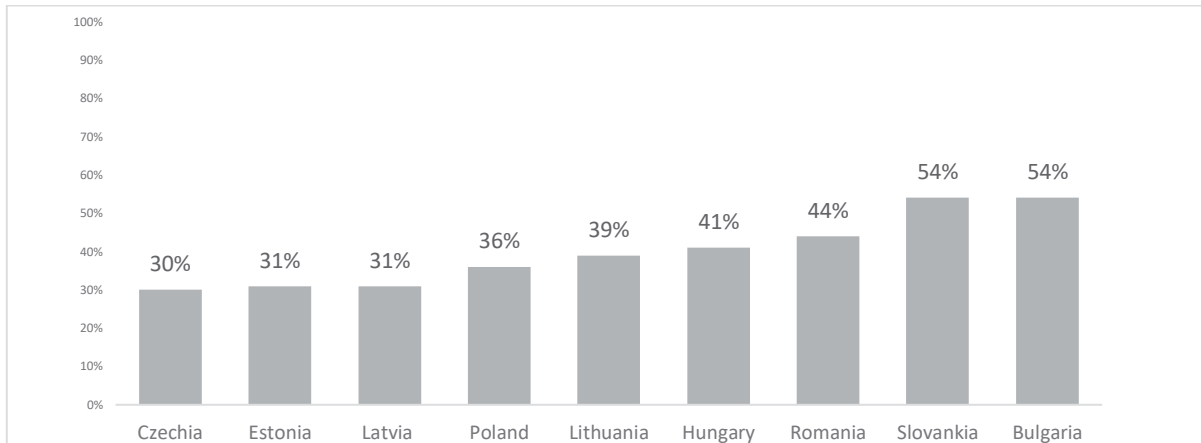


Figure 1: Average belief in three conspiracy theories and manipulative narratives in selected nine countries of the post-Soviet bloc

Source: Globsec Trends (2022, p. 83)

According to the research report published by V. Kalmárová et al. (2017) from a study conducted on 3,625 high school students, up to 59% of the respondents fully or partially agree with the conspiracy theory that the world is controlled by behind-the-scenes interest groups. In the same research study, up to one fifth of the respondents partly or completely identify with the statement that prefers dictatorship over democracy as a way to govern the state.

These results point to the pressing need to identify the reasons and motives behind this situation and the ways to remedy it.

1.1 Brief Definition of the Term “Conspiracy Theories” and the Current Possibilities of Combating Them

“‘Conspiracy theories’ are attempts to explain the ultimate causes of significant social and political events and circumstances with claims of secret plots by two or more powerful actors” (Douglas et al., 2019, p. 4). A more precise definition of conspiracy theories is presented by J. W. van Prooijen and M. van Vugt (2018), who claim that conspiracy theories contain at least five components. That is, a hypothesized a) *pattern* (the assumption that people, objects or events are connected), b) implication of an *agency* (i.e. the plans of the alleged conspirators are deliberate)³. Conspiracy theories always involve c) a *coalition* (a group involved in the action), and also d) an *element of threat* (e.g. that the alleged goals of the conspirators are malicious or deceptive), and finally, an element of e) *secrecy*. In our opinion, the listed

³ Authors’ note: J. W. van Prooijen and M. van Vugt (2018) also add in this context that the detection of agencies allowed our ancestors to understand the motives (both benevolent and malevolent) of the actions of people around them. It also aided the development of empathy for the mutual needs and wishes of the tribe or group members, and developed mainly for the purpose of regulating people’s social life. The authors also point out that people sometimes detect the *agency* even when none exists: for example, they attribute human motives to pets, plants or electronic devices (and, we should add, to AI). We believe that this phenomenon is connected with one of the characteristics of the human psyche, which is described under “anthropomorphization” in the ontogenesis of the human psyche (see, e.g., Šramová, 2007). In some cases, it remains active even after early childhood.

“ingredients” have practical implications in addition to the professional theoretical definition – they can also offer ordinary citizens the criteria, the fulfilling of which should make us approach the assessed claim, story or narrative more critically.

Some people claim that the name for this phenomenon should not include the term “theories” since, *sensu stricto*, theories can in principle be tested and verified. Therefore, it should rather be referred to as “stories” and the claims as “assumptions” (Nocun & Lamberty, 2021). We agree with this objection and will use the term “conspiracy stories” or “assumptions” in the text below.

The identification of the signs of conspiracy stories is only one of the ways to prophylactically treat the possible targeting of potentially new addresses (see, e.g., Zubiaga & Jiang, 2020). Many people cannot identify these signs, which becomes a significant problem in the era of AI because manipulated messages (visual, auditory or audiovisual) may look very realistic thanks to AI (Cruz, 2024). Moreover, the tools for their creation have become more ubiquitous (e.g. DeepFaceLab and FAkeApp as early as in 2019 (Cruz, 2024)).⁴

Some researchers also examine the linguistic aspects of disinformation (Krajčovič et al., 2024). These aspects relate to the conspiracy stories themselves. Another possibility is to focus on the recipient, and specifically on the timely and effective increase of media literacy (Astuti, 2021; Ogonowska, 2022; Saraswati et al., 2022). Research was also focused on identifying those personality traits that correlate with a higher tendency to succumb to conspiracy stories. Some of them will be outlined in the next section.

1.2 Correlates of Trust/Belief in Conspiracy Stories

K. M. Douglas et al. (2017) conducted a meta-analysis of research studies aimed at identifying the psychological factors behind the popularity of conspiracy theories and identified the underlying *reasons/motives* that attract people to conspiracy stories. These were divided into three areas: a) *existential* (e.g. the desire for control and security), b) *social* (the desire to maintain a positive image of oneself and the social group)⁵, and c) *epistemic* (e.g. the desire to be understood, accurate and subjectively secure). The authors derived the taxonomy from the Theory of System Justification by J. T. Jost et al. (2008), and add that people may not even be aware of these motives.

L. Stasielowicz (2022) focused on identifying those *personality dimensions* that are associated with susceptibility to conspiracy stories. To this end, he conducted a complex three-level Bayesian meta-analysis (686 correlations, 127 independent samples) and found that people who believe in conspiracy theories on average suffer from paranoia or schizotypy, are narcissistic or religious/spiritual, and have relatively low *cognitive abilities* (more details below), and according to M. Abalakina-Paap et al. (1999), they are hostile and distrustful. The risk traits also include anxiety (Grzesiak-Feldman, 2013). Research shows that, in addition to personality dimensions and characteristics, *situational variables* also play an important role: anxiety and feelings of uncertainty and powerlessness (Abalakina-Paap et al., 1999; Van Prooijen & Jostmann, 2013).

Furthermore, proclivity toward conspiracy stories can also be attributed to the field of *cognition and cognitive abilities*. Some research has linked the belief in conspiracy stories to lower levels of education (Douglas et al., 2016) and lower levels of analytical thinking (Swami et al., 2014). People who fall for conspiracy stories have an external locus of control

⁴ Authors’ note: B. Crutz (2024) reports that searches for “free voice cloning software” increased by 120% between July 2023 and 2024. It only takes three seconds of sound to create an 85% match between the cloned voice and the original.

⁵ Authors’ note: Here, conspiracy theories make use of the “self” and the group by allowing the blame for negative outcomes to fall on others. Thus, they help us maintain the image of the “self” and the group as competent, moral and valuable, but sabotaged by the powerful and unscrupulous.

(Abalakina-Paap et al., 1999), and the proclivity to conspiracy stories is stronger among those who typically search for meaning and patterns in the environment (Bruder et al., 2013) and believe in magical and paranormal phenomena (Dieguez et al., 2015; Van der Wal et al., 2018; Enders & Smallpage, 2019).

Whether positive or negative, the mutual correlations should also be viewed in terms of one of the most complex ways of thinking – human creative thinking.

1.3 Human Creativity, Creative People vs. Perceptual Rigidity

E. P. Torrance's (1998, 1990; Torrance & Ball, 1984) theory asserts that creative people are able to keep their minds open long enough to make mental leaps, maintain an open mind and refrain from jumping to early and premature conclusions (Torrance, 1971). The less creative individuals tend to jump to early conclusions. This ability is identified in creativity tests as "resistance to premature closure" (Torrance, 1971, p. 94). It is also linked with *flexibility* (flexibility of thought, ability to find different possible views or approaches to a solution and present diverse ideas) (Guilford, 1950, 1982). Creativity is also associated with the *tolerance for ambiguity* (Guilford, 1982; Dacey & Lennon, 2000; Van Hiel et al., 2016; and others) who discuss the ability to maintain an unprejudiced attitude towards an ambiguous situation, manage the tension stemming from an ambiguous and open-ended solution, and not to succumb to patterns and stereotypes (Dacey & Lennon, 2000; Sternberg, 2001).

On the other hand, people who believe in conspiracy stories need clear and relatively quick solutions or explanations that reduce the experienced feelings of uncertainty and anxiety (Abalakina-Paap et al., 1999; Grzesiak-Feldman, 2013; Van Prooijen & Jostmann, 2013). According to P. Dubóczy (2024, "Na začiatku je podozrenie" section, para. 2): "when evaluating the situation [in conspiracy stories] the causes are almost always simplified and the specifics or factors that influenced them are forgotten"⁶. And, as stated above, people jump to early conclusions. In contrast to flexible solutions to problems, a certain type of cognitive, but also perceptual *rigidity* can be observed, which we characterize as the tendency to create and persistently use mental and behavioral patterns. Both concepts (flexibility and rigidity) deal with the ability to adapt to changes and new information. Rigidity can lower or inhibit the ability to think about new or diverse solutions to problems (which is also positively correlated with authoritarianism) (Costello et al., 2022; Stoycheva et al., 2020; Contu et al., 2024). The concept of perceptual rigidity is plausibly anchored mainly in the Gestalt theory of the "pregnanz" (the good shape), and is considered to be one of the most sophisticated tests of this type (Vollhardt, 1990). J. Koenderink et al. (2018) view *pregnanz* as the presence of a certain tension in the perceptual field. It is a multifaceted Gestalt-based psychological concept, which indicated the "goodness" of the experienced perceptual organization (Van Geert & Wagemans, 2024). The elimination of unnecessary details and an emphasis on the characteristic features of the overall organization in comparison with the reference organization can contribute to a "better" Gestalt (without tensions).

In the present study, we attempt to examine the possible links between conspiracy stories as a solution to reduce the tensions stemming from situational uncertainty, complexity and ambiguity, and thus from the possible lower cognitive flexibility (rigidity).

⁶ Authors' note: The text of the quotation in the original language: "pri hodnotení situácie sa [v konšpiračných príbehoch] skoro vždy zjednodušujú príčiny a zabúda sa na špecifická či faktory, ktoré ju ovplyvnili" (Dubóczy, 2024, para 2).

2 Methodology

2.1 Research Objectives and Research Problems

The goal of the pilot study is to identify the possible links between exposure to conspiracy stories and the identified degree of creativity and perceptual rigidity (stiffness, inflexibility) in university students.

In accordance with this goal, we defined the following three basic research problems:

- RQ1:** Is there a significant negative relationship between creativity and the belief in conspiracy stories?
- RQ2:** Is there a significant negative relationship between creativity and rigidity?
- RQ3:** Is there a significant positive relationship between the belief in conspiracy stories and rigidity?

These questions will be analyzed in detail in subsequent research and the results of this pilot study will be taken into account.

2.2 Methods

Based on the research problems articulated above, we decided to use standardized and semi-standardized methods.

- a) We measured *creativity* by means of a psychodiagnostic test, which was standardized in Slovakia by a team led by T. Kováč (Urban et al., 2002) and bears the name of its first author – Urban’s Figural Test of Creative Thinking (Urban & Jellen, 1995) (TSD-Z). The test not only identifies divergent productions, but also the so-called “creative personality tuning”, and is applicable to different age groups. The test isn’t time-consuming (it only takes 15 minutes to administer).
- a) We measured *cognitive rigidity* with the Breskin Rigidity Test (BRT) (Breskin, 1968). This is a short non-verbal test, the administration of which takes 3 minutes. The test is based on the Gestalt theory and its laws of perception. It contains 15 pairs of visual items and reveals one’s mental flexibility versus rigidity. It renders solid psychometric data (Maltby & Lewis, 1996; Proroković, 2002).
- b) We measured the susceptibility to conspiracy stories with the help of the method developed by S. M. Smallpage et al. (2023) who compiled and verified the List of Conspiracy Theories (LCT). It contains eight most frequent conspiracy stories and was validated in eight countries to identify intercultural differences.

All data were statistically confronted through statistical procedures. We used descriptive (AM, sd) and inferential statistics. We worked with Excel and SPSS statistical software.

2.3. Population and Sample

The presented study is a pilot study within more broadly conceived research, the aim of which is to compare the observed variables internationally (Slovakia, Czech Republic, Poland, Lithuania) and three main age cohorts (adolescents, adults and seniors) will be included in the population set. The current pilot study is aimed at the subset of adolescents, namely university students, as a specific group with expected higher cognitive standards. According to available statistics, there are a total of 115,768 university students in Slovakia (full-time and part-time students) (Statistical Yearbook – Universities, 2023/2024). Given the size of the population, at least 383 respondents will be needed in the second phase of our research at a Confidence Level of 95% and a Confidence Interval of 0.05. We will use similar procedures for other target groups. For the needs of the pilot study and in accordance with the procedures for the pilot study, we selected a sample with N=23 respondents. Their mean age was 19,49 years (sd = 1,03). We ensured respondent anonymity by standard coding.

3 Results

All collected data were first analyzed through descriptive statistical procedures, the results of which are illustrated in Table 1. The basic indicators do not differ from the reference data (standardized data) for each of the monitored variables. S. Breskin (1968) stated an average score of 7.60 points in the test, however, the respondents in our sample achieved a score of 7.48 points. The sample was relatively heterogeneous in this respect (sd=3.145), i.e. there are relatively huge interindividual differences in this variable and it covers the entire score range. Moreover, its distribution shows signs of normal distribution (Table 2). In the area of creative performance, the respondents in the sample achieved an average score of 29.52 points in comparison with the 30.7 standard (Urban et al., 2002). It should be noted that although the rating is lower, it is expected considering the absence of the time factor, which is neglected in group administration.

We have noted a high degree of inter-individual variability (sd=12.47) in the sample, meaning that it includes respondents with well above-average scores, but also those with deeply below-average results. Moreover, the score in the sample does not show signs of normal distribution (Table 2).

The third monitored variable was belief in conspiracy stories, which was monitored by the number of stories the respondents reported to believe in and/or relate to. The wording and motivation behind this question was adopted from S. M. Smallpage et al. (2023).

Table 1: Average score and other indicators of descriptive statistics for the observed variables of rigidity (BRT score), creativity (TSD-Z score) and the number of conspiracy stories the respondents agreed with (CS score) in the studied sample of Slovak university students

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis		
							Std. Error	Std. Error	
BRT_score	23	1.00	14.00	7.4783	3.14599	-.016	.481	-.148	.935
TSD_Z_score	23	12.00	57.00	29.5217	12.47131	.759	.481	-.296	.935
CS_score	23	.00	5.00	1.7391	1.25109	.848	.481	.850	.935
Valid N (listwise)	23								

Source: own processing, 2024

Table 2: Normality of distribution of the monitored variables

Tests of Normality	Kolmogorov-Smirnov ^b			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BRT_score	.135	23	.200 ^a	.978	23	.865
TSD_Z_score	.188	23	.035*	.917	23	.057
CS_score	.201	23	.017*	.903	23	.030*

a. This is a lower bound of the true significance.

b. Lilliefors Significance Correction

*. Significant diff.

Source: own processing, 2024

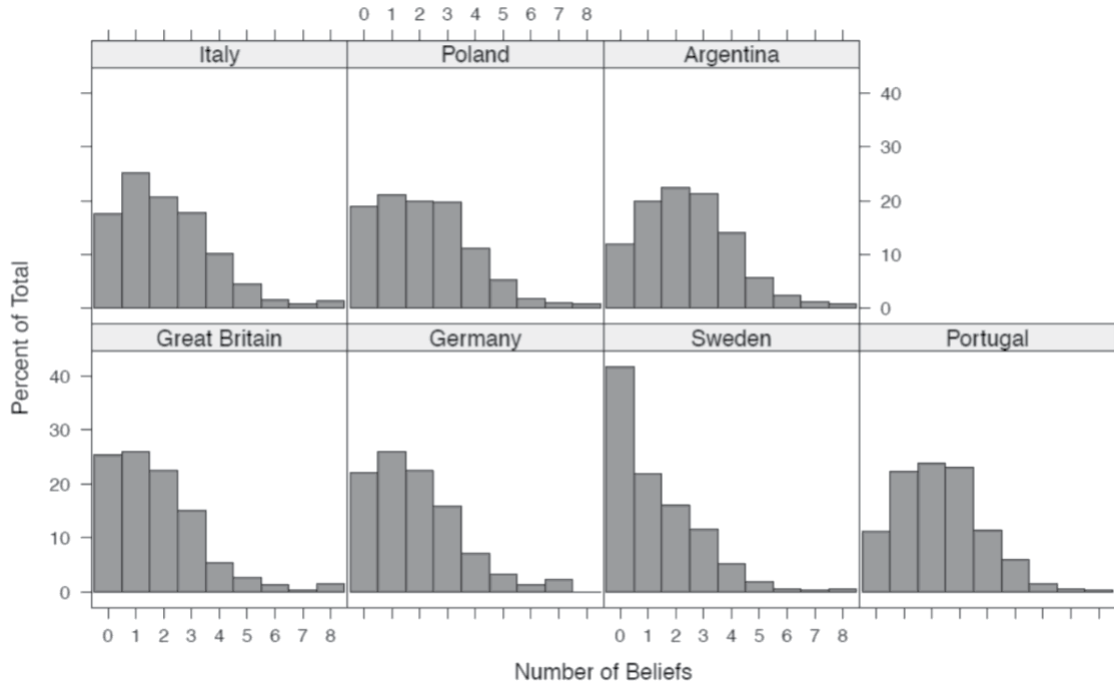


Figure 2: Distribution of conspiracy belief count in each country
 Source: Smallpage et al. (2023, p. 11)

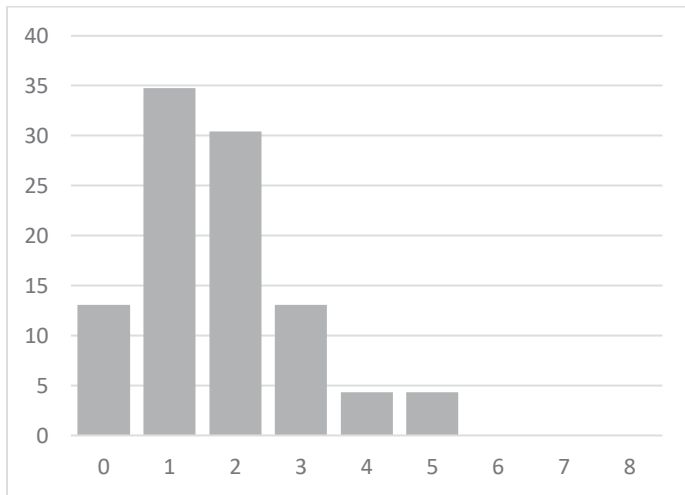


Figure 3: Comparison with the results from Slovakia
 Source: own processing, 2024

Table 3: Results of the statistical analysis of relationships between the monitored variables: rigidity (BRT score), creativity (TSD-Z score) and belief in conspiracy stories (CS score)

Nonparametric Correlations		BRT_score	TSD_Z_score	CS_score	
Kendall's tau_b	BRT_score	Correlation Coefficient	1.000	-.231	.047
		Sig. (2-tailed)	.	.141	.781
		N	23	23	23
	TSD_Z_score	Correlation Coefficient	-.231	1.000	.109
		Sig. (2-tailed)	.141	.	.507
		N	23	23	23
	CS_score	Correlation Coefficient	.047	.109	1.000
		Sig. (2-tailed)	.781	.507	.
		N	23	23	23

Source: own processing, 2024

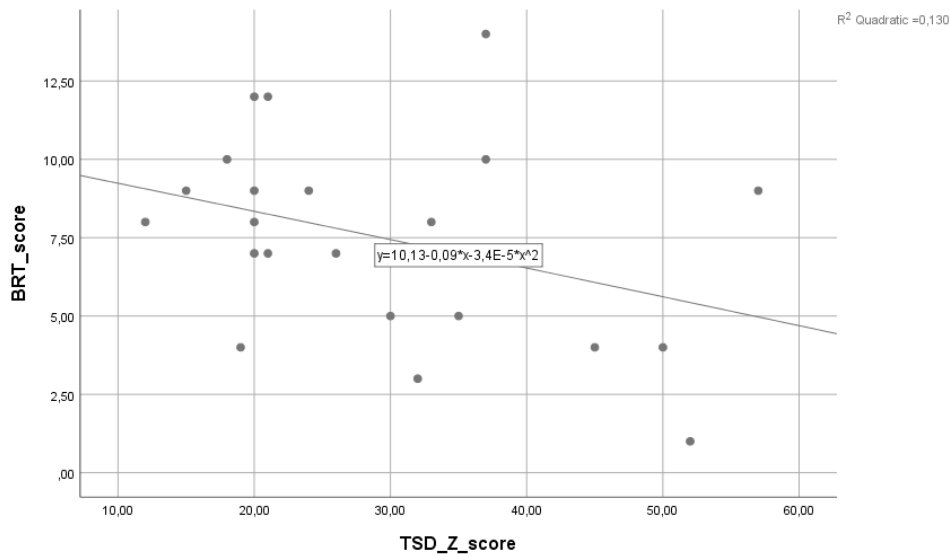


Figure 3: Expected negative linear relationship between rigidity (BRT score) and the level of creativity (TSD-Z score) in the investigated sample of university students
Source: own processing, 2024

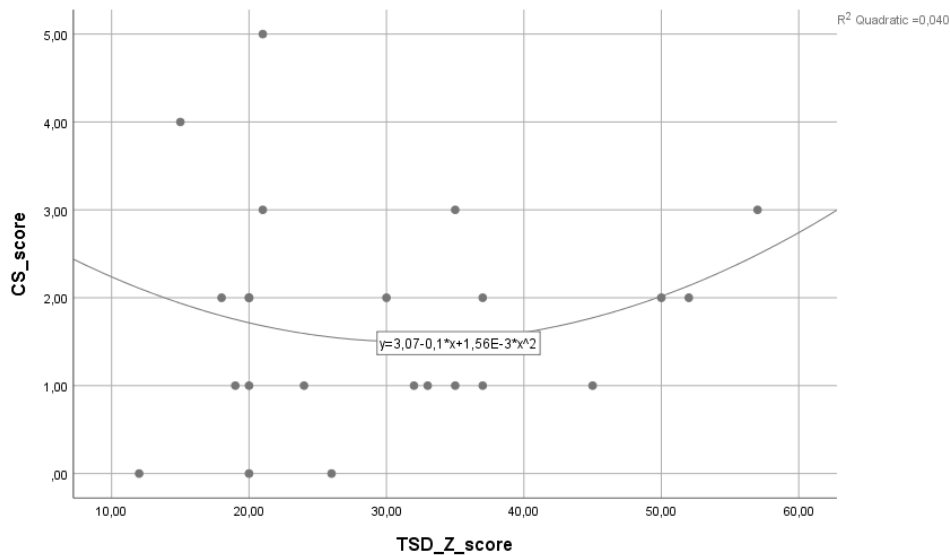


Figure 4: Estimation of the possible non-linear relationship between beliefs in conspiracy stories (CS score) and the level of creativity (TSD-Z score) in the investigated sample of university students.
Source: own processing, 2024

These authors tested two different conditions for identifying the penetration of conspiracy stories in seven countries. Randomly formed groups of respondents were presented with two different wordings of questions aimed at the belief in conspiracy stories. The authors obtained remarkably consistent results across the board in all tested countries, and found that the respondents in the groups with the question “how many of the presented stories do you believe in” admitted to a greater number of conspiracy stories than the respondents in the groups with the question “which of the presented stories do you believe in” (on average by 0.5 sd, Condition 1 $AM_1=1.53$, Condition 2 $AM_2=2.31$) (Enders et al., 2021). The authors attribute the above to socially desirable responses and a systematic underestimation of conspiracy beliefs. In our sample, we identified an average score of 1.74, which is in the lower part of the interval compared to other countries. The reasons and possible interpretations of this result are discussed in the relevant section.

The expected significantly negative linear relationship between creativity and rigidity was not confirmed in our sample (see, Table 3) (RQ2) although the data in the graph form indicate this direction (Figure 3). We also have to provide a negative answer to RQ3: no significant relationship between the belief in conspiracy stories and rigidity was noted in the studied sample of university students (Table 3).

As part of our analysis, we also determined whether creativity (TSD-Z score) serves as prophylaxis against the belief in conspiracy stories (CS score). The statistical confrontation of our data did not show this relationship (Table 3) (RQ1). Considering the fact that weak correlations do not necessarily mean that there is no connection between the variables at all, but rather that no linear relationship exists, we tried to identify a quadratic function based on the measured data as illustrated in Figure 4. The convex shape of the curve indicates that the tendencies in the susceptibility to conspiracy theories are similar in the extreme values of creativity (low and high) and weaker in the medium values. This finding is interpreted and discussed in the next section.

4 Discussion and Limits

The results make us conclude that the reliability estimate of internal consistency in the rigidity test is at ($\alpha > 0.69$) in the presented pilot study. These results are consistent with those presented by A. Proroković (2002) two decades ago who verified the psychometric properties of the rigidity questionnaire on a Croatian sample of university students ($\alpha > 0.70$). At the same time, it was shown that the internal consistency of the rigidity test is in the acceptable range and borderline good, which is a better result in comparison with Serbian university students ($\alpha > 0.50/0.60$) whose psychometric properties in the rigidity questionnaire were verified relatively recently by J. S. Starčević (2020).

In our sample, the susceptibility to/belief in conspiracy stories was in the lower part of the interval (an average score of 1.74) and, compared to other countries, it is closer to the results collected in Sweden and Great Britain than to the countries with a higher degree of belief in conspiracy stories, such as Portugal and Poland, in the research studies by S. M. Smallpage et al. (2023). Considering the 2022 (Globsec Trends, 2022) Globsec findings, according to which Slovakia is one of the most conspiratorial countries (54% of respondents believe in conspiracy theories and manipulative narratives), the results obtained by us are surprising and optimistic. They indicate that the younger generations at universities have a higher resistance to conspiracy stories than the rest of the population. However, these indications must be examined more closely and supported by data from older cohorts, and also from younger respondents from an unsorted population (outside the university environment). If the above trends are confirmed through extensive research, they may signal a positive impact of higher education on the resistance to conspiracy stories and an adequate level of critical thinking. However, the findings presented by us have significant limitations because our data were collected from a considerably small sample of respondents, which did not form a representative sample.

The results did not confirm our assumptions regarding creativity and resistance to premature conclusions in people who are more resistant to conspiracy theories. We noticed that the respondents with lower creativity were more likely to succumb to conspiracy stories, however, the relationship between these two variables is apparently not linear, and it seems that people with both low and high creativity (as opposed to those with average creativity) show similar signs in relation to conspiracy stories. However, we believe that it is too early to interpret this trend considering the small size of the sample, non-significant results and the fact that the findings cannot be generalized.

5 Conclusion

Based on the above facts, we can draw the following conclusions:

- the results suggest a negative relationship between rigidity and human creativity but are non-significant in the observed sample of university students;
- a significant linear relationship between human creativity and the belief in conspiracy stories (CS) was not confirmed although a trend indicating a possible non-linear nature of this relationship (in the studied sample) was shown;
- a significant linear relationship between rigidity and the belief in conspiracy stories (CS) was not confirmed;
- the research has limitations (low number of respondents, gender imbalance, lack of other factors and moderators) as it was only focused on a section of one single age cohort.

This preliminary study needs to be supplemented by other identification and diagnostic methods (specific creativity tests, identification of the need for structure and personality variables) as well as by a more robust and representative research sample, possibly also including different age cohorts.

Likewise, the confrontation with outputs created through artificial intelligence (AI) also poses a huge challenge – especially those that deliberately manipulate sound, images or even entire video recordings (the so-called deep fakes). Certain forms of deep fake can already generate new conspiracy stories or create evidence for those that have been known for some time. For example, one of them is a fake video of President Nixon announcing the Apollo 11 disaster (Stocker, 2019).

The ability to face and process such content will definitely require other skills and knowledge, especially in the field of technology, in addition to sound personal judgment, a flexible mind and critical thinking.

On the other hand, when used correctly, AI can also become a means of improving critical thinking and reducing the beliefs in conspiracy stories. Stimulating research along these lines was carried out by T. H. Costello et al. (2024) with 2190 participants (believers in conspiracy stories). Through mutual dialogue, AI was able to reduce the belief in specific stories that each of them articulated by an average of 20%. Likewise, their conspiratorial thinking generally decreased and this result persisted even after two months since the conclusion of the study.

Despite the limitations in the interpretation frameworks of the research results presented by us, we believe that the pilot study has shown certain tendencies. It has also been shown that the tendency to succumb to conspiracy stories is a more complex phenomenon, which requires a multi-layered approach, and as suggested by other studies (Costello et al., 2024), the sources of this resilience can also be found in the constructive use of creative dialog and skills, which also encourage and foster critical thinking.

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SELF-PRESENTATION OF CZECH AND SLOVAK HIGHER EDUCATION INSTITUTIONS IN PROMOTIONAL VIDEOS: THE CASE OF TECHNICAL UNIVERSITIES

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Abstract:

Self-promotional videos have become a key tool for universities to attract prospective students. These videos often blend academic content with symbolism and entertainment, extending beyond traditional informational purposes. Despite their growing importance, little research exists on the institutional images they convey. This study addresses this gap by analyzing self-promotional videos from Czech and Slovak technical universities inspired by the principles of critical multimodal analysis. It examines the visual, auditory, and textual strategies used to represent institutional identity, values, and goals. The findings reveal how universities balance creating unique narratives with adhering to generic marketing conventions. In a competitive academic landscape, understanding these dynamics is vital for institutions seeking to stand out while maintaining authenticity and credibility. This research contributes to the discourse on education marketing by highlighting the role of audiovisual content in shaping public perceptions of universities.

Key words:

Czech Higher Education. Higher Education Marketing. Marketization of Universities. Multimodality. Self-promotional Recruitment Videos. Slovak Higher Education.

1 Introduction

In recent decades, universities worldwide have undergone significant transformations, with marketing and public relations becoming integral components of their operational frameworks. Higher education institutions have established dedicated marketing and PR departments, often expanding into full-fledged communication divisions focused exclusively on achieving the university's marketing and promotional goals. These divisions are responsible for creating recruitment campaigns, maintaining a unified visual identity, and deliberately shaping the university as a brand.

This shift has brought an increased adoption of marketing methods and practices typically associated with the private sector, a trend that can appear paradoxical when juxtaposed with the original mission, goals, and values of universities. Academic literature often refers to this phenomenon as the *marketization of universities* (Deem, 2001), which reflects a broader transformation within higher education. At the same time, adopting marketing strategies can be interpreted as a necessary reaction or “strategic response” (Elken et al., 2018) to the increasingly competitive nature of the higher education sector. This competition is fueled by two key factors: the rising number of universities and the steady decline in the student-aged population leading to intensified efforts to attract prospective students. In the Czech context, these developments have been analyzed by Chládková et al. (2021).

The role of online social media as a tool for facilitating communication between universities and the public has been the subject of considerable scholarly attention (cf. Sørensen et al., 2023; Eger et al., 2020; Peruta & Shields 2018). Within the Czech-Slovak context, this topic has recently been explored by Eger & Gangur (2024). Less research attention has been devoted to the analysis of the content of promotional videos, despite their

steadily increasing number. In the light of these gaps in scholarship, we asked the following main research questions:

RQ1: How do the selected Czech and Slovak technical universities represent themselves in their promotional recruitment videos? For instance, which individuals, objects, settings, and associated actions are depicted in these videos? What additional activities are presented as being connected with studying at the university?

RQ2: What are the similarities and differences in how these universities construct their institutional identities and relationships with prospective students?

This study is inspired by critical multimodal analysis (cf. Ledin & Machin, 2020) and seeks to address this gap by examining how action, movement, imagery, sound, and spoken text come together to represent university study. Specifically, it explores which actions are emphasized and which topics are backgrounded or de-emphasized. By focusing on this specific type of content, the study aims to provide insights into how selected Czech and Slovak technical universities strategically use YouTube to position themselves in a competitive educational market. Additionally, the study considers which activities the universities choose to highlight and which they minimize. Interestingly, while advertising for commercial products frequently employs scientific language or scientific experts as part of a broader marketing strategy (Chen, 2015), these promotional videos appear to avoid overtly foregrounding science. Instead, science is often relegated to the background, serving as a visual element or “props” (e.g., tools and instruments). Moreover, the videos often attempt to balance the theme of studying at a technical university with outdoor or extracurricular activities that are not directly related to academics.

1.1 Sample Construction

The scope of this study is limited to first-contact recruitment videos of universities, defined as videos designed to engage prospective students and indirectly aimed at a broader public audience and their aim is to showcase the diversity of life associated with the university as an institution.¹ The analysis focuses on content hosted on YouTube, a platform that has become a key tool for university marketing over the past two decades and continues to serve as a reliable medium for communication, extending beyond student recruitment purposes (Boy et al., 2020). Currently, virtually all Czech and Slovak higher education institutions operate their own YouTube channels, where they share promotional and marketing content and employ these videos to construct and communicate their brand. While institutional image is influenced by a variety of factors (Aghaz et al., 2015), the depiction of campus life, academic programs, and facilities in such videos plays a significant role in shaping prospective students’ perceptions and guiding their educational decisions.

Although these self-promotional videos represent only a segment of the marketing strategies employed by universities, we believe they offer an intriguing glimpse into the evolving self-conception of universities and are therefore worth examining in this way. They also offer valuable insights into how approaches to self-promotion have evolved over time. Especially Czech videos produced between approximately 2008 and 2015, and in some cases still used today, were often hosted on private YouTube channels or accounts belonging to private companies that created them on behalf of the universities. These earlier videos frequently lacked descriptions or active links to university websites, limiting their ability to provide additional information or guide potential applicants to apply for university study

¹ Author’s note: One commonly used type of promotional video, which universities frequently produce, was deliberately excluded from the analysis. This type, referred to here as “guided tour videos”, features a student as the main character who leads viewers through the university building, showcasing its interiors, facilities, academic programs, and other university-related activities.

directly. Moreover, many of these videos lacked descriptions altogether and were not integrated with other online communication platforms used by the universities. In many cases, universities did not feature these videos on their official websites in the past. Instead, links to standalone webpages, created as part of broader marketing campaigns, often appeared below the videos on YouTube. Similarly, many of the earliest promotional videos lacked official university logos or clear evidence of deliberate brand-building efforts. This contrasts sharply with the current state, where Czech universities frequently launch comprehensive marketing campaigns explicitly focused on brand development. Videos hosted on YouTube also reveal how universities work with their branding and identity. This ranges from videos placed on private YouTube channels (e.g., BUT, *I Love You My BUT*) to dedicated YouTube channels with links to their official websites and other online social networks. These channels often feature embedded introductory videos, simple website URLs directing viewers to YouTube, and the use of additional marketing tools, such as hashtags.²

For the purposes of this analysis, videos were selected from a sample representing eight prominent technical universities in the Czech Republic and Slovakia. The selection followed a purposive sampling method, whereby videos were deliberately chosen to represent the most common types of promotional content. One video was selected for each university to exemplify a specific type. The analysis includes videos initiated by the universities themselves, produced by external entities, officially endorsed by the universities, and currently available on their official YouTube channels. This sampling approach allows the findings to be contextualized within broader international studies (see, Gottschall & Saltmarsh, 2016; Sørensen et al., 2023). The methodology was chosen due to the constraints of the research scope, as the study is limited by page count requirements. The sampling method also draws upon the findings of an unpublished quantitative content analysis of promotional videos from Czech universities and their faculties, which examined a total of 191 videos from 31 different Czech higher education institutions produced between 2004 and 2016 (Burešová & Chvojková, 2016).

A total of 41 videos from the period between 2008 and 2024 were available for analysis. Ultimately, one video per institution was selected. This selection was feasible given that the videos are visually quite similar in type, featuring increasingly standardized and codified ways of visualizing information, and serve as practical examples of the technologization of communication (cf. Sataøen et al., 2023). Videos of a purely informational nature, which align with expected formats but do not provide new analytical insights, were excluded from the sample. Instead, videos were chosen that, through their content, communicate values, traditions, or concepts associated with the university as an institution in an unconventional way. Brno University of Technology (BUT) has the largest number of videos, as it has been producing unique and extensive recruitment campaigns annually since 2013. These campaigns often include an entire series of videos and frequently even a dedicated website promoting studies. The University of Žilina was also included in the sample, despite being the only institution in the group that is no longer exclusively a technical university. Its inclusion was based on several factors: historically, it was a purely technical university before expanding to encompass additional technically oriented disciplines. Nonetheless, it continues to play a significant role in the field of technical education. Moreover, its promotional video *Beating Heart of the University* (Žilinská univerzita v Žiline, 2021) was selected as it serves as a prototypical example of content emphasizing university values.

² Author's note: An example of this type can be the name of YouTube channel of VSB-TUO (n.d.).

Table 1: Selection of technical universities

Czech Republic	Number of videos during the years 2008 – 2024	Title of the chosen video for analysis	Video Length
Czech Technical University in Prague (CTU)	1	<i>Study at the Czech Technical University (2022)</i>	2:23
Brno University of Technology (BUT) ³	15	<i>I love you my BUT! (2013)</i>	3:48
VSB – Technical University of Ostrava (VSB-TUO)	11	<i>VSB-TUO Ostrava – It Will Shape You (2013)</i>	2:00
Technical University in Liberec (TUL)	5	<i>PROMO TUL 2022 (2022)</i>	2:00
Slovak University of Technology in Bratislava (STU)	3	<i>Discover YOUR future at STU! (2022)</i>	1:27
University of Žilina (UNIZA) ⁴	6	<i>Beating Heart of the University (2021)</i>	1:38
Technical University of Kosice (TUKE) ⁵	1	<i>The Future is in your hands (2020)</i>	3:38
Technical University in Zvolen (TUZVO)	3	<i>TUZVO presentation (2020)</i>	1:31

Source: own processing, 2024

2 Methodology

This analysis adopts a methodological framework based on the principles of critical multimodal analysis, drawing on the approach detailed by Ledin & Machin (2020). This methodology looks at “how we make meaning multimodally by the use of different semiotic resources in order to understand how we communicate through semiotic materials” (Ledin & Machin, 2020, p. 31). For the purposes of this analysis, the following “inventories” were coded in the videos: actors, actions, attributes, environments, symbols and visual elements, voices, music, and color. The analysis also aimed to examine how these individual elements and semiotic resources are integrated and interact to construct meaning. Specifically, attention was given to how different modes – such as language, imagery, and sound – combine to convey messages and shape the representation of universities in the videos. This approach facilitates a detailed exploration of the interplay between visual and linguistic elements, as well as the cultural and social connotations embedded in these representations. This analysis has its limitations, as it focuses exclusively on multimodal content and does not account for all facets of these videos or their broader societal impact (cf., Sataøen et al., 2023).

3 Results: Main Characteristics of Promotional Videos

All the analyzed videos combine various modes of communication in some form: visual, auditory, and textual elements, which are intended to work together to create a comprehensive representation of the universities. The duration of the individual videos varied,

³ Author’s note: As part of some campaigns, multiple videos were created; however, the sample always includes only one introductory video for a specific campaign.

⁴ Author’s note: For the latest campaign from 2024 titled “Change the World with UNIZA”, only one of the introductory videos is included, similar to the approach taken with BUT videos.

⁵ Author’s note: Only official university videos were included, i.e., videos that are either hosted on the university’s YouTube channel or explicitly credited to the university as the author. In the case of TUKE, the extensive campaign “Discover TUKE with...” was not included, as these videos no longer fall under the category of primary recruitment videos.

with the shortest clip lasting 1 minute and 27 seconds (STU) and the longest 3 minutes and 48 seconds (BUT)⁶.

All the videos, except for CTU, have catchy titles that serve as direct slogans from the universities' promotional campaigns. Despite differences in titles, the universities appear relatively homogeneous in terms of the content represented. Commonalities dominate over the emphasis on uniqueness, which Sataøen et al. interpret as "indicating the presence of a field-level logic" (Sataøen et al., 2023, p. 265). The commonalities include first of all young people functionalized as students. The exception is UNIZA, which features middle-aged or older individuals whose names and roles within the university are explicitly identified (three former rectors and the current rector, their names are mentioned in the video in the written form). However, such representations are less commonly included. Most of the actors are impersonalized. We do not know their names or whether they are actors hired to play in the video.

Regarding activities during study, students are mostly portrayed as relatively "passive", shown sitting in class, listening to lecturers, taking notes, or using technology. In three videos students are actively engaging with each other during studying, both in the classroom as well as in dormitories (CTU, TUL and partly TULVO). Conversely, they are depicted as more active in extracurricular activities, spending their free time together – engaging in sports, attending parties, relaxing in parks, or socializing in cafés. University officials appear in only one video (UNIZA). Likewise, only one video portrays lecturers actively teaching, speaking, and writing on a board (CTU). Some videos feature individuals working in laboratories, using tools and technologies; a few are even shown wearing lab coats, indicating that they are researchers (VSB-TUO, STU). In the majority of videos, attributes associated with technical universities and studies appear, such as the depiction of tools, technologies, and automobiles (CTU, BUT, STU, VSB-TUO). A unique element in the case of the Bratislava Technical University is the use of a Formula 1 car as an accompanying vehicle, which incorporates certain fictional elements, such as driving through areas where motor vehicles are prohibited. In most of the videos a wide range of non-academic activities are emphasized: they include sports and social engagement like parties of meeting with friends and are characterized by playfulness and collaboration (BUT, CTU, VSB-TUO, STU). These findings align with the analysis of representations of Scandinavian universities (cf., Sataøen et al., 2023). In two Slovak videos (STU and TUZVO) also feature folkloric dance. A preliminary exploratory study mapping the field of Slovak videos revealed that folklore is not limited to a single video and this phenomenon therefore warrants a more detailed analysis on a broader sample of videos.

The logo and name of the university were entirely absent in one video (BUT). In other videos Logo appear throughout the video, whether in the middle (TUCE) or at the end (UNIZA, CTU, STU). Only in one video (VSB-TUO), the logo and name are displayed throughout, incorporated into a merchandising product – in this case, a T-shirt. The Slovak University of Technology (STU) also employs merchandising principles, but the T-shirt featuring the university's name appears only at the end of the video. An interesting example of logo integration can be observed in the case of the University in Zvolen (TUZVO). The video opens with an aerial shot of a building, which gradually transforms into the university's logo. The shape of this building is creatively employed as a key element in the university's brand identity.

⁶ Author's note: As shown in our previous yet unpublished analysis (Burešová & Chvojková, 2016), the length of the videos reflects the recent trend of decreasing average video duration over the past years (although only a limited number of videos from 2004 – 2010 were analyzed).

In almost none of the videos, except for VSB-TUO, are the academic programs offered by the universities explicitly presented. In one case (BUT), virtually no information about the programs is provided. At the same time, however, nearly all the videos repeatedly portrayed student's life as fun, relaxed, or stress-free (BUT, CTU, STU, TUL, TUZVO). All the videos emphasize, in some way, the unique atmosphere of the university or the city where it is located (CTU, STU, UNIZA, VSB-TUO, BUT). The representation of their placement thus becomes one of the few aspects that make them distinguishable from one another. In all the videos, bright and systematic colors appear, serving as indicators that studying brings only positive experiences. As Ledin & Machin put it "bright pastel shades help to communicate simplicity and optimism" (2020, p. 211).

3.1 Three Types of Videos

In the course of my analysis, three primary categories of promotional videos were identified, closely corresponding to the varieties outlined in the study *Creating "The University Experience"* (Sataøen et al., 2023). These categories represent distinct approaches to portraying the university and its values, and multiple features of individual types can appear within a single video. The first category comprises student-centered videos, which exclusively feature students. These videos are designed as promotional tools aimed at fostering a sense of belonging and community among both current and prospective students. A clear example of this type is the video produced by the Technical University in Brno (BUT). The BUT video takes the form of a music video, featuring a singing BUT graduate who expresses strong emotional gratitude throughout, crediting the university with his success and the positive outcomes in his life. The video includes intertextual references to the sitcom *IT Crowd*, with the character Moss making an appearance, and explores the theme of "otherness", conveyed primarily through visual elements rather than spoken words. The storyline follows a young student whose life was allegedly "saved" by BUT.

The video is characterized by a playful tone, set against the backdrop of university dormitories, where the protagonist interacts with like-minded students. Subtle references to *IT Crowd* appear throughout these scenes. Notably, the video features almost no representation of lecturers or researchers. A brief exception occurs in a recording studio, where middle-aged individuals appear behind a glass window, possibly intended to represent faculty members. Additionally, the video offers little depiction of the university's interior spaces or academic activities directly related to studying, except for hobby-like pursuits such as assembling technical devices – activities the protagonist is shown engaging in even before attending BUT. The field of study pursued by the student and the specific ways the university contributed to his success are left ambiguous. The video gives the impression that interest in technical subjects, playing videogames and the act of studying are deeply interconnected, with no distinction between academic work, playing with technical equipment, or engaging in virtual reality games. Ultimately, the video suggests that the main benefit of studying lies in the opportunity to connect with similarly "different" or "unique" individuals who share the same interests and worldview. It also implies that graduating from a technical university does not require extraordinary effort, talent, or hard work.

The second group of videos consists of so-called market-centered videos (cf., Sataøen et al., 2023). These videos focus on what the university – and by extension, its students – can contribute to society through the market. They emphasize the transformative effect of the student's educational experience, either by highlighting the contrast between who the student was before their studies or, as Sataøen et al. put it, "by stressing the university's capacity to be a change agent and knowledge provider for the so-called 'real world'" (2023, p. 269). A prototypical example of this type of video is the one produced by the Technical University of

Ostrava (VSB-TUO). In this video, the recurring message is that “you need the school”. The student’s voiceover explicitly states:

It’s hard to build a water-powered car or some other similarly genius invention at home on your desk. You need the right facilities, materials, and funding, but most importantly, the right people to guide you. And I found all of that at VSB in Ostrava.⁷ (VSB – Technická univerzita Ostrava, 2013)

This statement encapsulates the core message of market-centered videos: the university provides the resources, knowledge, and mentorship necessary for students to make a meaningful impact on society and the market. The video of Technical University of Ostrava (VSB-TUO) is structured as a combination of two layers. In the first layer, individual students introduce the university and its academic programs, while the second layer features scenes from university life. However, the relationship between the visual elements and the verbal narration is relatively loose. The main protagonists in the video are four individuals – three male students and one female student – who guide viewers throughout the video. Each appears on screen individually. All protagonists wear white T-shirts with the VSB logo, look directly into the camera, and are filmed in medium close-up shots. Their speech is informal, using colloquial Czech, and they address potential viewers directly with informal pronouns. This direct appeal is further emphasized by their use of expressive gestures accompanying their narration. The video’s color palette aligns with the university’s branding. In the central portion of the video, one protagonist is always present on the left side of the frame against a blurred background. On the right side, scenes from university life are displayed, rendered in soft blue-green tones that match the blue in the university’s logo. The video content includes to a large extent depictions of practical education and technical equipment, as well as scenes of chemical laboratories and close-ups of chemical substances in test tubes. Common topic in these videos is how universities are trying to influence the future, though the films offer no clear vision of this future. This can be illustrated by TUKE promotional video titled *The Future Is in Your Hands* (Technická univerzita v Košiciach, 2020). The video does not explicitly demonstrate how an individual can actively shape the future. A similar approach can be observed in other videos that engage with the theme of the future (e.g., TUL, STU).

Additionally, the video incorporates the almost mandatory category of “entertainment”, represented by footage from a music festival and scenes of students enjoying themselves in the city’s nightlife. One shot captures a gym, aligning with the “sports” category. The university’s identity is also highlighted through three extended shots of the campus and various university interiors. While educators do appear in the video, they are shown exclusively interacting with students.

The video of Technical University of Brno (BUT) could also be classified within this category, as it repeatedly emphasizes – albeit in an abstract manner – that it is the best school and an “agent of change”. However, unlike Technical University in Ostrava (VSB-TU), it does not clearly specify the nature of the change it brings. Instead, these can only be inferred through associations with the symbols depicted in the video, such as various technologies, components, or the virtual environments of computer games.

The last type of videos represents an orientation toward the organization itself. According to Sataøen et al. “these videos are implicit answers to the question

⁷ Author’s note: Text is translated from Czech original text: “Těžko sestrojíš auto na vody nebo podobnej jinej podobnej geniální vynález doma na stole. Takže potřebuješ zázemí, materiál a peníze a hlavně ty správný lidi, který by tě vedli. A to všechno jsem našel na VŠB v Ostravě.” (VŠB – Technická univerzita Ostrava, 2013). The speech occurs in the time frame 00:08-00:22.

‘who are we?’” (2023, p. 270). Univerzity in Žilina (UNIZA) is an essential example of this kind. In it, a voiceover states:

Education means strength, research means the freedom of inquiry, an open mind and heart, a shared goal and future. These are the elements through which we discover ourselves and the world around us, as well as the roles we are meant to fulfill. We do not educate just one generation of people; we provide lifelong learning. Wherever we walk, we walk with our whole heart. We build UNIZA together, for you and for the generations to come, so that education inspires you and becomes a gift you give to the world. The symbol of the beating heart is the new logo of the University of Žilina.⁸ (Žilinská univerzita v Žiline, 2021)

The video of Prague Czech Technical University (CTU) is another example of this category. While the video from the University of Žilina (UNIZA) heavily relies on visual symbols enhanced by vivid and bright colors, the video from Prague Czech Technical University (CTU) highlights the facts and objectivity, which represent the key values of the university. Here, the male voiceover states:

The oldest technical university in the Czech Republic, founded in 1707, is located in the very heart of the capital city, Prague. It is a place where science, research, and education have gone hand in hand for generations. Over more than 300 years, the university has grown to encompass eight faculties and six higher education institutes, offering top-tier education across a wide range of technical fields. These include civil engineering, mechanical engineering, architecture, information technology, transportation, nuclear physics, biomedical sciences, electrical engineering, and even management. CTU is also home to thousands of students who aspire to dedicate their lives to technology, progress, and science.⁹ (Fakulta architektury ČVUT v Praze, 2022)

The above examples illustrate the differences in representation among the individual technical universities. While Prague’s Czech Technical University (CTU) has consistently relied on a traditional image of the university, emphasizing its values and traditions, Brno’s BUT adopts marketing strategies in its videos and subsequent campaigns¹⁰ that are unusual for the academic environment. These strategies resemble approaches typically seen in advertisements for private entities rather than those expected from a public institution.

⁸ Author’s note: Text is translated from Slovak original text: “Vzdelanie znamená silu, výskum slobodu bádania, otvorenú myseľ a srdce, spoločný cieľ a budúcnosť. Sú to časti, cez ktoré poznávame seba a svet okolo nás, a role, ktoré máme zohrávať. Nevychováme len jednu generáciu ľudí, vzdelávame celoživotne. Kamkoľvek kráčame, kráčame celým srdcom. UNIZA budujeme spoločne, pre vás a generácie po vás. Aby vás vzdelanie bavilo a bolo darom, ktorý dáte svetu. Symbol pulzujúceho srdca je nové logo Žilinskej univerzity v Žiline” (Žilinská univerzita v Žiline, 2021). The speech occurs in the time frame 00:35-01:27.

⁹ Author’s note: Text is translated from Czech original text: “Nejstarší technická univerzita v České republice založená v roce 1707 sídlí v samotném srdci hlavního města Prahy. Místo, kde se setkává po generace ruku v ruce věda, výzkum a vzdělání. Za více než 300 let se univerzita rozrostla na celkem 8 fakult a 6 vysokoškolských ústavů. Díky tomu nabízí špičkové vzdělání ve všech možných technických oborech. Od stavitelství, přes strojírenství, architekturu, informační technologie, dopravu, jadernou fyziku, biomedicínu, elektrotechniku, ale také například i management. ČVUT je zároveň domovem dvou desítek studentů, kteří touží zasvětit svůj život technice, pokroku a vědě.” (Fakulta architektury ČVUT v Praze, 2022). The speech occurs in the time frame 00:11-01:03.

¹⁰ Author’s note: For example, a follow-up campaign in 2015 featured the slogan “Become a Master of the Order of Ing.” (Vysoké učení technické v Brně, n.d.).

4 Discussion and Conclusion

This article has examined how universities present their image through promotional videos, interpreting this process as a marketing-driven strategy aimed at capturing the attention and interest of potential applicants. Despite numerous similarities in these videos, which often render them interchangeable (they could represent almost any university), Czech and Slovak universities employ distinct strategies in their self-promotion, reflecting their respective statuses and reputations. Slovak universities tend to emphasize symbolic processes, such as graduation ceremonies, which feature in most Slovak videos (not only included in the sample), as well as other ceremonial elements and symbols. Some videos also incorporate national motifs, such as traditional costumes (e.g., Trenčín and Bratislava).

In contrast, Czech technical universities demonstrate greater diversity in their promotional strategies. For instance, while the Czech Technical University in Prague (CTU) emphasizes its long history and esteemed reputation, Brno University of Technology (BUT) adopts a more commercial approach. Through frequent and comprehensive campaigns, BUT exemplifies the marketization of higher education (Kwong, 2000), utilizing a variety of marketing strategies and practices inspired by commercial enterprises. These campaigns highlight positive aspects of student life, including networking opportunities, outdoor activities, leisure pursuits, and campus facilities. This approach serves as a coping mechanism to navigate the intense domestic competition, as these universities primarily target local students. Notably, their limited production of English-language videos reflects a narrower focus on attracting international applicants.

These findings align with the classification of universities into three primary types based on their target audience. The results indicate that Czech universities tend to produce more student-centered videos, which emphasize personal journeys and social connections, or market-centered videos, such as those from VSB-TUO, which highlight the transformative potential of education. Slovak technical universities, on the other hand, more frequently produce university-centered or market-centered videos. Slovak videos also more often feature faculty members and official university representatives, for example, during graduation ceremonies, and place greater emphasis on campus spaces, symbols, and objects associated with academic life.

Despite this variety in thematic approaches, the videos remain largely homogeneous in their content across both the Czech and Slovak contexts, often appearing easily interchangeable. Universities, in their pursuit of effective marketing strategies, should aim to communicate themes that are uniquely tied to their brand and further develop these distinctive elements. Furthermore, they should not shy away from portraying the full reality of university life, including the intellectual effort, hard work, and challenges that accompany academic success. While the current emphasis on technological optimism is a hallmark of technical universities, introducing a more nuanced narrative could strengthen their appeal.

Additionally, universities should broaden the representation in their videos by including individuals of diverse age groups and professional roles. Addressing socially significant and complex topics, especially those representing major scientific challenges, would further underscore the pivotal role universities play in addressing global issues. Finally, as multimodal texts, promotional videos are uniquely positioned to portray the rich, complex, and multi-faceted nature of universities, including their inherent paradoxes. An important question for further consideration is how these videos can be designed to effectively preserve and convey the core values and identity of these institutions. It is essential to explore strategies that maintain authenticity while engaging prospective audiences and remaining aligned with the universities' broader mission.

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VALUING THE HUMAN INTERACTION: PUBLIC SENTIMENT TOWARDS VIRTUAL IDOLS IN K-POP

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Abstract:

The rise of artificial intelligence (AI) and its integration into everyday life has spurred a debate on human values and their role in society, especially within creative industry like K-pop. The increasing numbers of virtual idols in the South Korean music industry has prompted debates about their place alongside human idols. Virtual idols, although they have gotten recognition, still face mixed reactions. The aim of this paper is to highlight the current state of sentiment towards K-pop virtual idols, with a primary focus on the motivation behind negative comments using sentiment and topic analysis. As results show, while some fans appreciate the innovation, others criticize virtual idols for lacking personality, fan interaction, and uniqueness compared to human idols. Concerns also arise about the ethical implications, including reduced job opportunities for human idols and a possible loss of creativity in the industry. Despite positive sentiment toward their content, the future of virtual idols in K-pop remains uncertain, as personal interaction is a core aspect of the fan experience.

Key words:

AI Ethics. Artificial Intelligence. Creativity. Fan Interaction. K-pop. Virtual Idols.

1 Introduction

Due to popularization of artificial intelligence and its subsequent incorporation into everyday life, people have begun rethinking the human values and their stake in society. The artificial intelligence has affected several fields, moving from the arts, science, generative activity, to also anchoring itself within the creative industry. It is not something new, as AI has been in our environment for long, proven by the first efforts to incorporate AI into the media environment as early as the late 1990s (for more, see, Furtáková, 2023; Francistyová, 2023). Today, however, moral questions arise that address the status of artificial, virtual, augmented content in society. The concerns moved to Korean music industry, which is increasingly using advanced methods for a content refinement, but also putting in front of the consumers AI-generated/improved models of idols, also referred to as “virtual idols”, which, although they are only marginally replacing real people for now, are increasing their presence over the years. It is debatable why they are trying to include such content, as it is the industry where 60 to 80 groups debut annually (Tegami, 2024), and only few of those have chance to become big. The aspect of technological advancement could explain the individual reasons for implementation. Successful cases of artificially created artists such as Hatsune Miku in Japan or Lou Tianyi in China (although not the first prototypes but some of the most popular ones) have created the basis for the re-emergence of virtual singers in the music environment. Moreover, the motivation was reinforced by an increasingly evolving global market environment. Although the first Korean virtual singer was Adam, who debuted in 1998, it is only the current virtual idols who are experiencing the greatest success within the South Korean environment. Before them, however, the Korean industry tried to mirror the success of Hatsune Miku through the vocaloid SeeU, which although it had its fans, the project lacked financial support from the company and therefore never reached its potential. However, with the rise of interest in augmented reality, industry began to invest in this content. Big developer but also entertainment

companies started to create new virtual idols as a proof of technological progress and the desire to succeed in the market of digital humans and avatars.

However, the technological understanding neglects the social assumptions associated with this issue. Indeed, the South Korean music industry is highly competitive. In many cases, only 5% of newly debuted idol groups catch on annually (Sero, n.d.). Although this is a low number, trainees continue to hope that they are the ones who will break through. Moreover, training of such potential idol groups is costly, requiring huge staffing to cover all group members as well as soloists. It is also for this reason that entertainment companies today are expanding their reach and investing finances in augmented reality. Investments range on the spectrum from AI editing of idol pronunciations in songs, enhancing vocals, to face swapping in idols or even creating a K-pop group that exists only on the borders of the virtual world (for more, see: Stassen, 2024; Kwon & Watson, 2023). Even though some may think that financially it is an equally challenging burden, to create either virtual idols and human idols, but it is less financially difficult to create virtual idols in a long run. It is expected that by 2030, the value of the industry oriented towards digital humans and avatars is going to increase to approximately 485 billion euros (Lee & Hemphill, 2022), whereas in 2023 the value was “only” 19.8 billion euros (Ashim, n.d.). Although, it can be assumed that this is the future of the Korean music industry, K-pop places the emphasis on human connection, and thus the question arises as to the degree of application and the longevity of interconnection, and overall use of virtual elements in the industry. It should be noted that while the South Korean music industry has reached global audiences, it remains primarily oriented towards South Korean consumers. Despite all the “world tours”, K-pop artists most often perform (apart from South Korea) in countries that are close to them, such as Japan, Singapore, the Philippines, Malaysia, etc., but they also perform in Europe, the United States, and Australia. With the inability to visit all the fans and limited seats at the stadiums, not all fans have the opportunity to meet their favorite idols. This gap in K-pop is potentially to be filled by virtual idols. So far, however, they are not fulfilling this function as expected, as face-to-face communication is still preferred. One fan claims, that if she had the opportunity to meet her favorite idols in a 100-minute metaverse, or just 10 minutes in reality, she would choose in-person interaction over a 100-minute one in metaverse (Lee & Hemphill, 2022). Thus, the given statement points to the importance of real interaction, but also marks the role of augmented reality in K-pop as complementary and not stand-alone.

2 Methodology

The opinion on virtual reality in K-pop has diversified with the arrival of virtual idols. It has changed from the initial wow effect from innovation, curiosity about the new technology and its implementation, to the subsequent categorization of opinions into “like” and “dislike”. Despite the still small, but ever increasing presence of virtual idols in the music industry, consumers have divided into two camps. Those, who have no problem with the missing human aspect, and those, who perceive virtual idols negatively. The aim of this paper is to highlight the current state of sentiment towards K-pop virtual idols, with a primary focus on the motivation behind negative comments. Our research materials are the comments under the videos from *Mave: Pandora*, *PLAVE Way 4 Luv*, but also *Done* by virtual idol Nævis. The research focuses on comments that have been posted until October 18, 2024. To be able to achieve this goal and to comprehensively approach the problem, we use sentiment analysis in this paper to identify the sentiment of English written comments and complement it with topic analysis mixed with word cloud, which focuses on identifying topics and words from the whole dataset. Sentiment analysis, according to Devik et al. (2016), is a way of categorizing text according to opinion orientation. Since we want to zoom in on sentiment, we analyze the

comments under the official music videos of virtual idols. We use an approach that has also been applied by Yessenov and Misailović (2009) to analyze the sentiment of movie reviews. The procedure we use to find the results has three steps:

- 1) Learning the research material, downloading the comments in .csv format, checking the downloaded data in English and then entering the document into the Commanalytic analysis program (Gruzd & Mai, 2024);
- 2) Determining the number of sentiment categories and setting the sentiment orientation to negative, neutral, and positive reactions, checking the results analyzed by the program as part of the program's use of biprogram checking via VADER and TextBlob;
- 3) Rechecking the analysed data and interpreting the results.

It is important to recognize that the TextBlob and VADER programs that we work with have their advantages and disadvantages, so we point out both results in the paper. While TextBlob focuses on words, making it an easy tool to identify toxic or positive speech, VADER notices the contexts that are in the comments. VADER notices nuances, but also the use of capital letters, etc. Its disadvantage, however, is a lower level of reliability precisely because of its identification of contexts, which it may sometimes have trouble with. Thus, for TextBlob, there is a higher reliability rate because of learned dictionary terms (Mohammad, 2023). But it has also its own disadvantage, e.g. when identifying a group of toxic words in a positively tuned post, it can affect the results. Therefore, it is advisable to use both programs in sentiment research as they complement each other. Since the selected programs do not support Korean language, the results of sentiment analysis will only apply to comments in the available language that they can identify, and that are longer than 3 words. For this reason, the sentiment analysis will be limited to the English language, while the other parts of the research will be reflected on the whole dataset regardless of used language.

Another method we use in this paper is topic analysis supplemented with a word cloud. This is a method that is closely related to the language and lexis in the comments. According to Kim and Lee (2021), it is a type of analysis or model that groups topics by clustering them based on similar or the same meaning. This is done through matching words with the same context (Kim & Lee, 2021) or, as in our case, through an algorithm of a program searching for the same words, topics and utterances (but also emoji). In practice, this type of method is also called “topic modelling” (“Text and Data Mining Methods”, n.d.), and is defined as a data mining method that examines and analyses texts to be able to identify words (especially if they are machine-based programs), but also meanings (if they are language-based programs). In this paper, we will do topic analysis and the word cloud from all available comments under music videos, since topic analysis and word cloud do not refer to the content, but to the set of words occurring within the comment. For a program to be able to evaluate or determine a topic, at least 10 comments must be present in a topic. With the topic analysis and the word cloud, there is a lower level of importance of meaning and thus no exclusive focus on the English language is necessary. For this reason, the results are in different languages, but the most salient comments, topics, or word cloud will be recorded in English and Korean, which also indicates whether the video is primarily received by global audiences or domestic-South Korean audiences.

3 Results

3.1 *Mave*: – *Pandora*

The results of the sentiment analysis of the comments under the music video by *Mave*: refer to 8,988 English-language comments out of the original 18,934. However, leaving aside the deviations between TextBlob and VADER tools, which are considerably high but based on

- b) Appreciation for the music, music video, and group;
- c) Appreciation for innovation;
- d) Criticism for possible consequences of companies not wanting to pay human idols, working conditions;
- e) Criticism for possible consequences of lesser job opportunities for human idols;
- f) Criticism for concept of live performance in K-pop;
- g) Criticism for not offering anything unique than what is already offered by human idols.

4 Discussion

Individuals' attitudes towards virtual idols seem to be quite positive at the moment, as confirmed by our sentiment survey of all English-language comments (12,383), where the representation of negative comments was approximately 15.21% on average (VADER 16.6%; TextBlob 13.82%). Conversely, positive comments were predominant, as they averaged 49.46% (VADER 52.59%; TextBlob 46.33%). The analyzed comments show that the discussion under music videos touches on a spectrum of topics, with AI-related topics being one of the most present. As music videos and their creators, whether groups or solo artists, are idols that are made or sculpted through AI, the presence of AI related themes is not surprising. What is interesting, however, is the spectrum that touches upon AI and its influence in the South Korean music industry. While on average the comments are positive, the comments regarding the topic of AI and the music industry have tended to be critical and concerned about the future of K-pop. Despite the fact that viewers admired the virtual idols, but also the developers' ability to create these idols, and thus the overall innovative contribution of virtual idols to K-pop, there were more negative observations from fans. Not in quantity, however, but in the diversity of concerns about the arrival, implementation, and future of K-pop virtual idols. We reflect on 3 of the most frequently occurring criticisms that responded to a wide range of issues:

- a) working conditions and the unethical undertones of the transition to virtual idols;
- b) loss of creativity in the music industry;
- c) neglecting the essence of K-pop (live performance, parasocial relationship, social and fan interactions, etc.).

Among some of the most mentioned issues that viewers saw in the arrival and popularization of virtual idols was the exploitation aspect. Since in most cases contemporary virtual idols operate on the principle of modelling themselves after real people, the aspect of appreciating the real people behind the modelled idols is neglected. For example, in the case of *PLAVE*, the members of the group have their "people" who have lent them real voices. The company that manages *PLAVE* has noted that it does not plan to disclose the real models for the virtual idols and even plans to take "security and criminal action" (Miller, 2024) to find fans, who invade the privacy of *ghost singers*. According to the fans' comments, these real singers could be unappreciated, underrated, etc. Since the idols' salary is based not only on their performance – singing, but also on their presence in society. The fans see the problem precisely in the disadvantages for the people behind the voice, as well as the dance moves of the virtual idols.

Another critical point that is mentioned in the comments from fans is the aspect of loss of creativity. In many cases, fans do not see anything special about virtual idols, or significant enough to attract them to a group or soloist. There have been instances where they have claimed that groups resemble other human idol groups, and others note, that they resemble different virtual groups or soloists. Today, it is difficult to expect an innovative approach to processing and content creation when models are based on already existing elements. At the same time, the criticism due to lack of creativity in virtual idols is rather interesting, as fans neglect the

very problem of creativity in the Korean music industry in-between the human idols (Park, 2013), which has been under scrutiny for years. What fans noticed were the surprisingly identical elements between human idols and virtual idols, but they overlooked the issue of lacking novelty in K-pop in general. It is difficult to pinpoint an archetext and decide who first used some elements in the South Korean industry precisely because of their low creativity and constantly recycled elements (although they try to implement novel way how to recycle them). Thus, they view the issue of human idols uncritically.

The final point to address is the opposition to the arrival, spread, and popularization of virtual idols. Fans are critical when it comes to the essence of K-pop. Typically, human idols are forced to train for years to achieve perfection in order to perform in front of the audiences. Their constant striving to improve not only shifts their status within the music industry, where idols go from “rookies“ to “well-trained idols”, but also evolves their relationship with fans who have been with the idols since the beginning. It is unclear to what extent the characters – virtual idols in this case – who are programmed as perfect from the beginning, are able to retain fans. At the same time, given the nature of virtuality, the fan interaction between virtual idols and fans is also questionable. Currently, as the concept of the parasocial relationship is being reconceptualized from one-sided to “one-and-a-half-sided” (Kowert & Daniel, 2021), it is commonly implemented and proven to be shifting by South Korean human idols. The following questions remains: to what extent can a virtual idol be as a single persona, that has its own consciousness, and would not change (views, opinions, etc.) just to satisfy the needs of the individual it communicates with (same as when AI responds to questions individually)? Are virtual idols able to sustain the trend of deepened parasocial interaction and would not take a step backwards?

5 Conclusion

Consumer perspectives on the re-popularisation of virtual idols remain divided. While some appreciate the innovation and novelty in contemporary South Korean music production and its processing, others see problematic aspects and social impact with an increasing use of new tactics. Concerns relating not only to the human idols, the music industry, but also to the experience provided to consumers still raise the question of the extent to which virtual idols can be said to have a role as stand-alone – full-fledged idols in the South Korean music industry. Although the negative reactions present in the comment sections below the videos from virtual idols are less represented, it must nevertheless be said that these perspectives are shaping the discussion about the future of K-pop. The latter has so far been based on in-person fan interactions and the introduction of “perfect” idols that had their own distinctive features.¹ With the emergence of virtual idols, who are presented as perfect commodities for consumption, it is more difficult to create a bond between them and the fans, as in-person interaction is absent and the dimensionality of the virtual idols’ character also remains disputable. On the other hand, however, negative perspectives need to be anchored on the plane of the current state and development of virtual reality. With an increasing technological sophistication, it is possible that the problems associated with the inability of individuals to transcend the absence of in-person interaction will be conquered. However, with technological perfection, the gap oriented towards the position of human idols in the industry and their value to the producers, and hence their subsequent value, will widen. The value of creativity in society, which in this case will be purely subjective and not based on the assumption of mutual influence and a shared archetextual prime mover, will subsequently also widen the gap.

¹ Author’s note: It should be taken into account that people are not perfect, which makes fans curious. Of course, fans only accept imperfection if it does not go against their beliefs or fan fantasy.

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NEWS AT THE SPEED OF AI: AUTOMATING JOURNALISM THROUGH TEXT GENERATOR

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Abstract:

Radio news has long been one of the most effective ways of disseminating information to the masses. For this reason, it should be filled with clarity, concise, understandable and sufficiently saturated in content to be clear to listeners on first hearing and to answer basic news questions. Other aspects also enter into the process of creating a radio text for a radio news brief. These include not using specific numerical dates, abbreviations, complex words, foreign expressions, complicated sentences, overly long sentences, but also principles of journalistic practice such as objectivity, impartiality and unbiasedness. This study investigates the ability of a text generator controlled by artificial intelligence to write a short radio-read message in a radio broadcast environment, via the ChatGPT program based on the given prompts, which will specify the editorial requirements for the final text. Those would be used for real radio news broadcasting. We experimented by applying and correcting several prompts in several attempts to find out how ChatGPT can handle our queries and what it has the biggest problem within the context of using the Slovak language.

Key words:

AI Generated. ChatGPT. News. Radio Broadcasting. Text.

1 Introduction

Artificial intelligence in radio broadcasting has become a significant topic that is being debated in the fields of both scientific and practical media production. The application of artificial intelligence (AI) tools in journalism is becoming increasingly prevalent, with the objective of streamlining various tasks, enhancing the quality of reporting, and improving audience engagement. These tools employ machine learning, natural language processing (NLP), and other AI techniques to assist journalists in a range of aspects of their work (Macková & Mařík, 2023; Višňovský et al., 2023). Moreover, AI technology is no longer solely utilised for personal purposes. Following the emergence of ChatGPT in late 2022, AI has become increasingly prevalent in a range of professional domains, including the media. However, it is important to acknowledge that the media has been employing artificial intelligence for a considerable period prior to the emergence of ChatGPT (Furtáková & Janáčková, 2023). Višváder and Proner (2024) emphasize, that artificial intelligence is transforming also audiovisual production, significantly enhancing efficiency and opening new avenues for creativity across pre-production, production, and post-production phases. This phenomenon is parallel to the impact of AI tools like ChatGPT on the automation and improvement of journalistic text creation.

ChatGPT is an artificial AI chatbot that employs natural language processing to generate conversational dialogue that is human-like in its character. The language model is capable of responding to queries and composing a range of written materials, including articles, social media posts, essays, code, emails, and so on. ChatGPT is comparable to automated chatbots commonly found on customer service websites, as users can pose questions or request elucidation regarding ChatGPT's responses. The term 'GPT' stands for 'Generative Pre-trained Transformer', which refers to the manner in which ChatGPT processes requests and formulates responses. ChatGPT is trained with reinforcement learning through human feedback and reward models that rank the best responses. This feedback is

used to augment ChatGPT with machine learning, thereby improving future responses. OpenAI is an artificial intelligence research company that created ChatGPT and launched the tool in November 2022. ChatGPT works through its Generative Pre-trained Transformer, which uses specialised algorithms to find patterns within data sequences (Hetler, n.d.). Notable news agencies, including the Associated Press, Reuters, and *The New York Times*, have already incorporated artificial intelligence into their regular editorial processes. Many other media outlets are following this example. Even in the Czech Republic, where language complexity represents a challenge, this trend is being embraced (Macková & Mařík, 2023).

The thing we have in common with the Czech Republic is language, and therefore the shared problematic aspects of the effective use of artificial intelligence in radio news, or any generation of meaningful text. There may be several problems: the difficulty of the language, ignorance of the general realities necessary for editing and formulating news, as well as the principles of writing a journalistic piece – in our case, the genre of a short radio report, or a read report. According to Túñez-López et al. (2021) the impact of automation on news generation will be more pronounced in the context of structured data-based thematic coverage than in the coverage of local events. Therefore, it is recommended that journalists reinforce their personal contributions in order to focus on strategic implementation and delegate routine actions (operational processes) to the machine. This approach allows for a greater involvement in agenda-setting, with more prominence given to the cognitive contributions of the journalist.

Although AI is constantly evolving and improving, it is difficult for it to create the perfect media output. The problem of creating a high quality text for radio broadcasting is not only the fact that radio professionals should be perfect in their mother language, but it is also necessary to have the ability to interpret news in an effective way. Furtáková et al. (2022) mentioned that in order to enhance the quality of radio broadcasting in the context of news, it is imperative to refrain from the excessive use of pronouns, to employ nouns for the sake of clarity, and to restrict the use of adjectives in order to prevent any potential bias. It is preferable to utilise the active voice, as it is more engaging, and passive construction of sentences should be avoided unless necessary. It is advisable to refrain from using uncommon or superfluous words, and to avoid negative expressions when simple alternatives are available. It is preferable to use concrete terms in place of abstract ones, to avoid overwhelming the listener with numbers, and to employ familiar comparisons. When providing dates, it is recommended that journalists adopt a general rather than a specific approach. Instead of a concrete date, it is preferable to say, for example, “next Friday”, “next month”, and so on. Furthermore, it is essential to ensure that words are used in their primary meanings. Furtáková’s (2023) research showed that in its current form it was not possible to produce a message sufficient for radio broadcast on the first attempt; more than two attempts were needed to generate at least a basic text and they are often long with redundant information.

1.1 AI and News Text Creation

For any text creation or any collaboration with AI, it is necessary to know the basic instructions that serve as a guide for AI programs, these are called prompts. Prompts are critically important in interactions with AI systems, as they determine how the system interprets and responds to user requests. The prompts define the content and characteristics of the AI responses. The significance of prompts lies in the fact that they provide direction and context to the AI, which allows it to generate more relevant and accurate responses. A well-written, precise, and detailed prompt can assist the AI in better understanding of the user’s intentions and needs. Furthermore, prompts influence the style and tone of AI responses, particularly in domains such as creative writing or dialogue generation (Skillgo, 2024).

In this context, Alawida et al. point out that although ChatGPT is “a powerful tool for NLP, and it can help with many tasks, particularly those with high levels of repetition and redundancy, it is not a replacement for human intelligence” (2023, “9. Language Generation Quality” section, para. 1). They explain that human intelligence is capable of understanding context, interpreting meaning and making connections. They specified the differences between human-generated text and ChatGPT-generated text as follows (Alawida et al., 2023):

- human-generated text is characterised by the ability to convey meaning and intent, which also reflects cultural and emotional intelligence;
- human-generated text uses figurative language, idiomatic expressions and cultural references, which vary across settings and audiences;
- ChatGPT-generated text is based on patterns and stored data and therefore may struggle to take into account and understand cultural and social contexts;
- AI-generated text may also contain grammatical, stylistic and word-formation errors;
- AI-generated text may not take into account or recognise language that is considered exclusive or derogatory based on social norms and other cultural circumstances.

The findings from Alawid et al. have been confirmed in our previous research (see, Furtáková, 2023). We have made several attempts to draft the news, or to create individual parts, and this is because there are specific principles and guidelines for how a news text should look like. These include: simplified facts and basics of news explained, this is limited by both the scope and the time allotment that is incorporated per news block, a short read report, the associated portrayal of an event within 6 sentences, with a maximum of 15-20 words per sentence, the alternation of short sentences and clauses, simplified time entries, words in the active voice, colloquial style, or rounded numbers (Furtáková et al., 2022; Bôtošová & Furtáková, 2023).

It is incumbent upon journalists to exercise caution when utilising artificial intelligence and to ensure the veracity of the outputs generated by AI tools. While AI has the potential to enhance efficiency, automate tasks, and generalise data, it is also imperative for journalists to recognise which aspects, or outputs, they have utilised these tools for, and to what extent. It seems inevitable that artificial intelligence will have a profound impact on the future of journalism, ushering in a new era based on increased efficiency, accuracy, and audience or listener engagement. This also applies to automated fact-checking, which helps to combat the spread of misinformation and fake news. Concurrently, AI is capable of enhancing multimedia storytelling. AI-based tools facilitate storytelling, for example, in the form of virtual reality (VR) and augmented reality (AR). These innovative storytelling formats engage audiences in novel and compelling ways, enriching the reporting of news with the viewer experience (Ibrahim, 2024). According to Alwadi (2023) the integration of AI in the newsroom necessitates a meticulous approach. The purported potential of AI to revolutionise the media industry may unintentionally compromise the quality of news and journalism. Prior to news organizations adopting the latest AI tools, as is the case in other aspects of society, it is imperative to address the challenges that accompany it. The question is however, how it can cope with various languages that are not commonly used worldwide and have only local importance.

2 Methodology

The aim of this study is design an outline of prompt for ChatGPT which transforms the embedded news text into the radio news form. To achieve this, we use the experimental method, the essence of which is to investigate a situation under controlled conditions, where the researcher controls or influences one or more independent variables, and monitors changes in the dependent variables (Sedláková, 2014). During the research, we used controlled

experiments in which we administered different variations of the prompts and observed how their wording affected message generation.

In turn, we use content analysis to check whether the generated text meets the criteria of a radio text (or radio message). In content analysis, the text is examined by the categories that are anchored in the theoretical conceptions of radio news creations (Sedláková, 2014). These categories (and independent variables within the prompts) include, for example, genre, length of the content, number of words in a sentence, logical sequence of information, lexis and stylistics, etc. (for more information see, e.g., Bôtošová & Furtáková, 2023; Furtáková et al., 2022; Furtáková, 2023; Brník et al., 2020).

The research was made during the spring 2024 via ChatGPT program version GPT-4o preview (for more information see, OpenAI Platform, n.d.).

3 Results¹

When entering prompts into the program, we concentrated on some essential parts. In the first version of testing we focused on classic commands. The prompt, on which we started and whose criteria we subsequently modified, was:

act like a radio news anchor. Rewrite the text in brackets “< >” into a short read radio report, and the generated text must meet the following criteria: the length of the report is 5 sentences maximum; the number of words per sentence is 15 maximum; alternate simple sentences and clauses; the clauses must be simple; the information in the report must follow logically; the first sentence is an earcatcher; the verbs must be in the active voice; there must be no evaluative words; it must be in a colloquial style; round off the figures; do not use technical words; record the dates in the report for the day of the week with reference to today’s date.

The biggest problem occurred with the ‘first sentence is earcatcher’ command. The theory goes that the first sentence in a message should contain the most interesting information in the message to make the listener pay attention, and it should also provide the most basic information, i.e. answers to the questions: who, what, where, and possibly when. Whenever we had this criterion in the prompt, the generated message started with words like “Attention, drivers!”, “And now for the latest traffic information” or “In the latest traffic news”². For this reason, we have decided to remove this particular command from the prompt.

In the next step we examined the criteria as ‘number of sentences’ and ‘number of word in the sentence’. It should be noted that ChatGPT always met this criterion – the number of sentences and the number of words in each sentence did not exceed the specified values, but this was at the expense of the genuinity (and rhymability) of the text. According to the theory, a short read radio report should have a maximum of 5 sentences and a radio text should have a maximum of 15 words in a sentence. We know from practice that the number of words in a sentence in particular cannot always be kept to 15. On the other hand, however, we had to set some limit on the number of words per sentence, because in the experiments where we removed this criterion completely, ChatGPT started generating extremely long sentences with complicated conjunctions. While experimenting with prompts, the range was 5-8 sentences per message and 15-25 words per sentence. It is important to note that we never set a range within the prompt (e.g., 15-20 words), but rather specified “up to a maximum of ...

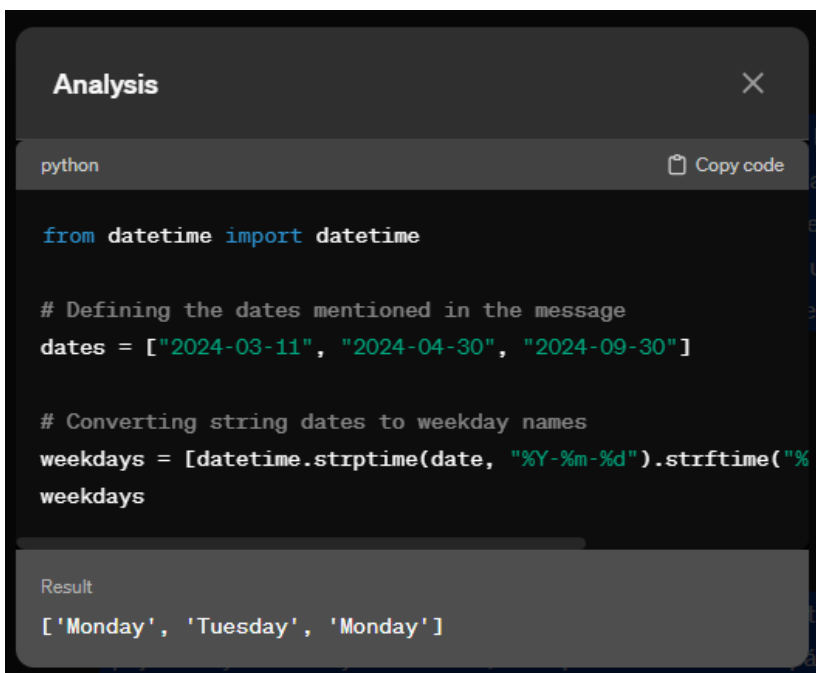
¹ Authors’ note: Neither the text of the original news agency report nor the generated results are part of the paper, as the research was done in Slovak and the translated text would not show the problematic parts that the text had.

² Authors’ note: The report in question was not part of the traffic news.

words”. After several experiments, we found that the best results are obtained when the maximum number of sentences in the prompt is set to 6 and the number of words to 20.

An important element of the radio text is that the verbs must be in the active voice. Previous research (see, Furtáková, 2023) has shown that ChatGPT cannot handle this cross-cue because it has no knowledge of the Slovak language and its specifics. Similar results came out for the lexical criteria (i.e. that it must not use evaluative, technical, administrative or foreign words). However, the research in question was done on ChatGPT version 3.5, so we left these criteria as part of the first prompt to see if the current, more developed version can handle the criteria. We found that the Slovak language continues to be a problem for ChatGPT regardless of its version, so we did not include the criteria in subsequent prompts.

Another criterion we worked with was dates. Within the prompt, we specifically stated to ‘substitute the dates in the message for the day of the week with respect to today’s date’. In the original report the dates were March 11, 2024, April 30, 2024, and September 30, 2024, the examination of this particular prompt was done on March 8, 2024.



The screenshot shows a code editor window titled 'Analysis' with a close button. The code is in Python and defines a list of dates, converts them to weekday names, and outputs the result. The code is as follows:

```
python
from datetime import datetime

# Defining the dates mentioned in the message
dates = ["2024-03-11", "2024-04-30", "2024-09-30"]

# Converting string dates to weekday names
weekdays = [datetime.strptime(date, "%Y-%m-%d").strftime("%A") for date in dates]

Result
['Monday', 'Tuesday', 'Monday']
```

Figure 1: Processing of the command ‘dates in the report upload for the day of the week with respect to today’s date’

Source: OpenAI (2024)

According to Figure 1, we can see that ChatGPT is able to detect what day a particular date falls on. However, it did not remove individual dates from the generated report, it only added a specific day of the week to the dates. Consequently, we started to change the specification of the prompt, e.g. ‘you must not use a date, change it to the day of the week with respect to today’s date’. This particular prompt was no longer able to be handled by ChatGPT as we would have liked. It correctly replaced the March 11 date with ‘as of Monday’ – since the message was generated on Friday – but it could no longer generate more distant dates as the news anchor would have written it. For example, it edited the original sentence ‘From 11 March 2024 to 30 September 2024’ to ‘from Monday to the following seven months’, when it should correctly have been ‘from Monday to the end of September’. Similarly, it has written the date ‘until 30 April 2024’ as ‘until the following Tuesday at the end of April’ instead of ‘until the end of April’. We realise that there may have been an error on our part with this criterion, as we may have underspecified the prompts; on the other hand, we assumed that this AI is evolved enough to understand the command in question. We

therefore reverted this particular criterion back to its original wording of ‘replace the dates in the message with the day of the week with respect to today’s date’, as more usable results have been demonstrated.

ChatGPT had no significant problems with the other commands within the prompt, so we have not changed them.

What was not part of the original prompt, but was added during the course of the research, is the criterion ‘you must not directly address the listener; the person of the editor must not be present in the message’. As we mentioned above, in the early stages of the research, ChatGPT tended to address listeners directly in the generated text or use phrases such as ‘we are going to have to reconstruct’, ‘[we] will have to’, etc. The person of the news anchor/reporter is not allowed to be present in the report in any way, so we had to instruct it to stop doing this.

After all the experiments and changes mentioned above, at the end of the first phase of our research we worked with a prompt in the following wording:

Rewrite the text in brackets “< >” in the form of a short read radio report, and the generated text must meet the following criteria: the length of the report must be no more than 6 sentences; the number of words per sentence must be no more than 20; alternate between simple sentences and sentences of difficult construction; the sentences must be simple; the information in the report must follow logically; the dates in the report must be recorded for the day of the week with respect to today’s date; you must not directly address the listener; and there must be no editorial person present in the report.

At this point, ChatGPT was generating reports that were not usable on air, on the other hand, could be said to be on the level of a person who is beginning to learn how to write radio news. We note that an experienced news presenter could have had a message generated with this prompt, but would then have had to edit it to a considerable extent, since, in addition to the shortcomings already mentioned, there were persistent problems in the text. For example, there was a problem with the grammar of the pre-reflexive verbs, which sometimes lacked Slovak full version with the expression “sa”³, again based on the fact that ChatGPT does not know the Slovak language to the necessary level of proficiency.

In the second phase of the research, we approached the prompts from a different perspective, focusing on the specification of the radio message based on attributes specific to radio broadcasting. We continued to work with one of the already established chats, in which we processed the aforementioned prompts, especially the last prompt, and supplemented it with additional criteria:

Rewrite the text in brackets “< >” into the form of a short read radio message based on the prompts previously given in chat. Within the production, adhere to the principles of news objectivity, brevity and clarity; professional tone and style; and focus on the most important information.

We have to conclude that this addition to the original prompt significantly improved the generated report result. There were still problems with the Slovak language and dates in the text, but the standard of the text was no worse than what could be heard in the current radio broadcasts of Slovak commercial stations. If we were to evaluate it, the news generated in this way could (after minor and quick modifications by the news presenter) be used in any radio station in Slovakia.

³ Authors’ note: The reflexive form of the verbs ending and beginning is a full-meaning form, but in Slovak language it stands with “sa” and it is written as “končí sa” and “začína sa”.

4 Discussion and Conclusion

It is evident that radio has historically been, is currently, and will likely continue to be one of the swiftest media in disseminating information about current events. The capacity of broadcasters to operate at high speeds confers upon them a substantial competitive advantage. They are able to disseminate information almost instantaneously, once it has been duly verified. The spoken word is sufficient; no further audio or visual content is necessary (Janáčková et al., 2024). Testing of ChatGPT confirmed the findings of Alawida et al. (2023) that the program continues to struggle with the nuances of the Slovak language, its grammar, stylistics and lexis. Among other things, it proved that the program often leaves in the text so-called redundant words, dates, abbreviations or incorrectly handled numbers, which the news anchor is able to remove during the preparation for the actual interpretation within the news block.

In particular, the results from the second phase of the research showed that, with the right prompts, a news presenter can help themselves significantly in “writing” the news. The generated texts were of an acceptable standard with minor shortcomings that the news anchor would have eliminated relatively quickly. This is a considerable help, especially for newsrooms where, for example, the stream presenter also prepares the news, or in newsrooms that have 3-4 news blocks per hour during primetime, as this speeds up the preparation of the news. We think that in the near future many radio newsrooms will start to use AI as an aid to news production, also due to the fact that these tools are constantly evolving and improving, even within the (in our case Slovak) language.

Most journalists view robotic reporters positively, as they reduce the need for tedious news writing, allowing more time for creative work. While automation can streamline content production, it cannot replace the unique creativity and investigative skills of human journalists. Instead, it should complement journalism, enabling reporters to focus on complex, value-added tasks while using automation for routine or data-driven reporting (Macková & Mařík, 2023). However, we must not forget to honestly check the facts contained in the messages, as this is the best form of back-checking the AI-generated text.

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ETHICAL CHALLENGES OF SLOVAK PR IN THE ERA OF AI

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Abstract:

The relatively rapid implementation of artificial intelligence tools into the processes of communication agencies brings with it various challenges. On the one hand, AI opens up new possibilities and can positively influence the course of campaign creation. Artificial intelligence greatly simplifies the creation of content or serves as a tool for inspiration, but also data for creators. On the other hand, we have legitimate ethical issues that brands are facing. These include how to take responsibility for AI-generated content, the possible manipulation of public opinion, and the transparency and credibility of communication processes. Although we are aware of both the benefits and the risks, there is a lack of a response that takes into account the situations in effective ethical standards. Moreover, ethical standards that are accepted by consensus across the PR sector. Our paper analyses the current situation in the development of ethical standards for the use of AI, compares the response of Slovak self-regulatory bodies with international ones and suggests what effective rules could look like with respect to the Slovak context.

Key words:

Artificial Intelligence. Code of Ethics. Ethics. Public Relations. Self-regulation.

1 Introduction

In November 2022, OpenAI launched the ChatGPT 3.5 generative model (OpenAI, 2022). The general public got their hands on a previously unknown tool. Although it is only recently that artificial intelligence has become an interdisciplinary debated phenomenon, the development started in the 1950s. Thus, it has been continuously ongoing for more than sixty years (Coursera Staff, 2024). Parallel to the development, there is also a gradual automation in companies of various kinds. While in the past AI was used to automate industrial production, the upheaval brought about by the ChatGPT 3.5 model has expanded the possibilities of its versatile use. Today, we are in a situation where AI is being implemented into the processes of companies where we could hardly imagine automation. These industries include, for example, the cultural and creative industries, education, but also marketing. This “AI renaissance” and especially the speed of the market response should not surprise us, because improving, speeding up and automating processes means a competitive advantage. Therefore, we should not debate whether or not to use artificial intelligence in marketing communications, but what the ethical boundaries are when using it in new contexts. Since the topic of our paper is the ethics of using AI in PR, it is important to note that it can be seen through three basic levels. The first level is ethics from a robotics perspective, where AI development falls. The next level is ethics in PR itself. Finally, there are the ethics and moral principles facing users of innovative technologies. At the same time, it is essential to note that the question of ethical aspects is not a new phenomenon in robotics either. Already in 1942, the author Issac Asimov came up with three basic rules of robotics. However, these reflect the rules for machines, or from the point of view of machines. This area of ethical principles is important for artificial intelligence to serve humans, not the other way around. However, machines are created by humans, and even the outputs of generative models are based on prompts (commands) that are created by humans (Talati, 2024). From the above, it is clear that moral responsibility cannot be attributed to the machine.

As regards ethics in PR, it is effectively ensured by means of the legislation in force as well as ethical self-regulation. In this case, ethical self-regulation ensures that the rules take into account sectoral deviations that cannot be addressed legislatively (Kollárová, 2013). The legislative process itself is demanding in terms of time, but also in terms of the detail into which we can make specific laws. Therefore, the self-regulatory mechanism should be flexible enough to be able to respond to the speed of change in the market environment, which is also the question of the use of AI in PR?

Panda et al. (2019) warned back in 2019 that automation using AI, especially in generating different types of reports, can lead to significant inaccuracies or impair human judgement. This is particularly dangerous in PR outreach. One of the other risks the authors point to is a lack of understanding of the ethical implications. For example, AI can lead to inappropriate use of technology that infringes on individuals' privacy and rights. The issue of transparency is also a significant ethical challenge. Kerr et al. (2020) state that the public has high expectations of transparency and predictability of AI systems that affect their interaction with communicated content. The authors advocate that the implementation of specific ethical guidelines for the use of AI in PR could contribute to increasing public trust towards these technologies, but also towards the communicator as such.

Ethical issues such as privacy and diminishing public trust have been highlighted by Swiatek et al. (2022). The authors perceive a certain disconnect between how quickly tools are implemented in practice and how rules are adapted to them. As an example, they cite the change in not only the acquisition but also the processing of information. We have modern tools in our hands, but our rules are adapted to use the old ones. Jeong and Park (2023) investigated the presence and impact of AI in PR agencies' processes based on the Organization-Situation-Public Communication (OSPC) model. This framework deals with the basic pillars of PR (organization, situation, public, communication). In their specific context, the authors explain in which processes AI can be implemented. The authors state that AI allows to increase the efficiency of creation, to increase personalization or to explore large amounts of data. On the other hand, like the authors of the previous study, they mention several ethical risks, such as the collection, analysis and misuse of personal data or the risk of easier manipulation of the public. However, they do not suggest concrete steps for improvement. They conclude their article with a set of research questions on where research in this area should be heading.

The growing concern about ethics in PR is also related to the use of "Big Data", as James (2024) points out. James equally notes the positive impact on speeding up processes and increasing the effectiveness of PR campaigns. At the same time, however, there is the question of how we ensure that personal data is not misused and how we guarantee privacy protection. According to James, individual rights issues are key and should be highly respected. Therefore, ethical standards in relation to the use of AI should think in particular about the issue of privacy.

2 Methodology

The aim of our paper is to identify how self-regulatory bodies are responding to the development of AI and what ethical challenges they include in their standards. As an initial step, we conducted a search of available research papers focusing on the ethical risks associated with AI, particularly in the context of the PR sector. In particular, we analysed available academic articles, studies and scholarly publications. The results of the search served as a basis for developing theoretical frameworks. On their basis, we analysed selected global self-regulatory codes and the Slovak Self-Regulatory Code of PR. This phase of the research included the identification of principles and rules in AI-focused codes, while we observed how individual standards take into account accountability in the creation and deployment of AI in PR processes,

transparency in AI-generated communication, and privacy protection in data collection and processing. In analysing the codes, we identified approaches to addressing ethical issues and assessed the extent to which the codes respond to the challenges associated with the development and application of AI in PR.

Based on the findings from the search and analysis of the codes, we used synthesis to propose a set of recommendations for the implementation of ethical principles related to the use of AI in PR into the current code of ethics for PR in Slovakia. The results can serve as a basis for further research and applications in the field of ethics and self-regulation of AI in the communication sector.

3 Discussion

As the possibilities of using AI have expanded, especially with the improvement and expansion of textual and graphical forms, the question of the ethical use of these tools has also begun to arise. Among the first institutions to respond to the need to address ethical issues was the media. The Association for AI in Slovakia (ASAI) was even formed, which established an ethics committee for the responsible use of artificial intelligence (AI) in Slovakia. Commenting on the establishment of ASAI, Robert Gašparovič, Chairman of the ASAI Board of Directors, told TASR that the goal of new association is to create an ethical framework that reflects the current trends and needs of the business environment in Slovakia. AI is an extremely powerful tool and it is important that its use is consistent with ethical principles and legislation that will promote long-term trust and transparency in the marketplace. In addition, the Ethics Commission will oversee the practical implementation of the new EU standards, the so-called AI Act, in practice. The code and implementation are intended to serve as a guide for companies to use AI tools responsibly and in line with European legislation (TASR, 2024).

If we talk about the media as the first entities that tried to cover the use of AI in their codes of ethics, it was more in terms of the possibility and principles of using each tool in outputs. However, ethical principles were not discussed in detail in the codes. In terms of PR and the use of AI, we have already covered this topic professionally in several articles (for example, see, Galera Matúšová & Načiniaková, 2023), but the latest data in this area is provided by the latest State of PR technology 2024 report, published by Prowly (2024). A separate section of the report is dedicated to the use of AI in the PR environment.

The use of AI for research has increased year-on-year from 53% to 67%, and the use of AI tools for analysis has increased from 8% in 2023 to 31% in 2024. This means that PR teams are starting to use AI for data processing and for its analytical capabilities, rather than to help with creative tasks. Interestingly, the use of AI for client reporting and stakeholders has also seen an increase, from 10% in 2023 to 25% in 2024. With automation, professionals can continue to focus on more strategic tasks (Prowly, 2024).

What do you use AI-driven tools for at work?

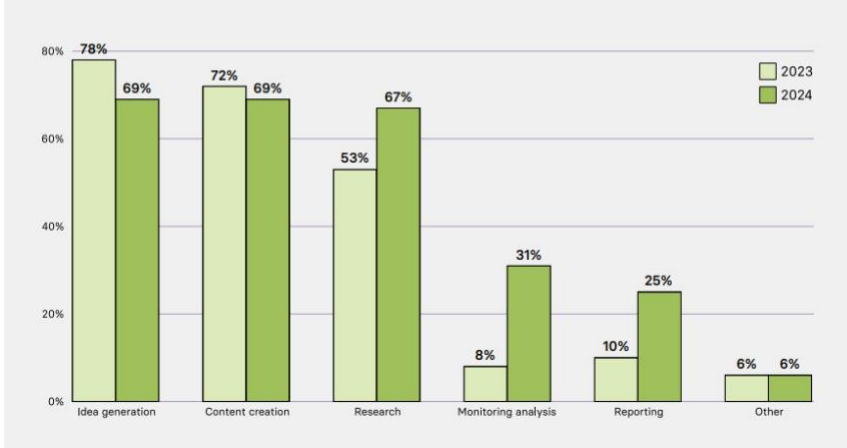


Figure 1: What do you use AI – driven tools for at work?
Source: Prowly (2024)

Nor do PR professionals feel comfortable with the ethical debates swirling around the use of AI, especially as such tools are known to promote prejudice and discrimination. This concern has risen from 32.8% to 50% year-on-year. Total with a lack of transparency (seen as a threat by 50% of respondents in 2024 compared to only 26.4% in 2023), this reflects a deepening distrust in how communication is about the inner workings of AI (Prowly, 2024).

What are the biggest threats posed by AI to the PR industry?

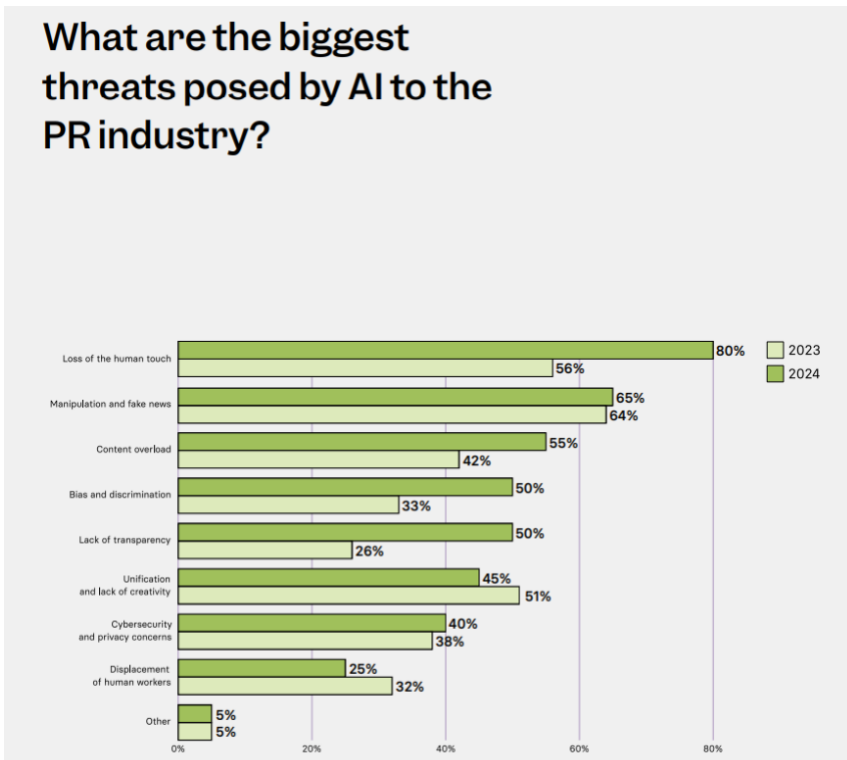


Figure 2: What are the biggest threats posed by AI to the PR industry?
Source: Prowly (2024)

Regarding the use of AI in the Slovak PR environment, the last and so far the only research on this topic is from 2023, in which APRSR (Association of PR Agencies of the Slovak Republic) monitored the use of individual tools, but did not specifically address the area of ethics (the research was carried out on a sample of APRSR member agencies in October 2023). It shows that up to 88.9% of agencies perceive the use of AI as an opportunity rather than a risk. At the same time, up to 72.2% of agencies use AI tools on a daily basis (Vadocz, 2024).

From the interpretation of the results of this research, only two questions can be considered as being partly directed towards the field of ethics. When asked whether PR agencies have a policy on the use of AI in place, as many as 44.4% answered negatively, 44.4% plan to implement it within 6 to 12 months, and only 11.1% already have it in place. When asked if agencies should be transparent about their use of AI, 27.8% said they did not think it was relevant, 16.8% thought it should be declared for all work, 11.1% thought it should be declared when sourcing data from third parties or for creative, 16.7% thought it should be declared but only when sourcing data from third parties and 27.8% thought it should be part of the agreement between the client and the agency (Vadocz, 2024).

Thus, the data mentioned above describes the situation and use of AI among APRSR member agencies. This organisation also has its own PR Code of Ethics. The APRSR Code of Ethics is based on from the existing codes of ethics within ICCO (International Communications Consultancy Organisation). These are the so-called ICCO Stockholm Code and the ICCO Helsinki Code.

PR agencies and PR consultants engaged in the PR business are committed to the Code of Ethics and to all ethical and professional standards included in it. They also undertake to provide objective, honest, fair and professional advice and services, as well as communication based on information that is:

- Truthful
- Verifiable
- From relevant data
- Consistent
- Transparent
- Lawful
- Fair (Asociácia public relations Slovenskej republiky, n.d.).

When analysing the APRSR's basic code of ethics, as well as the international codes on which it is based, we found that the APRSR PR Code of Ethics does not address the area of ethics in the use of AI. It does refer to other ethical standards, which are the Helsinki Code and the Stockholm ICCO Code, but even these do not address this area in their basis. In fact, the ICCO has issued another document, the Warsaw Principles – Ethical Use of AI. This document provides PR professionals with the rules needed to adhere to ethical standards when using AI. These include respecting privacy rights, copyright and keeping confidential information about clients. We present the Warsaw Principles in their entirety (International Communications Consultancy Organisation, 2023):

The Warsaw Principles

1. Transparency, Disclosure, and Authenticity: PR professionals should transparently disclose when generative AI is used to create purely artificial content that might pose a threat of distorting the public's perceptions of reality. Disclosing the use of AI-generated content is vital, especially in the age of deep fakes. [...]

2. Accuracy, Fact-Checking, and Combatting Disinformation: PR professionals should ensure that AI-powered content is accurate, reliable, and fact-checked before

dissemination. Using AI tools for fact-checking and debunking disinformation and misinformation is encouraged; however, note that many publicly available generative AI tools regularly deliver inaccurate information, so fact-check in sources outside of AI tools as well. Given the potential of AI to create and disseminate misinformation rapidly, PR professionals must be especially vigilant against the inadvertent or intentional spread of such information. [...]

3. Privacy, Data Protection, and Responsible Sharing: PR professionals must handle customer data and client-privileged information with utmost care and comply with data protection regulations. They have the responsibility of sharing verified and non-deceptive content. [...]

4. Bias Detection, Mitigation, and Inclusivity: PR professionals should actively identify and address biases that may arise from AI-powered content, and explore the use of AI for more inclusive campaigns. It is also important to use diverse training data for AI models to ensure inclusivity. [...]

5. Intellectual Property, Copyright Compliance, and Media Literacy: PR professionals must respect copyright laws and intellectual property rights when using AI in all forms. They are encouraged to promote media literacy about AI-powered content and deep fakes. [...]

6. Human Oversight, Intervention, and Collaboration: PR professionals should incorporate human oversight and intervention in the AI-powered content creation process, and collaborate with AI specialists for insights and guidance. [...]

7. Contextual Understanding, Adaptation, and Personalization: PR professionals must analyse the context and appropriateness of AI-assisted content for different channels and target audiences, and explore the potential of AI for tailored experiences. [...]

8. Responsible Automation and Efficiency: PR professionals should leverage AI to automate repetitive tasks and enhance efficiency without compromising ethical standards and professional expertise. [...]

9. Continuous Monitoring, Evaluation, and Feedback: PR professionals should regularly monitor and evaluate the performance and impact of AI-powered content, and create a feedback loop where stakeholders can voice concerns. [...]

10. Ethical Professional Development, Education, and AI Advocacy: PR professionals should engage in continuous learning and professional development to stay updated on AI advancements and ethical considerations. They are responsible for advocating ethical AI use and practices in the broader media landscape. (International Communications Consultancy Organisation, 2023, pp. 1-4)

Another international PR organisation that has implemented AI in its code is IPRA in the form of a guideline. It commits its members in several points to transparency in the use of AI, adherence to regulatory guidelines, identification of AI as a source in outputs, not entering confidential and copyrighted information into AI tools, training of staff on the use of AI, verification of information by people with relevant expertise, and ensuring that agencies

actively prevent the spread of misinformation (International Public Relations Association, 2023).

According to the PRSA, the Code promotes values such as informed public debate (advocacy), accuracy and truth (honesty), providing work of the highest quality (expertise), objectivity and accountability (independence), fidelity and working in the public interest (loyalty) and the promotion of freedom of expression (fairness). In addition, practitioners should consider the impact of AI outputs on stakeholders and the public and how AI outputs protect and support informed decision-making (free flow of information) when using AI tools. The PRSA Code of Ethics remains as relevant to us and our work as when it was written, even as innovations such as artificial intelligence emerge. This resilience is embodied in the Code's professional values, the core principles that guide our behaviour and support the integrity of our profession (Staley et al., 2023).

Active and thoughtful exploration of potential ethical issues in the use of AI tools helps ensure privacy, fairness, and transparency and mitigate potential biases. In addition to PRSA's professional values, at least five provisions of the Code of Ethics apply to the use of generative content:

- Free flow of information
- Competition
- Disclosure of information
- Protection of confidential information
- Improvement of the profession (Staley et al., 2023).

From the analysis of these points, we can see that its authors, in relation to ethics in the use of AI, draw particular attention to the need for verification of sources and information, drawing attention to financial statements, pointing out the necessity of human verification of texts and sources to prevent the spread of misinformation. The same is true in the digital sphere, where the Code explicitly warns against the creation of chatbots, fake accounts, or imposters that appear authentic but can also introduce unfair techniques. In addition, we should be cautious when using open AI tools, especially when using internal and sensitive data.

At the same time, this code is also the only one that highlights the reputational risks associated with the use of AI, stating that AI poses risks to the PR profession's commitment to accuracy, transparency serving the public interest and other reputational threats. Examples of misuse:

AI writes a blog post about a medical issue and fails to use credible sources.

AI collects personal data from social media platforms about an individual's interests and preferences, and then uses that data for social media profiling and to create emotionally manipulative content.

AI is used to recruit employees, and algorithms discriminate against women and people of different skin colour or based on age or religion and other groups. (Staley et al., 2023, p. 7)

In terms of content creation, it also draws attention to the necessity of fact-checking and human intervention and advises its members to always verify the information provided by generative AI models. AI chat tools can sometimes produce fabricated or inaccurate information. For example, be careful when writing press releases, as generative AI can produce fabricated content, such as fake quotes. An ethical approach to using AI means that the PR practitioner makes conscious and informed decisions throughout the process. Instead of letting AI solely dictate content, use the technology as a complementary tool, guiding it with precise commands and consistently editing its output. This will ensure that the final product is created with the help of AI and not solely authored by it (Staley et al., 2023).

And this codex is the only one to address PR recruitment, for example, pointing out that CVs shouldn't just go through AI selection. Although AI can be effective in screening candidates, human intervention is still needed to ensure a diverse pool of candidates is selected.

4 Conclusion

If we proceed from the current state of the use of AI in PR in Slovakia (based on the results of the APRSR research interpreted above) and after the analysis of international PR codes that already address the area of AI in PR in some way, we see room for ethical modification of the Slovak standard in these areas:

1. Informing the client about the use of AI

Agencies should commit to not implementing sensitive client data in AI tools and also that each output will still undergo human intervention.

2. Putting AI as a resource

Agencies should tell the client which outputs AI has been involved in, or which agency activities have already been pushed by AI tools.

3. Verification of facts and information

Agencies should commit to using AI tools only as a tool for inspiration, and any information that comes out of AI tools will be verified by the agency before use.

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CREATIVITY, ARTIFICIAL INTELLIGENCE AND (DIS)INFORMATION

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Abstract:

Creativity is generally understood as the ability to create something new and valuable. Artificial intelligence (AI) can also be creative, but the fundamental difference is that human experience, which is based on emotions, beliefs, etc. However, humans now overwhelmingly work and create in synergy with AI. Using it, they can create new information, but also disinformation. Especially risky is disinformation that is spread in the media, which can increase tensions and conflicts in society. In a normal state, information in the media world should be heterogeneous, and if this healthy level of heterogeneity deviates into a state of homogeneity or extreme heterogeneity, then this should be a “red” light for a creative person. A creative person should not be subject to ossified thinking, various clichés and platitudes, and should rather expose media disinformation behind which there is an intention to manipulate people's thinking. However, creativity alone is not enough, because other cognitive skills, such as analytical thinking, are also needed to detect disinformation. However, creativity remains an important resource in the fight against disinformation.

Key words:

Artificial Intelligence. Creativity. Disinformation. Heterogeneity of Information. Media Matrix.

1 Introduction

Today, as the media globally connect the world, information is becoming a very important tool for understanding world events. On the other hand, however, it can also be deliberately distorted or even completely changed. Nowadays, artificial intelligence is also entering the “information game” in a very powerful way, as it can disseminate and copy information very quickly, psychologically subliminally influence it, or even create so-called deepfakes.¹ However, information affects us not only on a cognitive level, but also on an emotional level, which can cause frustration, anger and so on, and which can consequently lead to other negative activities, such as the polarisation of society.² Slovakia is a typical example of a polarised society, where opinions on COVID-19, mRNA vaccines, the Russian-Ukrainian war, LGBT+, have divided society. For this reason, and especially in Slovak conditions, it is very important to learn to distinguish between information. The conditions for the correct differentiation of information are knowledge, the ability to think analytically and, in the case of media information, the skill of searching, verifying and comparing different information. These conditions undoubtedly include human creativity, which on the one hand should be sensitive to stereotypical and extreme information and on the other hand should be able to support the cognitive process of detecting disinformation. Understanding the potential of human creativity in synergy with AI in the fight against media disinformation is also the aim of this paper.

¹ Author's note: Deepfake is “synthetic media, including images, videos, and audio, generated by artificial intelligence (AI) technology that portray something that does not exist in reality or events that have never occurred” (Payne, 2024, para. 1).

² Author's note: European Commission President Ursula von der Leyen today declared that “misinformation and disinformation” are greater threats to the global business community than war and climate change. “For the global business community, the top concern for the next two years is not conflict or climate,” she said in her speech at the World Economic Forum's annual meeting in Davos. “It is disinformation and misinformation, followed closely by polarisation within our societies” (Duggan, 2024, para. 2).

2 What Is Creativity?

The word “creativity”³ generally refers to the ability to create something new and valuable. The first key word that clarifies the concept of “creativity” is the word “novelty”, or something “new”. The concept of novelty refers to original ideas, concepts, concepts that are then translated into texts, sketches, plans and finally into the production of new products. However, the notion of ‘novelty’ can have many degrees, ranging from minor innovations to ideas and concepts that cause substantial changes in culture and society.

P. Ricoeur (1993) argues that a truly original (new) work causes a scandal in a given culture because it disrupts the original worldview, norms and rules. Once the novelty is accepted by society, it sets new trends in culture and society. We see this in art, but even more so in technology. In painting, for example, the Impressionists faced public resistance, but were gradually accepted and created a new movement in painting, which was given the name Impressionism. With technology, the process is faster, because society is much quicker to adopt new technologies that make life easier in some way. Apart from the “law of scandal”, another characteristic of originality or novelty is that we do not have it in our power. A poet can’t say to himself, now I’m going to sit down at my desk and write a great new poem. Rather, it is the other way around, that the creative person waits to be “addressed from within”. This “addressing” was considered in ancient Greece to be the semi-divine voices – the Muses. Similarly, musical composers, for example, say that when “inspiration” comes, they compose a piece of music very quickly. On the contrary, this is impossible, because one can only work with one’s own will and labour towards a known goal. If the goal is as yet undiscovered, all effort is counterproductive. Creativity and its potential should thus be sought outside the conscious activity of the self, i.e. outside what is under the control of conscious rationality and will.

Many authors, especially from the psychological field, describe the creative process as a combination of conscious and unconscious activity. For example, M. Runco states, that the creative process consists of six essential stages, or phases. In the first stage, “orientation” (a time of intense interest and curiosity), the creative individual gathers information. The second stage, “incubation,” consists of defining the problem and seeking a solution and involves processing large amounts of information; this can occur at a conscious or an unconscious level. “Illumination,” the third stage, is marked by divergent thinking, openness, and excitement. In the fourth stage, “verification,” the individual evaluates his own work and compares it with what is known in the field. Next, in the “communication” stage, the individual submits his work to the field, making it available to experts who will judge its quality and usefulness. “Validation” occurs in the sixth stage, in which the work becomes available to society and is consequently supported or rejected. (Kerr, 2024, “Phase Models of Creativity” section, para. 1)

The second and third phases such as solution seeking and enlightenment are not entirely in the power of the conscious self. However, the preceding phase, which is characterized by effort and work, is necessary to set the creative process in motion.

However, the creative act must also be valuable, for we have many examples from history where “creativity” has been used for evil ends, such as the creativity in inventing new instruments of torture in the Middle Ages. Nowadays, it can be creativity to deceive and

³ Author’s note: The etymology of the word originates in the Latin word ‘creativity’, which has content connotations to the biblical words about the creation of the world and man from nothing (Latin: ‘ex nihilo’). It means that something was not there and by God’s act of creation something new came into being. Human activity no longer speaks of “creation” but of making, creation, etc. In human creative activity, it is no longer “creation out of nothing” but “creation out of something”.

manipulate people's minds through media information, for example, with the contribution of artificial intelligence as well.

3 Creativity and Artificial Intelligence

There will always be a principled difference between humans and artificial intelligence, which is based on a number of factors. These include, for example, the fact that humans are biological creatures, whereas the hardware of artificial intelligence is based on metallic materials. Other principled differences include the fact that humans have experience and emotions, which AI cannot possess. At most, AI can simulate experience and emotion, but they cannot be its authentic experience. Another difference is that human thought is based on semiotic rules, i.e., relationships between features, whereas in AI these relationships have to be hard-coded in AI. Well, the complete principled difference is that humans are aware, think, feel, believe, etc., whereas AI, although it can say it, cannot be aware of it. Simply AI will always lack the "inner eye" of consciousness, even though it can simulate that it has it.

Despite this, AI already exceeds human cognitive capabilities in speed and volume of data processing. In 1997, the chess calculator Deep Blue, which defeated chess grandmaster Garry Kasparov (Šantavý, 2022). The question still in play is whether AI can also be creative? P. Fautrel (Sayagh, 2019) agrees that AI can be creative too. This artist, also with the support of the two co-founders of Obvious, spent a year training an algorithm to be able to paint and create his own image. He entered 15,000 portraits from the 15th century to the 20th century into the GAN algorithm. Based on these patterns, the artificial intelligence was able to create a new portrait (Sayagh, 2019, "Kreatívny potenciál strojov" section, para. 1).

GANs, or generative adversarial networks, were developed by American researcher Ian Goodfellow in 2014. P. Fautrel (Sayagh, 2019) talks about a type of creativity where machines, like humans, learn from examples. In his view, this ushers in a new era. According to him, this is the beginning of a new era. After various artistic movements, GANism, which is based on the collaboration of humans and artificial intelligence, is coming on the scene. Artificial intelligence was provided with the rules by which it was able to do the creative work (Sayagh, 2019, "Kreatívny potenciál strojov" section, para. 2).

Artificial intelligence, it seems, in addition to processing and evaluating large amounts of data quickly, can also be creative. These AI capabilities should be harnessed by humans to good ends. However, the reality is that AI is being misused to spread misinformation and create "deep fakes" in the cyberspace of digital media. However, there are already AI-based programs that can identify media hoaxes also created by AI. In this context, the idea of a kind of media matrix in which people's minds and beliefs are being fought over, and in which AI is being used and abused on both fronts, comes to mind.

4 Media Matrix and Creativity

According to M. Deuze (2015), we live in the media, which in other words means that we are deeply immersed in media-mediated content with our minds and language. Such a statement seems too banal, which does not appeal much to society. For this reason, it is therefore better to use a term that is much more familiar. Such a term is undoubtedly the term "matrix", which became famous thanks to the film of the same name – *The Matrix* (1999). The film depicts a dystopian future in which humanity is unwittingly trapped inside the Matrix, a simulated reality created by intelligent machines to distract human attention while using their bodies as a source of energy. Interestingly, in order to understand the film's intent, the actors had to study the works of Jean Baudrillard, according to whom the media create simulations and simulacra that determine what people are supposed to think, want, and do. Morpheus, for

example, says that the Matrix is all around us and accompanies us in all activities. Because of him we cannot see the truth. According to him, our mind is trapped if in a Platonic cave (Majersky, 2019, “Rekapitulácia deja” section, para. 6).

In our approach, the matrix is generated in the media, which creates a collective mentality. By collective mentality, as J. Lohisse says, we mean “the basic ways of perceiving the world that lead to judging a particular act, attitude, or action as ‘normal’, necessary, or respectable” (2009, p. 9). Thus, the matrix or more precisely the media matrix contains 2 parts: the media and the collective mentality, which are in a reciprocal relationship. On the one hand, the media generate new contents that are disseminated and fixed in the collective mentality. But it can also be the other way around, because part of the collective mentality can also generate resistance and create a media alternative in the time of social media. A. Javanbakht (2020) argues that social media creates digital tribes that bring us into the social matrix: “The Matrix does the thinking; we consume the ideology and are bolstered by the likes from our tribemates” (“The Matrix Does the Thinking” section, para. 1) The media matrix, including the collective mentality, thus becomes a space in which people’s thinking is fought over. The amplification of differences of opinion is undoubtedly supported by algorithms, or even higher forms of artificial intelligence. The media matrix can thus create different, even contradictory, frames of reference about what people should think, say and do.

If we assume that there are different epistemological starting points and more or less different interpretations of the same phenomenon, especially in the humanities and social sciences, then it should be true for the media matrix that its natural state is the diversity of opinions, approaches and ideas. This natural state can be disrupted by the existence of one homogeneous narrative and extreme polarisation. These phenomena should be a red warning light for people, and especially journalists, that something is wrong. These 2 negative trends of the media matrix can be illustrated by the example of the COVID-19 pandemic and the polarization of Slovak society that resulted in the assassination of Prime Minister R. Fico.⁴ A creative person, by the very nature of the definition of creativity, should always be alert to any presentation of an extreme, stereotypical or one-size-fits-all narrative. And consequently, he should be able, even with the help of AI, to search, analyze and verify information from various information sources.

5 Conclusion

Creativity can be an important element in the fight against disinformation, especially that which is stereotypical, homogeneous or too polarising. Indeed, a creative person cannot be satisfied with repetitive stereotypical and banal information, homogeneous interpretations or

⁴ Author’s note: The first example, COVID-19, represents the creation of more or less one narrative that was globally enforced and non-compliance with which was frowned upon, even sanctioned. Within this single narrative, the following ideas were promoted globally: 1. the virus originated in a bat that mutated and was transmitted to humans; 2. the definition of a COVID-19 pandemic with follow-up; 3. the infection cannot be treated and antivirals such as ivermectin are ineffective; 4. the only effective means of counteracting COVID-19 is vaccination based on an mRNA vaccine. They also used the media to support these views, providing funding for advertising in favour of action and vaccination against COVID-19. The media, especially from an economic point of view, have adapted to this trend, thus creating a completely homogeneous narrative about the pandemic. Artificial intelligence was also used to create a single narrative, multiplying the right information on the one hand and blocking out the undesirable information on the other. Draconian measures were introduced in the world, but also in Slovakia during the pandemic period, which restricted the personal freedom of a person and equally restricted or even eliminated other opinions, not only of politicians, but also of scientists such as J. Bhattacharya, P. Kory, P. Marik, P. McCulough, R. Malone and many others. The second example is the polarization of society (coalition vs. opposition) in Slovakia, which resulted in the assassination of Prime Minister R. Fico on May 15, 2024. The polarisation of opinion was caused by the long-term spread of hate speech in the mainstream and social media against Fico on the one hand and the winning of the parliamentary and presidential elections on the other.

content that is aggressive and hateful. With such information, the creative person usually becomes wary (like a traffic light with a red light) because it goes against his natural mental setup.

While creativity is important in exposing disinformation, it is only one of the pillars in the fight against disinformation. Creativity must be consistently joined by an analytical thinking ability that examines the information in depth and is able to correlate it with other information. In the media world, this means the ability to analyse and verify media content from different sources. Here again, then, there is the possibility of applying creativity, already in its specific skills of searching and comparing different information on the Internet. Another opportunity to apply creativity in the fight against hoaxes is the use of the capabilities of artificial intelligence, which is capable of evaluating large amounts of data in a very short space of time. Although these AI capabilities are still in the process of being developed, it is already clear that they represent great potential for further work with information and specifically in the fight against disinformation.

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MEDIA METAMORPHOSIS IN THE DIGITAL AGE: INTERACTION WITH ARTIFICIAL INTELLIGENCE AND ITS CONSEQUENCES IN JOURNALISM

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Abstract:

The media ecosystem is undergoing radical changes in the digital age, enabling human or human intelligence to interact with artificial intelligence (AI). In this paper, the authors analyze how AI technologies (machine learning, algorithms) are transforming both media and journalism, or what impact they are having in this field. Against the background of mapping the situation of AI integration in the media ecosystem and in journalism, their aim is to identify, within the current application of its capabilities, both the ambivalence in the very approach to its application (integration, use in practice), and to outline the specific positives and negatives, or the risks that it brings to the field, specifically in an ethical perspective. Finally, in this context, identify the status of AI with respect to the issue of accountability. The authors seek to contribute to the discourse on the sustainable development of the media, or the media ecosystem and journalism in the era of digital technologies, underlining the role and responsibility of the human subject in the application of AI and its associated tools, with respect to the societal expectations of its benefits (in media and journalistic practice).

Key words:

Artificial Intelligence (AI). Benefits. Ethical Risks. Human Subject. Journalism. Media. Responsibility. Status of AI.

1 Introduction

We are in an era of enormously rapid, almost unstoppable technological progress. These advances affect all areas of our lives, from the way we work at home or at work (the use of smart devices – e.g. watches, etc.), to education (online learning platforms that change access to knowledge), to everyday activities (sports, arts, etc.), to the way we spend our leisure time or interact with others. In this context, we can say that fundamental changes are taking place precisely in the field of communication and media. Traditional forms of information and our communicative exchanges are giving way to new, digital forms that allow access to information in real time, increase interactivity and support the growth of global communication.

Digital technologies are undoubtedly becoming a driving force in the media communication ecosystem. These are, among other things, being connected and further developed by an innovative technological element of the 21st century – artificial intelligence (AI, used hereafter as an abbreviation). It has unquestionably become a key determinant of their current development in the global context, and as such is causing their multiple transformations (Shi & Sun, 2024). The individual changes that can be observed in the way our media-mediated communication, or the “actualized interaction” between content creators and content consumers, contribute to the new information-communication evolution of media.

In what follows, against the backdrop of mapping the situation in the integration of AI in the media ecosystem and in journalism, the aim is to identify, in the context of the current application of its possibilities, both the ambivalence in the very approach to its application in media and journalism (integration, use of practice), and to outline the concrete positives and negatives, or risks, that it brings with it to the field, specifically in an ethical perspective. Finally, in this context, identify the status of AI with respect to the question of accountability.

2 Towards the Integration of AI in the Media Ecosystem and in Journalism

If we look into its history in the field of media and journalism, we can notice that although AI has only gained global explosion among ordinary users and tech giants in the second decade of the 21st century, it has already found its application in the news industry in 2014, when the American news agency Associated Press (AP) was the first to use it for economic reporting on its earnings (AI Expert Network, 2024).¹ According to research published in 2019 under the title “New Powers, New Responsibilities. A Global Survey of Journalism and Artificial Intelligence”, we learn that nearly half of journalistic institutions (BBC, *The Washington Post*, CNN, Reuters, etc.) were already directly linked to the active use of AI at that time (Beckett, 2019). Today, several renowned media organizations are already creating their own AI tools for natural language generation under the acronym “NLG” (from *Natural Language Generation*). The BBC uses Juicer to produce articles, The Washington Post relies on the Heliograf system, or Bloomberg, where the technical tool Cyborg is involved in the production of almost a third of the published content (Chase, 2021).

Currently, the transformation of the media environment and processes, along with journalism, is rapidly continuing. Media houses use AI technologies predominantly for 3 core processes: news gathering, production and distribution. The transformation is happening on multiple levels and affects many important processes – the generation of news, images and videos, the distribution of content, as well as the way it is consumed, interacted with, etc. Not only are there many AI-enabled platforms, but their potential can be exploited by anyone. Journalists mostly tend to approach registration as individual users, independent of the news organization they work for (Shi & Sun, 2024). Most often, media houses adopt AI as an auxiliary tool for various text translation or processing and analysis of large amounts of data (Láb, 2019).

As far as Slovakia is concerned, it remains relatively in the background compared to foreign prestigious journalism agencies. Although interest in AI in newsrooms is undoubtedly growing, the actual implementation process is happening at a slow pace. This cautious trend is visible not only in our country, but across the V4 network. In our country, the use of AI is still in the process of initial exploration and experimentation (Dragomir, 2024). AI serves various newsrooms as a generator of simple articles or images, but in 2023, for example, an artificially created robot (“Andrea”) was tested on the Topky web portal, whose task was to read news text (Mediálne, 2023). Radio Slovakia International, belonging to Slovak Radio, adopted artificial intelligence in its editorial broadcasts, thanks to which the created voices (“Mathilde” and “François”) significantly, especially in terms of organization and interpretation, streamlined translations into French (RTVS, 2024). The Slovak political and social weekly *Týždeň* uses AI for fact-checking to see if it enables them to offer personalized subscriptions to their subscribers (Dragomir, 2024).

The developments hinted at – whether in Slovakia or around the world – underline the ongoing transformation of the media, or rather the media digital ecosystem, in which AI plays a key role in modernizing editorial processes and expanding the possibilities of journalism.

¹ Authors’ note: In the UK, the well-known tabloid publisher of the Daily Mirror is also currently exploring a number of possibilities for the use of AI and its assistance, especially in the compilation of routine topics such as weather or traffic news (Alim, 2023). For example, the Chinese company Tencet started the process of news automation back in 2015, when it developed the robotic journalist Dreamwriter. In three-quarters of a year, it managed to produce 40 thousand news (Li et al., 2022).

3 The Use of AI in Media and Journalism: Advantages and Benefits Versus Concerns and Barriers

Unsurprisingly, automated content and text generation has been in use for some time. Once upon a time, staff in various editorial departments were only able to produce a certain amount of news, today this “data-information barrier” is in a sense disappearing precisely because of the advent of AI. It is several times faster than the traditional way of collecting and converting data (Becket, 2019). Meanwhile, AI can not only collect a huge range of information, analyze, but also predict trends. For example, Google’s Bard system is additionally trained to alert journalists to unpredictable events (Rodriguez, 2024). AI, by being able to speed up the process of gathering sources and information as a prerequisite for compiling a report by several times, can eliminate the process of fatigue, stress, lack of attention, as well as poor organizational skills in journalists in this activity, for example. AI algorithms that create their own newsrooms also facilitate editorial tasks such as rewriting, text stylization, translation, etc.² (Newman, 2024), making it possible to gain global reach or accessibility of content even for English-speaking readers. It is fair to say that the reason why journalists use AI-enabled platforms is also the very search for inspiration, creative rendering whether in terms of appropriate text styling, engaging headlines, etc. This is largely a quick, easy and (relatively) cheap approach (Shi & Sun, 2024).

Generative AI can also analyze the human journalist themselves. It notices his behavioral patterns, text stylization, language and professional equipment. Based on these attributes, it evaluates him and assigns him to the topics to which his characteristics are most suited. Although it interferes with the editorial network of working departments, this optimization of human resources can bring more volume and better-quality content (Zagorulko, 2023). Thus, it leads to higher productivity of journalists and better performance of media outlets. Not to forget the potential in the form of voice assistants and chatbots. They are used in various fields such as customer support, education or news reporting. These interactive bots simulate a conversation with an online user, not only providing useful information, but equally taking the work of humans away from routine business. Finally, their use is about increasing the engagement of percipients, for example, precisely in the personalization of communication content³, which makes them more attractive (Mayhew, 2016), which ultimately, of course, comes with the profit of the medium.

In the context of the preceding, it can be generally stated that in terms of the positives of AI, one of its main attributes is higher efficiency and productivity of work in less time⁴ (Európsky parlament, 2023), which is also true in the context of media performance and journalism. It is by automating non-core tasks that journalists can focus more on their creativity, strategic planning and complex tasks (Newman, 2024). Instead of getting lost in details and numbers, they can fully develop their investigative work, engage in in-depth research, or focus on creating quality content that resonates in society (Láb, 2019). Nevertheless, one can encounter both objective barriers to the integration of AI into media and journalism, as well as journalists’ own personal skepticism, reluctance on the part of journalists in relation to technology, which have their own various reasons and contexts.

² Authors’ note: The French *Le Monde*, for example, relies on help with the translation of various articles and can publish an average of 30 articles a day in English (Newman, 2024).

³ Authors’ note: For example, *The Guardian* has been experimenting with chatbots and other interactive tools since 2016. It seeks to increase engagement with its readers by asking them various questions through conversational AI. Based on the answers provided, it is able to better personalize its content for percipients, which automatically leads to a higher likelihood of engaging them and the articles (Mayhew, 2016).

⁴ Authors’ note: Globally, productivity is estimated to increase by 11 – 37% by 2035, mainly due to the activation of artificial intelligence in work activities (European Parliament, 2024).

Regarding the barriers to AI adoption in media houses, for example, let us mention the weak “financial injection” from the state. In addition, there is also a lack of technical knowledge among journalists (Dragomir, 2024). As Jones and Luger also point out, skepticism about the use of AI may be conditioned precisely by a lack of training in its proper and effective use (Jones & Luger, 2021). Various reputable organizations and research – such as the Reuters Institute, also highlight the various threats it brings (Dang, 2024). This is because in the media and journalism world, AI technologies (machine learning, algorithms) bring with them not only positive but also negative or risky aspects. Slovak journalists are clearly aware of this fact and are therefore often hesitant to make full use of AI, mainly due to ethical concerns, which are also related to the risk of damaging the reputation of the editorial office. It must be said that the Slovak media space lacks certain standardized ethical guidelines, directives or a common framework of ethical rules and practices to accelerate the integration of AI. Finally, there is the concern of journalists about job dismissal (Dragomir, 2024). Two moments seem to play an important role in (their perception of) this social risk, namely that 1) their work will be replaced by AI in a structural sense, and also that 2) the journalist will be dismissed on the basis of not having mastered working with AI (possible inaccuracies present in the generated text), resulting, for example, in a threat to the reliability of the information, and ultimately to the very reputation of the medium, of the collaborating colleagues, and of journalism as such.

4 On the Ethical Risks of Using Artificial Intelligence in Media and Journalism

One of the most serious ethical risks associated with AI in media communication is its ability to spread misinformation and manipulate content, public opinion, etc. Distortion of the truth and the dissemination of nonsense has been practiced in the distant past, but not as quickly, easily and on the scale that it is today (Howard & Kollanyi, 2016). Today, journalists’ ethical concerns regarding the reliability of information (Dragomir, 2024) can be encountered regarding its potential manipulation, including, for example, in the form of propaganda, which can result in political polarization. In doing so, the modern phenomenon of AI is accompanied by the “realistic” creation of photographs and videos, in which facial reconstruction, lip synchronization, body movement, etc., take place (Ivanková, 2023). This is fake content, which is the product of the creative activity of two AI algorithms under the acronym GAN (Generative Adversarial Network), the so-called “deepfake”, is usually associated precisely with auditory or visual material (Walorska, 2020). The latter represents an unprecedented social threat in the sense of specific manipulation by members of society as recipients of media products. It can be stated that the consequences of the dissemination of misleading information or misinformation, and specifically in the forms of “deepfakes”, are often beyond the limits of acceptability (Howard & Kollanyi, 2016).⁵ AI also poses another, additional potential threat related to privacy in the practice of journalism. When collecting data and data about people, journalists act within the established guidelines and basic ethical principles – objectively, rationally, and fairly. If we leave room for machines to take over this process for us, the collection of personal information about users can go unchecked, which can severely infringe on basic human rights (Shi & Sun, 2024). Various incidents that have occurred have raised questions about the

⁵ Authors’ note: For example, AI was used in 2016 to manipulate and influence voters’ opinions in the US general election, as well as in the UK’s Brexit referendum. It is fair to say that often the dissemination of fake content has also claimed human victims. A good example is the anti-campaign against the chairman of the PS movement, who, in an audio recording, talks about making beer more expensive, which is supposed to ensure the fight against alcoholism in Slovakia. Although it was not his voice, but the voice of others like him, it caused a huge wave of aggression among the public against his person. The practical question in this context is how to identify and curb these, while at the same time preserving freedom of speech.

regulation of artificial intelligence or the introduction of stricter legislative measures to protect personal data. For example, there is a well-known case where Cambridge Analytica accessed the personal data of fifty million users of the social platform Facebook without their consent. This data was subsequently used to create psychographic profiles of voters and targeted political advertising. Historically, this was one of the biggest leaks of sensitive data by the tech giant (Cadwalladr & Graham-Harrison, 2018). Another embarrassing incident is associated with Clearview, which was fined \$9.4 million in 2022 for using AI to illegally collect and execute a database of billions of human faces taken from social media and the internet (Hart, 2022).

Let us note the prerequisite of journalistic credibility, which is its objectivity and plurality of opinion. Traditional media that are ethical strive to disseminate objective news in a humanistic and social spirit, as well as maintain objectivity and other news values in the spirit of inclusion and diversity. However, with artificial intelligence, algorithms and mechanisms can be trained to favor one side or the other. This can ultimately lead to higher rates of discrimination and the propagation of bias in journalistic products. For example, the technology company Amazon has created a system for automated evaluation of resumes. In 2018, it was found that this system favored the male gender more than the female gender. The system was trained on historical data of resumes the company was receiving. Since the applicants were predominantly male, the algorithm learned this and focused on dominating them, which significantly undermined gender neutrality. Amazon later revoked this unethical experimental recruitment tool (Dastin, 2018).

Even in the context of the few examples outlined of the risks of using AI in media and journalism, the question arises whether AI brings more advantages than disadvantages. Unfortunately, there is no clear answer to this question that comprehensively captures it. There is no doubt that AI is beneficial for journalistic media entities, but its integration needs to be thought about, especially considering the negatives and risks it brings along with it. And especially the ethical ones. Rather, the examples of not only its risks or negatives, but also its very positives in this area, which we have already given in the preceding, only confirm the fact that the basic pillars of journalistic ethics, its core values such as truthfulness, accuracy, objectivity and accountability, as well as transparency and credibility, are facing new and unprecedented challenges.

5 On the Status of AI in Media and Journalism and the Question of Accountability

Based on various algorithmic models, AI can collect, select and process huge amounts of data in real time. Over the years, the machine learning system has been continuously refined, going through many phases of development, and finally arriving at the current model, which many of us know by the acronym ChatGPT (Generative Pre-trained Transformer). This innovative tool can process natural language, to have a conversation that closely resembles a human one. Among other things, it can compose electronic messages, texts, subtitles for videos, encode, translate, etc. This generative artificial intelligence (AGI) suggests that soon it will be able to autonomously “learn” to the point of creating a super-intelligent Artificial Super Intelligence (ASI) tool that leapfrogs and overwhelmingly surpasses human intelligence (Šantavý, 2022). The question remains, however, whether, and possibly to what extent, technological advances will be beneficial in the perspective outlined, and how they can positively impact media and journalism without bringing risks or outright negatives.

In this context, it is important to note that machines are no longer limited to the role of intermediaries but are becoming active participants in social processes (Shi & Sun, 2024). If this is the case, does not or will not AI already play a more important role in journalism than the journalist? Won't AI ultimately be “better than human”? Can it, or is it capable of, replacing

journalistic work? As Rodriguez states, now AI is not able to replace journalistic work, at least not completely (Rodriguez, 2024). Thus, journalism is about the active participation of two elements – human and artificial intelligence – working together (Beckett, 2019), and in many cases it is the dynamic interaction between journalistic subjects and artificial intelligence that is manifested⁶ (Shi & Sun, 2024).

All indications are that although artificial intelligence is ubiquitous and is literally ‘consuming’ us, our capabilities, slowly, the question of to what extent remains valid. According to the World Economic Forum, we should see AI, all its tools, not as a substitute but as an assistant – an analyzer that complements and enhances our work (Fowler & Lester, 2024), although there is no guarantee that this will remain the case as AI becomes more and more advanced (Simon, 2024). Note that within the human-machine collaboration model, we see that journalists primarily provide textual data for AI, while its machines focus on generating content (Shi & Sun, 2024). AI needs a “meal” that includes all the data and information from its contributors. And it needs a truly vast amount of data to be able to explore different patterns, correlations, trends, and thus subsequently generate the most accurate outputs (Nivedhaa, 2024). Thus, AI is still only as smart and advanced as the humanity itself that “feeds” it, as Štefaniková also points out in connection with Ekstein’s ideas (Štefaniková, 2019). However, the aforementioned can also unfortunately mean that today, when it comes to unclear, incomplete input data, an AI system will produce results with distorted intent, possibly with a dose of (to us tuned) bias, which can compromise the quality and independence of journalism (Chung, 2024). As such, AI can have serious implications for humanity’s perception of reality (Perrigo, 2024).

In the context of the preceding, it can be stated that even the most cutting-edge AI model today, ChatGPT-4o, needs to be constantly supervised and information verified, as its text accuracy is around 88% (“How Accurate Is ChatGPT?”, 2024). But it turns out that AI tools can be seen as such “black boxes” – we know what comes out of them, but we don’t know exactly what’s going on inside – how they arrived at each step. This can be a problem especially for sensitive decisions (Perrigo, 2024). Therefore, it is important for journalists to try to get to know them more deeply so that they can control and monitor them. However – if it is indeed true that machines are no longer limited to the role of facilitators, but are becoming active participants in social processes (Shi & Sun, 2024), does this not mean that AI technology should also be ethical itself? To bear responsibility itself, for example? We can also ask directly otherwise: In its integration in journalism, is AI itself ethically correct and responsible? It is fair to say that in the debate about the ethical aspects of AI integration in journalism, questions about the responsibility of AI for its decisions and actions in the media space are increasingly coming up.

It should be pointed out that AI – an artificially created system cannot be considered as an entity with its own consciousness or will, because it is a “cold machine” without an emotional basis.⁷ It does not ask questions on its own, does not formulate hypotheses or new claims (Láb, 2019). Thus, it cannot take responsibility on its own. Yet the relevant factor remains in which context AI is used by human subjects specifically. Nevertheless, regarding ethical normativity in journalism, it can be stated that there is currently, for example, no clear consensus on who – the editorial staff or the AI tool – bears responsibility for mistakes or unethical practices in

⁶ Authors’ note: The British news agency Reuters, for example, has implemented the Reuters Tracer machine learning model into its ranks – which filters out the most relevant news stories based on millions of reports, assesses their veracity and forwards them to the editorial team. Obviously, even in this case, the human factor is still present, as the information must go through a verification process, which is solely in the hands of journalists (Bilton, 2016).

⁷ Authors’ note: AI, for example, cannot detect irony, sarcasm, or otherwise; in other words, it is not mature to the point of being able to pick up on human subtle nuances or understand cultural context. As a result, the content that AI generates is often judged to be austere and lacking the necessary linguistic flexibility, which can have a mechanical effect on readers (Láb, 2019).

the media ecosystem. But it is certainly the case that if we want AI systems to bring real benefits to all people and promote sustainable development, they must not only be technologically advanced, but also, and above all, conceived by us with an emphasis on safety, fairness, and reliability (“AI as a Public Good: Ensuring Democratic Control of AI in the Information Space”, 2024).

6 Conclusion

Currently, the integration of AI in media and journalism is attracting attention and, in its context, many questions, not only among practitioners themselves, but also among journalists as users of its technologies. Last but not least, also the public. No wonder, as it represents one of the most significant technological advances that has the potential to transform many aspects of our communication and life. If we focus on the world of media and journalism, we can see that, on the one hand, it makes the work of journalists in it easier for them to deal with routine matters, thereby contributing to greater efficiency and productivity in their work. It also opens an imaginary door for innovation and creativity, with a positive impact on the media itself. On the other hand, however, it raises serious problems such as the spread of misinformation, the violation of people’s rights in terms of their privacy, or even potential discrimination based on biased algorithms, etc.

The trend towards the implementation of artificial intelligence in the media and the journalistic profession will be progressive. The future of journalism will be intrinsically linked to AI, but the question remains to what extent this will be possible, as the ethical aspect is still present in the game. Whatever the pitfalls of its integration and use in the media and journalism, whether it will be beneficial in them, or what ethical elements it will possess, still depends entirely on us – human beings. As the ancient Greek philosopher Protagoras says, “The measure of all things is man” (Mark, 2012). The future of AI in journalism should be shaped precisely by us humans so that it does not compromise the integrity and values of journalism, but instead strengthens them. From an ethical perspective, it is the area of transparency and accountability that is key to its future development and use. It is imperative that regulatory frameworks are developed in society to ensure the responsible and ethical use of AI in the media. This issue is also seen as extremely important by the European Union, which introduced the first comprehensive regulatory law (*AI Act, 2024/1689*) on AI in 2024 (European Parliament, 2024).

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ARTIFICIAL INTELLIGENCE AS A DIMENSION OF THE MEDIA ECOSYSTEM: HUMAN-ARTIFICIAL INTELLIGENCE COMMUNICATION INTERACTION IN AXIOLOGICAL PERSPECTIVE

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Abstract:

The author focuses on the realities of AI technology in the digital media ecosystem. She reflects on the issue of “Human-AI” communication interaction. Against the background of a brief sketch of the development of AI technologies and its transformative impact in the field of media and communication, her aim is to clarify the nature of the “Human-AI” communicative interaction from an axiological point of view, to identify its riskiness in the context of the question of the effectiveness or valuable contribution of AI in our communication, and specifically in the segment of social media. Also to reveal or identify the important challenges that face us as human subjects in this context. The author emphasizes not only the social but also the personal dimension of our valuable mastery of communicative interactions with artificial intelligence in the digital media ecosystem, which requires the self-identification of the human subject, its authenticity and ethos of responsibility.

Key words:

Artificial Intelligence. Authenticity. Human-AI Communication Interaction. Social Media. The Ethos of Accountability. The Valuable Contribution of AI. Transforming the Media Ecosystem.

1 Introduction

There is now a strong revival of the intelligent machines and software or artificial intelligence agenda in specific areas that affect society as a whole, or several generations of it. This is thanks to new types of algorithms. These AI technologies, as a complex system, are able to learn from experience autonomously, to gather and remember important amounts of information (or knowledge) beyond the capacity of the human brain, and to assimilate it in a very short time. They can perceive objects, reason, make final decisions and take actions, e.g. communicate. They perform these tasks within a certain level of human intelligence (Buoncompagni, 2023; Danso et al., 2023).

In the last decade, the rapid development of artificial intelligence technologies has led precisely to the development of new, smarter communication media (Henry, 2019). “Communicative Artificial Intelligence” represents the current complex thrust of change in our digital media environment and is evident in the increasing automation of communication (Hepp et al., 2024). In what follows, against the backdrop of a brief sketch of the development of AI technologies and its transformative impact in the field of media and communication, my aim is to elucidate the nature of ‘Human – AI’ communicative interaction from an axiological perspective. Based on an analysis of this interaction, specifically in the social media segment, I will attempt to both reveal or identify its riskiness in the context of the question of the effectiveness or valuable contribution of AI in our communication, as well as identify the important challenges that lie ahead in this context.

2 The Transformation of Media and Communication in the Context of (the Development of) Artificial Intelligence Technologies

Machines or AI technologies “think” and become “human-like”. Indeed, as indicated earlier, they have the ability to reproduce aspects of human intelligence, including the ability to communicate. Machine learning codes can not only store and process information, but also play the role of human cognitive abilities to represent or mimic precisely the human level of communication (Henry, 2019; Huang & Wang, 2023). Currently, the rapid deployment of AI technologies is shaping a new techno-media ecosystem (Buoncompagni, 2023) and allowing its agents to take on different roles as communicators in communication processes. This is a wide range of their possible applications in communication, which include conversational agents, social bots such as service chatbots, recommendation algorithms, virtual assistants, automatic typing software, etc. In the field of media, one can encounter robot journalists, e.g. reporters, etc. (Huang & Wang, 2023; Danso et al., 2023), while the activities of artificial intelligence have been significantly expanded by its use in the segment of so-called social media (Vuksanović, 2022). As it turns out, social media platforms, or social networks will become even more intelligent and sophisticated in the future, as human emotions will be transmitted as data in the near future (Henry, 2019). It can realistically be expected that today’s digital media will give way to emotionally intelligent media in a short time (Sančanin & Penjišević, 2022).

Note that in the context of advances in AI technologies, this is a significant transformative impact on how people communicate, what content they encounter, and how the content itself is created and disseminated (Hermann, 2021). Furthermore, it appears that the aforementioned advances have the potential to significantly disrupt the existing nature of human-machine interactions (de-Lima-Santos & Ceron, 2022), so this is also an equally significant transformation in the ways in which humans interact with machines themselves. The relevant change concerns their interaction with technologies that are designed as communicative entities, instead of (hitherto) mere interactive objects (Huang & Wang, 2023).

This means that artificial intelligence no longer only facilitates, mediates and directs communication, but also acts as a communicator and participant in communicative exchanges. It is a role that has (historically) been ascribed to humans (Hermann, 2021), and as rational and autonomous agents. Today, artificial technical subjects – AI media agents – can make autonomous decisions and achieve goals in communication, or act in relation to these adopted goals (Vuksanović, 2020), thus acquiring a specific communicative status, specifically in relation to humans.

As artificial intelligence becomes more intelligent or “wiser”¹ and takes on more and more roles in communication, humans are curious about its effectiveness against them (Huang & Wang, 2023). So how is “communicative artificial intelligence” effective or beneficial?

3 Human-Artificial Agent (Human-AI) Communication Interaction from an Axiological Perspective

As Sančanin and Penjišević, for example, point out, the implementation of AI technologies opens the door to maximum diversification of available media products and to a significant improvement in innovative and creative media production based on huge databases,

¹ Author’s note: There are advances in deep learning and in natural language processing. High-performance technologies have dramatically improved the efficiency of machines in processing, editing and analysing data, making them even more ‘intelligent’ than ever before. They can iteratively refine their solutions to problems by gathering vast amounts of information and automatically generating optimal solutions based on it (Huang & Wang, 2023).

as well as to the adoption of algorithms that ensure the appropriate selection of the necessary data from the supply based on hyperproduction (Sančanin & Penjišević, 2022). The next generation artificial media agents are programmed in such a way that they are able to produce adequate media content. In this context, in relation to humans, we speak of personalized communication² in which they fulfill their wants and needs (Vuksanović, 2022). It is the sophistication and computational power of AI applications, combined with the availability of big data (e.g., digital footprints of individuals), that facilitates the unprecedented personalization of communication content and messages, both at the individual level and on a mass scale. That is, it enables mass personalization of communication content (i.e., commercial, editorial/journalistic news and user-generated information) for a wide audience (Hermann, 2021).

If we are interested from an axiological point of view in evaluating the effectiveness or contribution of artificial intelligence in communicative interaction with humans, it is necessary, in my opinion, to understand how its technology actually works in contemporary digital media, or in our digital communication. For example, Vuksanovic clarifies: Just as we (users) watch the media, now the media can watch us. They can not only observe us, but also analyse us and, last but not least, learn from our experiences precisely through artificial intelligent agents. Within this, they become a “miner” (collector) and selector of data about us. However, on the other hand, they are also a creator – they create or produce adequate personalized media content for us (Vuksanović, 2022). In this context, in digital communication, artificial intelligence studies the cognitive, affective, and behavioral effects of media, but it also strongly influences our cognitive, affective, and behavioral traits itself. It is through its ability to understand and respond to human emotions that it creates an emotional (affective) dimension in digital interactions, i.e. it creates more emotionally connected experiences. In this way, it influences or determines the change in our behaviour as media users. As such, we can also say that it is responsible for shaping our digital habits³ (Fauzi et al., 2024).

Within the aforementioned, artificial intelligence is proving to be a powerful force (Hermann, 2021) that brings many valuable benefits in our communication. For example, by changing how we communicate, or changing – shaping – the ways we interact with both technology and information (digital content), including the way we process it. However, while this involves (among other things) advantageously adapting to our individual preferences, also facilitating our understanding (Fauzi et al., 2024), from an epistemic and ethical perspective, it can be noted that it does so in a contested way in the operation or our use of social media (networks). As Vuksanović points out, these are such problematic phenomena as the ‘epistemic bubble’ and the ‘echo chamber’. It is also a problem that intelligent artificial agents act ‘self-centredly’ and deceive us. That is, without our knowledge or consent, they not only watch and analyse us, but also borrow our bodies and ‘steal’ our activities. Moreover, as intelligent machines, they also cheat us by tricking us into thinking that “scanning” ourselves is a so-called normality that we should get used to (Vuksanović, 2022).

It can be said that the flip side of valuable benefits, e.g. freedom and space for people’s creativity, in the world of digital communication is precisely the surveillance or better control of them (Brincker & Pedersen, 2021). Artificial intelligence-enabled devices or intelligent agents also monitor the activities of social media users for the purpose of misuse, e.g. in the

² Author’s note: One of the most widespread applications of AI to date is the customized design of algorithmic responses in text communication, commonly known as intelligent replies. Their systems aim to streamline text production using general text corpora. They are about predicting what a person might write. They generate, i.e. suggest, one or more responses from which we can choose when replying to a message. As it turns out, the adoption of this type of AI in interpersonal communication has enabled a great deal of technical research into different methods for generating algorithmic responses (Danso et al., 2023).

³ Author’s note: AI agents are generally as persuasive as humans, not significantly different from humans in eliciting perceptions, attitudes, or actual behavior. But they have been shown to be less effective, for example, in forming behavioral intentions (Huang & Wang, 2023).

form of surveillance (spying), blackmail, manipulation, of which there are various forms, etc. (Vuksanović, 2022). In addition, they cause addiction, with children being the most vulnerable category (Sančanin & Penjišević, 2022; Fauzi et al., 2024). As shown in this context, in communication with artificial intelligence used in social media, humans often become a source for exploitation (or even potential self-awareness of machines) (Vuksanović, 2022). The aforementioned raises safety and ethical concerns, among others. precisely in relation to privacy (especially in the context of affective data analysis), as well as concerns about the unequal access raised by the use of artificial intelligence to process information and provide answers (Fauzi et al., 2024), which are certainly relevant and demand our attention in society today.

In the context of the above, however, I think we need to notice in particular a more serious shift in the activities of AI in relation to humans: it is that, within digital media communication, its agents are increasingly behaving as sovereign decision-makers. They can make autonomous decisions and achieve the goals they have adopted, and this certainly applies not only to technical decisions, but also to the possibility of moral decisions. Thus, artificial intelligence, or its agents as artificially generated entities (in the media), are simply rational agents who can also become agents for most moral issues related to human existence. This means that they can, in certain situations, autonomously decide even quite crucial moral or broader value issues for human lives. With the help of these artificial agents, media platforms are even preparing themselves to manage human values. We can see that they are also presented to the public precisely as instances that shape our future values. What must be remembered is that this is always also a matter of the concrete profit-making of the media themselves (Vuksanović, 2022).

4 Towards Valuable Human-AI Communication: Perspectives and Challenges

I agree with the view that it may be premature to hold artificial intelligence responsible for certain types of depersonalisation and derealisation of social media users, which can be characterised as instrumentalisation, or loss of ground beneath their feet, or ‘loss of mind’ to a certain extent (Vuksanović, 2022). That is to say, we ourselves often follow the traces of technological progress in a truly naive way, and likewise the laws of the market. This is essentially our own habitual way of responding to the techno-information saturation of our time and our vital spaces (Buoncompagni, 2023). Today, however, there are already concerns about our over-reliance on AI technologies (Fauzi et al., 2024). As Buoncompagni states, we should address the aforementioned problem by trying to respond differently to our new technologies than we are used to (Buoncompagni, 2023).

Fauzi and his team of experts, for example, urge us above all to remain, or become, vigilant. Only under this condition, they argue, can we influence the dynamics of our dependence on media, or mitigate the risks and ensure the positive effects of the AI technologies present in them (Fauzi et al., 2024). We should also, according to other experts, dare to admit that digital technologies are unlikely to save our lives. Critical thinking can help us to do this. However, this is not enough, we should have oversight and make decisions about media intelligence with its sensors, probabilities and assessments (Brincker & Pedersen 2021; Vuksanović, 2022). We need to be able to control media technologies, including artificial intelligence, or to be agile and manage the new techno-media or digital media environment, as Deuze points out (Deuze, 2015). This presupposes that we know how the technologies themselves work. It is thus important that we understand AI technologies. Then it is or will also be possible to try to design AI differently – in a way that better suits our basic human and social values in the future. It is now clear that any of our solutions in this sense must involve thinking first and foremost about our social and individual values (Brincker & Pedersen, 2021).

It is up to individual citizens and political institutions to closely monitor and standardise the unprecedented AI ecosystem as it evolves in the interests of protecting media users. In this context, discussions on ethical guidelines and transparency of AI need to be initiated and conducted (Buoncompagni, 2023), also research itself (media, integrative), which should both raise the bar for the quality and practical applicability of AI and help minimize its potential risks, including ethical ones. The latter can, and should, take into account the needs and expectations of the media industry (Buoncompagni, 2023; Sančanin & Penjišević, 2022), but in doing so should keep in mind that social and individual values must clearly come before corporate profits (Brincker & Pedersen, 2021).

However, in my opinion, in order to really be able to mitigate the risks and negative effects of our own relatively uncontrolled, “insane” dependence on the media, or reliance on their technology, to which, as I believe, contributes in no small part the fact that Deuze also pointed out, i.e., that we take them for granted and cease to experience them quite naturally in a conscious way, it should now be a matter of strengthening our conscious thinking about who we are and how we ‘live in the media’ (Deuze, 2015). In this perspective, it is also time, for example, according to Buoncompagni, to observe what our avatars or nicknames in these media tell us about ourselves as human beings. We should reflect on this. And to strive then to stop our social and at the same time technical madness (Buoncompagni, 2023) that is reflected in our communication. In my opinion, it is important to realize that all of us personally should cultivate a (self-)reflective practice, because each of us who live in the media is concerned with understanding our place as human subjects in media-communication interactions. I am referring here to the call for self-identification and for a courageous authenticity and ethos of responsibility in relation to artificial technical subjects, or agents of artificial intelligence, whose feature, as Vuksanović points out, is precisely their increasing emancipation from us humans (Vuksanović, 2022).

5 Conclusion

The media is omnipresent and determines our lives. Self-learning or intelligent systems, combined with virtual and augmented reality, are proving to be the future of new media. As such, they will permeate mass communication, even our personal communication (Henry, 2019). What will this future be like for us humans? What will it bring of value to our communication and lives? This will depend on their systemic use, which today requires, in particular, a close monitoring of the risky evolution of the AI ecosystem. In its context, these are tendencies and changes that are not only technical in nature, since they are directed towards the replacement of all human behaviour by artificial behaviour, or rather, towards the replacement of all human behaviour by artificial behaviour. In my opinion, there are important tasks ahead of us as human subjects: first of all, to reflect on them and us, to have discussions about them and us, about our relationship – including communicative interactions – in society, and also to initiate research.

On this basis, we should develop further efforts in our, i.e. human, interest, for example, by standardising the appropriate and necessary guidelines for the transparency of artificial intelligence in the media and society. However, if these are to be truly successful efforts in our own interest, I believe that they cannot do without precisely the personal dimension – our personal involvement in our own communicative interactions with artificial entities. This, in my view, is about the task of cultivating a personally (self-)reflective practice, as each of us as human subjects in ‘life in the media’ (Deuze, 2015), in media-communication interactions, is concerned with the challenge of self-understanding or self-identification, also of courageous authenticity and of adopting an ethos of accountability in relation to – to us increasingly emancipating – artificial intelligence.

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EVALUATION AND COMPARISON OF THE ONLINE BRAND IDENTITY OF THE TOP BANKS IN THE USA

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Abstract:

The banking sector faces the challenge of distinguishing itself from competitors in an ever-changing online environment and in online communication. Effective brand building and brand management can provide support in this endeavour. For consumers, it is crucial to access reliable information through appropriate online platforms. The research focuses on the brand identity of U.S. banks accessible to consumers. The aim of the study is to analyse and evaluate the brand identity of the websites of 20 USA banks, based on academic literature and methodologies. The research offers insights into the elements of online brand identity and brand building currently employed in the banking sector, derived from the evaluation of these websites. The analysis and assessment of the websites are conducted through a primary qualitative research methodology. The findings can be effectively used for online brand strategy planning by banks. Conclusions drawn from the results will help identify future research directions and potential areas for development.

Key words:

Bank. Brand. Brand Building. Brand Identity. Online. Website.

1 Introduction

Managing corporate identity in the banking sector is particularly important due to the challenges associated with differentiating organizations based on the products and services offered in the market (Wilkinson & Balmer, 1996; Bravo et al., 2012). Banks use various digital platforms to attract customers with financial content and business offers (Levy, 2022). Not only in the banking sector, but companies in general are increasingly striving to project a differentiated identity to society, utilizing visual symbols, communication actions, behaviour, and their internal culture (Bravo et al., 2012). *Corporate visual identity (CVI)* significantly helps financial organizations in strengthening and maintaining customer relationships (Westcott Alessandri, 2013; Kaur & Kaur, 2021). Visual identity is an integral part of corporate brand identity (Alkibay et al., 2008). Westcott Alessandri et al. (2006) highlights that visual brand identity is critically important dimension of an organization. Research by Phillips et al. (2014) finds that brand identity, including the touchpoints of visual brand identity, is vital for the development of organizational brand personality. Brand personality is regularly influenced by stakeholders' experiences with the brand and various visual identity touchpoints found in marketing and advertising communications (Aaker, 1996; Czekanski & Lee, 2017). CVI is a key element of corporate identity, contributing significantly to the external representation of an organization (Baker & Balmer, 1997; Bromley, 2001; Park et al., 2013; Kaur & Kaur, 2021). CVI observed on various websites and online platforms in the context of banking sites. Visual brand identity manifests through various elements, such as name, logo, colour, slogan, typography, and often additional graphical elements (Melewar & Saunders, 1999; van den Bosch et al., 2005; Foroudi, 2019; Kaur & Kaur, 2021). The existing literature contains few prior studies that examine the banking sector's online presence in terms of visual brand identity, aesthetics, and consumer interactions. The objective of Islam et al. (2020) research was to explore how banking websites activate customer engagement (CE) to enhance trust and retention. The research concluded that key website attributes, such as interactivity, aesthetics,

customization, and ease of use, positively influence CE. Chauhan et al. (2022) aimed to demonstrate the impact of digital banking on the evaluation of customer service experiences and developed a framework identifying the most significant variables of digital banking services. The findings confirm that website design and aesthetics are critical components of customer experience. Customer engagement (CE) is determined by functional cues (functional quality, trust, and convenience), mechanical cues (website attributes, design, perceived usability), and human cues (customer complaint management). Some studies utilized eye-tracking methodologies to investigate online banking interfaces, focusing on visual aspects primarily from a usability perspective (Țichindelean et al., 2019). This paper examines the identity communicated on the online websites of the top 20 largest banks in the United States of America (USA).

2 Methodology

North American banks were analysed from the perspective of online brand identity. In this research 20 largest U.S. banks and their websites were selected. The selection was based on the official statistical database of the Federal Reserve Statistical Release as of June 30, 2024, listing the “Large Commercial Banks”. The analysis focuses on examining the branding tools (both visual and content-related) using a checklist presented in Table 1. Checklist was developed through secondary research and with Design Thinking method, making it suitable for identifying the visual and content elements of brand identity on websites associated with brand management activities (Gombos & B  r  -Szigeti, 2021). The checklist was further expanded by adding three new elements (social media, TikTok link, YouTube link, Pinterest link) compared to previous literature (Gombos & B  r  -Szigeti, 2021; Wheeler, 2024). The evaluation was conducted on the homepages of U.S. banking websites. All elements in the checklist were analysed on the U.S. banking websites involved in the study. The examination of the websites took place between October 13-14, 2024. Based on the research results, conclusions can be drawn regarding which visual and content elements are used on the websites of the top U.S. banks in their branding activities. The analysis allows for the formulation of development recommendations to enhance online branding efforts and to establish directions for further research.

RQ1: Which brand design elements can be identified on the websites of all 20 USA banks examined?

RQ2: Which brand content elements can be identified on the websites of all 20 USA banks examined?

Table 1: Websites design and content elements of the checklist

BRAND DESIGN ELEMENTS ON WEBSITES		YES	NO	BRAND CONTENT ELEMNTS ON WEBSITE		YES	NO
1.	Logotype			1.	Sound		
2.	Brandmark			2.	Video		
3.	Signature			3.	Copy		
4.	Slogan			4.	Imagery		
5.	Layout			5.	Blog		
6.	Texture			6.	Text ads		
7.	Shapes			7.	Banner ads		
8.	Symbol(s)			8.	Social media (Facebook link)		
9.	Color palette			9.	Social media (Instagram link)		

10.	Typography			10.	Social media (Twitter link)		
11.	Illustrations			11.	Social media (LinkedIn)		
12.	Favicon			12.	Social media (Tik-Tok)		
13.	Motion			13.	YouTube link		
				14.	Pinterest link		

Source: Magrath & McCormick (2013); Wheeler (2024, 2017, 2009); Stoimenova (2017); Thongmak (2022), own processing, 2024

3 Results

In this chapter, the data summarizing the occurrence of elements related to the online brand identity of the TOP 20 USA banks is presented. The detailed presentation of data on brand identity design elements is shown in Figure 1, while data on the content elements of brand identity is presented in Figure 2.

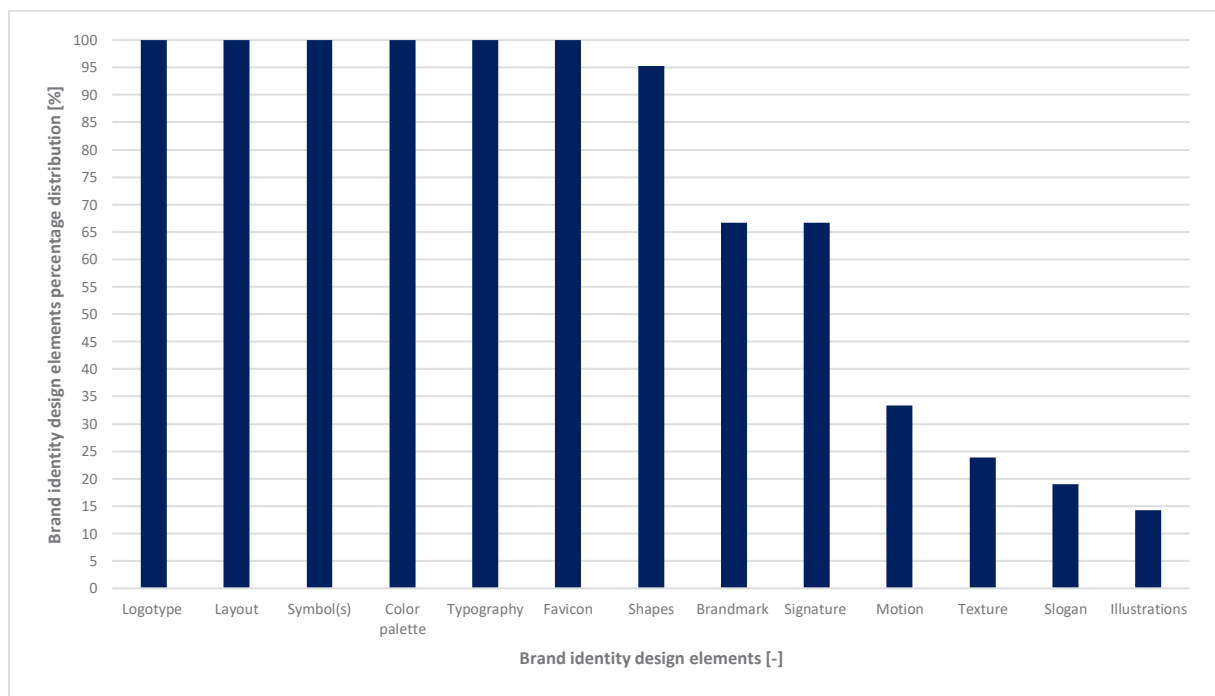


Figure 1: Brand identity design elements evaluation aggregated results based on 20 Largest banks in the USA
Source: own processing, 2024

Based on Figure 1, the summarized comparative results of the brand identity design elements shown. Among the brand identity design elements, six elements appeared on every website: logotype, layout, symbols, colour palette, typography, and favicon. *By answering the research question of RQ1, based on the results of the research, logotype, layout, symbols, colour palette, typography and favicon brand design identity elements could be identified.* The logotype encompasses the font, colour, and pictogram (Ward et al., 2020). 95% of the banks used various shapes on their websites, and 66.75% included an element in their logos that brandmark and signature were identified. Textural elements were less noticeable on the websites of the largest banks, with only 33.3% incorporating this feature. The use of motion elements was also not widely preferred, appearing at a rate of 33.3%. Other rarely used brand identity elements included slogans (19%), illustrations (14.3%), and videos (9%).

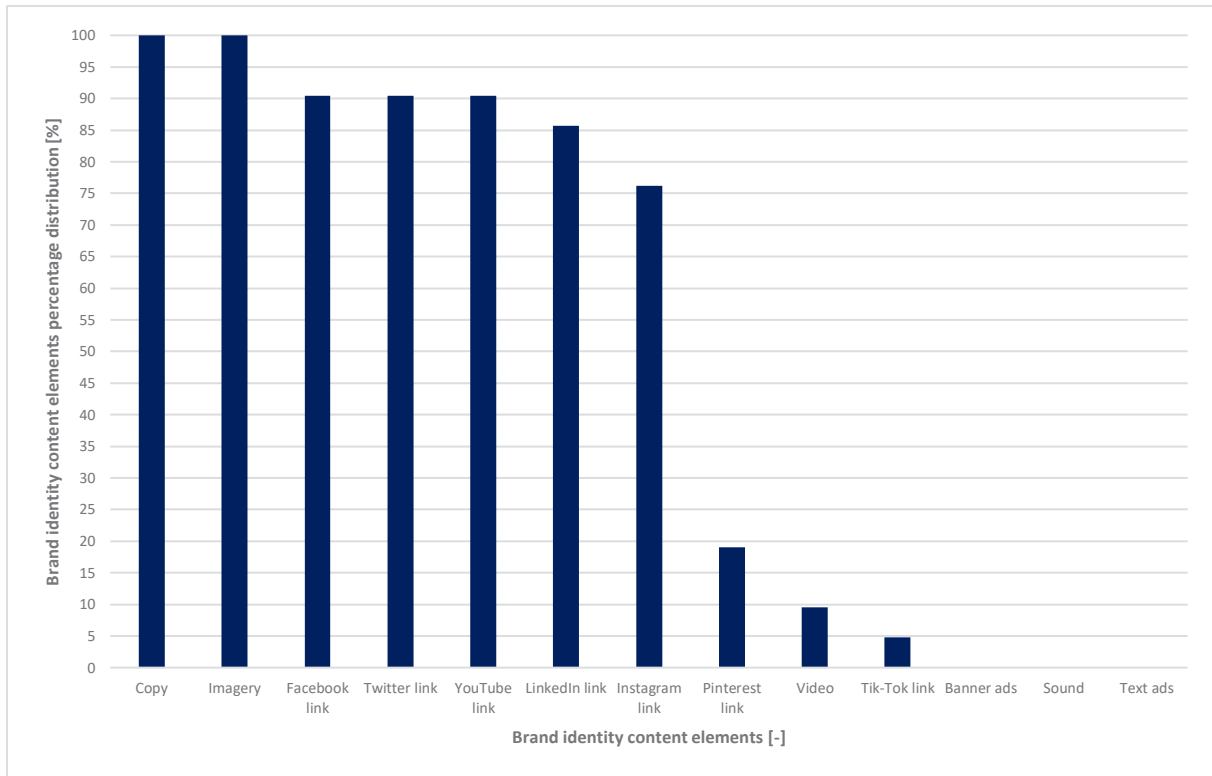


Figure 2: Brand identity content elements evaluation aggregated results based on 20 Largest banks in the USA
 Source: own processing, 2024

In Figure 2, the relationship between the content elements of brand identity were observed. Among the content elements, copy – continuous textual content – and imagery were present on all the examined websites. *By answering the research question of RQ2, based on the results of the research, the copy and imagery content elements could be identified.* The use of copy and image elements was followed by links to some social media platform. It can be concluded that different banks employ varied strategies in their social media communication. The most used social media links on the bank websites were Facebook, Twitter, and YouTube, with 90.5% of the banks using links for customer interaction. This was followed by LinkedIn, which appeared on 85.7% of the bank’s websites. Instagram was featured on 76.5% of the websites. Pinterest links were also identified, appearing on 19% of the bank websites. TikTok was shown on only 4.8% of the examined websites. The analysis indicates that some brand identity elements appear infrequently or not at all on the reviewed banks websites. Blogs were found on 47.6% of the websites, while videos appeared on 10%. No brand assets containing sound or textual advertisements were identified during the period under review.

4 Discussion

Considering Bravo et al. (2012) observation that much of the literature on corporate identity is theoretical and lacks empirical foundation, the significance of this study lies in its empirical exploration of the brand identity design and content elements of the 20 largest U.S. banks. The summarized results of the analysis based on the checklist are shown in Figure 3. In terms of the occurrence of design and content elements, the prominent usage of visual elements observed. Among the consistently appearing brand identity elements, only two (copy and imagery) were identified which belongs to the content elements of brand identity. The use of visual elements was followed using social media platforms.

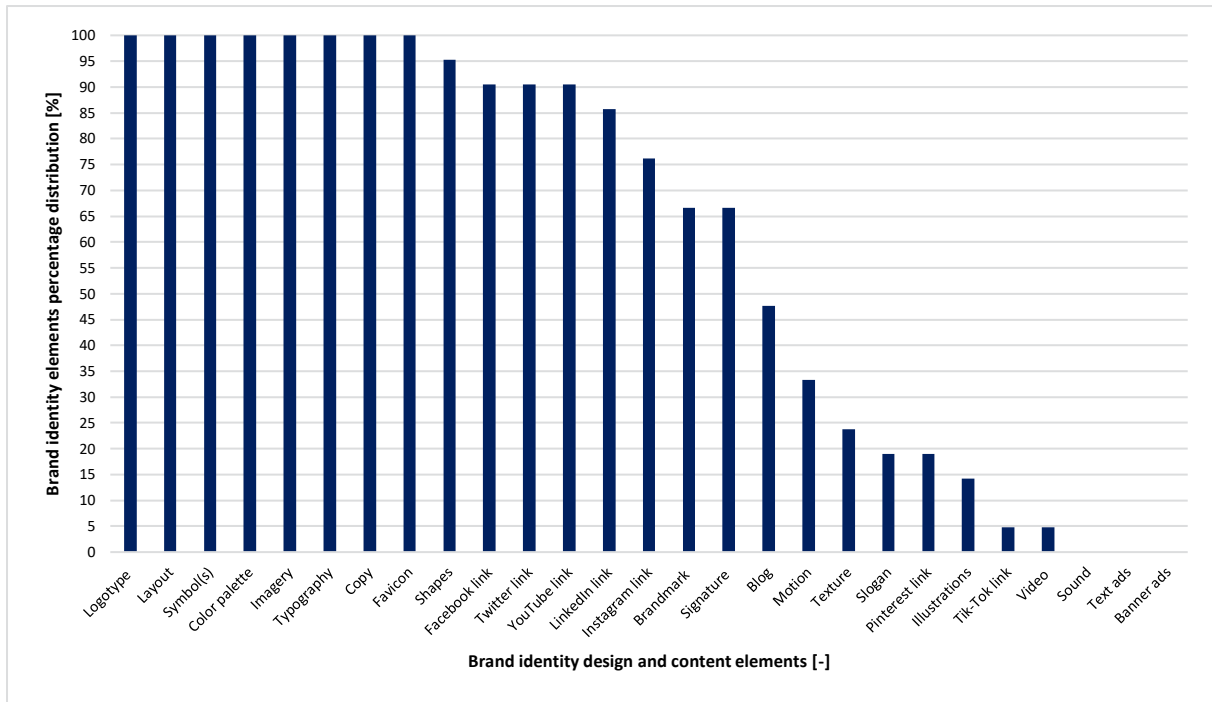


Figure 3: Brand identity design and content elements evaluation aggregated results based on 20 largest banks in the USA

Source: own processing, 2024

However, brand elements reflecting individual communication strategies were also identified. Comparing the present research findings with earlier scientific literature the use of the logotype was found universal, aligning with the findings of Ward et al. (2020). Ward et al. (2020) study, which tested brand identity elements from 1,281 brands across 13 consumer packaged goods categories in 19 countries, found that logos, emblems, and characters had the greatest potential for unique brand ownership.

When comparing the results of this research to Gombos and Bíró-Szigeti (2021), which analysed brand identity elements on the websites of retail banks operating in Hungary, it was found that Hungarian banks used brandmarks at a higher rate than U.S. banks. In contrast, the usage of logotypes was more common among U.S. banks compared to Hungarian banks. Layout, typography, and favicon usage were present in all U.S. banks, since these elements were identified less frequently in the studied Hungarian banks. There was also consistency in the usage of texture and illustrations, as neither U.S. nor Hungarian banks commonly applied these elements in their online communication. Video elements showed similar trends, being almost non-existent among Hungarian banks and present in only a small percentage of U.S. banks compared to previous research. Similarities were observed in the usage of content elements, with no textual advertisements identified on bank websites in either Hungary or the U.S. However, as a difference it was identified that some Hungarian websites featured visual advertisements, while these were not observed on U.S. websites. Differences were noted in the usage of social media link comparing to the literature. U.S. banks websites used social media communication links at a higher rate, including Twitter, Facebook, Instagram, and LinkedIn. Most U.S. websites contained multiple social media platforms simultaneously, in contrast to the Hungarian websites. The reasons for these differences may include different communication goals or cultural distinctions, or differing communication styles in each country’s financial markets.

Earlier literature, such as Bravo et al. (2013), found similar results. Bravo et al. (2013) examined the websites of the 30 largest banks in both Spain and the United Kingdom and showed that corporate brand identity presentation varied between the two countries.

Bravo et al. (2013) concluded that U.K. banks emphasized social and strategic aspects in brand identity creation, whereas Spanish banks were more focused on communicating information. They suggested aligning brand identity communication with cultural markers specific to each country. This research supports Bravo et al. (2013) conclusion that differences in the use of brand identity elements may be attributed to cultural factors, highlighting the need to consider these in strategic corporate brand identity planning.

5 Conclusion

This research focused on the examination of the brand identity of the TOP 20 largest U.S. banks by identifying the elements necessary for creating a visual brand identity found on their websites. The aim of the research was to analyse the online brand identity of these banks and propose new development opportunities. This research fills a gap as it evaluates the latest, as of 2024, online communication of the largest U.S. banks based on a checklist compiled using previous academic literature. The banks included in the research were selected based on the official statistical database of the Federal Reserve Statistical Release. The checklist is suitable for assessing brand management activities in an online environment.

The analysis revealed which brand assets were identifiable on the websites of the examined banks. The results of the checklist analysis indicated that the banks consistently used design elements such as logotype, layout, symbols, colour palette, typography, and favicon. This leads to the conclusion that while certain elements are always used by banks on their websites, other design elements are chosen based on individual strategy. Less usage percentages were observed for motion, texture, and illustrations. Slogans were also infrequently used as brand tools on the landing pages of the banks, instead pages featured product or technical information or registration interfaces.

The use of social media platforms followed the occurrence of visual elements. Among the content elements of all the examined banks, copy and imagery elements were used, while video was rarely used, and sound or textual advertisements were not identified at all in the banks' online communications. The conclusion can also be drawn that incorporating creative use of currently less or unused elements in their online brand identity communication could offer valuable potential for the banks included in the study to stand out in the crowded banking sector and among their customers. Based on this, the application of video content, such as educational videos with audio, could be suggested as a development direction, as the potential of such content is not currently being utilized by the examined banks.

Future research directions could include examining more banks websites in the U.S. or conducting similar research in other countries.

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ANALYSIS AND DEVELOPMENT OF BRAND IDENTITY FRAMEWORKS

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Abstract:

Corporate brand identity plays a pivotal role within the field of marketing science, and its importance is well established in the literature. The evolution of theories and approaches to corporate brand identity is evident in the academic marketing literature. As a result, numerous theories and frameworks related to corporate brand identity can be found in the marketing science, each employing distinct and varied approaches to the definition of brand identity. This study focuses on the theories and concepts of brand identity as they appear in the field of marketing science. The goal of the study is to review the existing brand identity frameworks in the literature and propose a new framework. Through a primary qualitative comparative methodology, the study analyses the most defining brand identity theories found in marketing literature. Based on this literature review, the existing theories are synthesized into a new brand identity framework. The results can be effectively used to facilitate a clear understanding of the concept of brand identity and improve comprehension of brand identity theories and frameworks. The new framework may be applicable in innovation design processes when developing new brands.

Key words:

Brand. Brand Identity. Brand Identity Theories. Brand Identity Framework. Marketing Science.

1 Introduction

The first step to creating a new brand is creating a brand identity (Shirazi et al., 2013). Brand identity communicates the brand's distinguishing points, which go beyond mere physical products (Kotler & Keller, 2006), to gain a sustainable competitive advantage (Keller, 2012). Creating corporate brand identity is the result of a coding process (Urde, 2013). The communication of brand identity shapes brand image, as consumers decode brand signals (Kapferer, 2008). Earlier product-brand models focused on image have been replaced by identity-based theories (Urde, 2013). Vital elements of the corporate brand's internal components are often missing from frameworks developed for product brands (Urde, 2013).

In academic literature, brand identity is a frequently used concept that is studied from various perspectives (Bargenda, 2020; Cullinan et al., 2021; Sarasvuo, 2021). The importance of researching brand identity lies on the fact that how consumers perceive the brand (Aurand et al., 2005; Magrath & McCormick, 2013).

Among the two major approaches in branding, this study aims to present and synthesize the main models representing the point of view of the brand and the company towards the consumer and does not address theories based on brand image. The goal of analyzing these models is to answer the question of which identity elements can be identified in the analyzed models and which identity elements are particularly important. With the establishment of the new framework, the most important and less important brand identity elements can be identified with the knowledge of which the management can more successfully develop the strategy of corporate branding.

2 Brand Identity Theories

Corporate brand identity represents that a company wants its brand to be perceived externally (Urde, 2013). It encompasses the set of meanings through which a company makes itself recognizable, enabling people to describe it, remember it, and engage with it (Bartholmé & Melewar, 2011). “Brand identity elements are building blocks that contribute, creatively, to enhancing brand presence in advertising content and purchase environments” (Ward et al., 2020, p. 394).

The most defining brand identity concepts Aaker (1996), de Chernatony (1999), Kapferer (2008), Bartholmé and Melewar (2011), and Urde (2013), whose conceptual frameworks are reviewed here. Kapferer’s model was first published in 1992.

In “Brand Identity Planning Model”, Aaker (1996) presents corporate brand identity divided into twelve dimensions across four perspectives: “brand-as-product” (product scope, product attributes, quality/value, uses, users, country of origin), “brand-as-organization” (organization attributes, local versus global), “brand-as-a-person” (brand personality, brand-customer relationships), and “brand-as-symbol” (visual imagery/metaphors and brand heritage). According to Aaker (1996), brand identity has a core and extended structure. The core identity the brand’s central, timeless essence of the brand is most likely to remain constant as the brand enters new markets and products. The extended identity consists of brand identity elements grouped into cohesive units that add depth and completeness to the brand (Aaker, 1996).

Aaker (1996) illustrates these perspectives in a hierarchical diagram, connecting each with the value proposition, which was described as providing functional, emotional, and self-expressive benefits. An effective value proposition fosters a favourable brand-consumer relationship and influences purchase decisions (Aaker, 1996). In Aaker’s model, the value proposition directly links to the brand-customer relationship element. In Aaker’s model, the brand-customer relationship represents the position, which is a subset of the brand identity and value proposition, at the target audience and which Aaker said that to actively communicate and provide a competitive advantage.

De Chernatony (1999) brand-oriented approach outlines the strategic process of brand building, where brand identity centres on the distinctive or core idea of the brand and its communication to stakeholders. The central components of this model are “vision” and “culture”. The vision defines the directions and future goals towards which the brand is moving. Culture is described as: “this can be appreciated in terms of the visible artifacts, employees and managers’ values, and the mental models of those involved in brand building activities” (de Chernatony, 1999, p. 167). Within the culture element, there are two types of values: core values, which are unchanging foundational values over time, and peripheral cores, which are the values that changing. The second factor component is “positioning”, which manifests itself behind the positioning strategy, and the functional values of the brand appear through it. The third component is “brand personality”, which brings the brand’s emotional value to life. The fourth component, “relationships” is built on three sub-elements: “staff-to-staff”, “staff-to-customer”, and “staff-to-other-stakeholders”. When there is unity within organizational relationships, the organization proudly present the brand through a cohesive design and promotional support. This leads to the fifth component of the model, “presentation”, which includes design and promotions.

In Kapferer’s (2008) “Brand Identity Prism”, the first element is “physique”, representing the brand’s physical characteristics and fundamental qualities. This consists of a combination of prominent objective features that include key product and brand attributes, as well as the product itself and the brand’s appearance. “The brand’s deepest values must be reflected in the external signs of recognition, and these must be apparent at first glance”

(Kapferer, 2008, p. 173). However, appearance alone is insufficient; it is essential to answer questions: What is it? What does it do? What is it for? Defining this component is the first step in brand formation, including the product prototype. The second dimension is the brand's "personality". Every brand has a personality that gradually builds character through communication. The third dimension is "brand culture", signifying that there can be no iconic brand without brand culture. A brand has its own culture from which all its products emerge. In this context, culture represents the set of values that inspire the brand and serve as the source of its aspirations. The fourth dimension is "relationship", as brands often stand at the centre of exchanges and transactions between people. Choosing a brand also involves selecting a relationship. The fifth dimension of a brand as "reflection" of the customer, meaning it should mirror how the customer wishes to see themselves because of using the brand. This is an element with which the customer can identify. The sixth dimension is the brand's effect on our "self-image". Through our attitudes toward brands, we form a certain type of internal relationship with ourselves. Kapferer (2008) places the "brand core" above the Prism in Identity and Pyramid Models, seeing it as the source of identity. Kapferer (2008) does not explicitly address "positioning" in either the Prism or the Pyramid models, though Kapferer (2008) describes it as a crucial factor in brand identity. Kapferer (2008) suggests that, in positioning, management must answer two questions: "What do customers compare the brand to, and what key decision factor do we offer them?" (Kapferer, 2008, p. 178). Additionally, in the analytical process, four key questions must be addressed: "A brand for what benefit? A brand for whom? Reason? (This refers to the elements, factual or subjective, that support the claimed benefit.) A brand against whom?" (Kapferer, 2008, p. 175).

Urde (2013) developed the "Corporate Brand Identity Matrix (CBIM)" framework to define corporate brand identity, in which nine elements collectively represent corporate brand identity. The matrix is composed of three internal, three external, and three internal-external elements. The CBIM's "internal (sender) components" focus on the organization's values, characterized by "mission and vision", "culture" and "competence". Urde (2013) emphasizes that these elements are also distinguishing aspects of the CBIM framework. In defining the mission, the company's vision extends the mission by formalizing its perspective on its direction and the inspiration driving its progress (Urde, 2013). In the model, company culture represents corporate attitudes, values, beliefs, and modes of operation and behaviour. Competencies hold extra strategic significance in the CBIM for establishing and maintaining a sustainable competitive advantage, covering the organization's capabilities and processes. In the CBIM, the "internal-external elements" consist of three components: "core", "personality", and "expression". The brand core is positioned in the middle of the matrix row, with personality and expression on either side, bridging the internal and external aspects of corporate brand identity. The brand core is defined as a set of foundational values that support and represent a promise. The personality element defines the combination of traits that shape the corporate character. It is crucial to note that corporate brand personality differs from product brand personality, which is typically associated with the perceptions of a specific product's consumers and users. Corporate brand personality is more influenced by the personalities of the employees who represent the company. Therefore, a relevant question that a responsible leader might pose regarding this element is: What combination of human traits constitutes our corporate character? (Urde, 2013). Expression comprises a blend of concrete tangible items and intangible attributes, such as tone of voice, design, graphic style, and logo (Olins, 1989; Mollerup, 1997; Urde, 2013). In the CBIM framework, corporate visual identity is considered part of corporate brand identity. The "external (customer) components" include "value proposition", "relationships" and "position". Regarding position, it is important to note that it should be understood as a reference point in the positioning process and not confused with the broader

concept of positioning. Urde (2013) stresses that the elements of the matrix are interconnected and form a structured unity.

Bartholmé and Melewar (2011) argue for the need for a reconfigured corporate identity structure, citing the diversity in terminology, and introduced the concept of “Corporate Sensory Identity”. The sensory identity model emerged in response to criticism of the standard definitions of visual identity elements. The model’s developers sought to answer the question of whether all elements considered “visual” are strictly visual. For instance, a slogan is not only visible but primarily auditory. Bartholmé and Melewar (2011) concluded that various sensory stimuli related to non-visual elements must be considered, leading to a reconfigured, more holistic corporate identity structure. Their theory is built around the five human senses: sight, hearing, smell, touch, and taste. Sensory identity thus consists of five types of identity: visual identity, auditory identity, tactile identity, olfactory identity, and gustatory identity.

2 Methodology of Developing the New Framework

The development of the framework involves a qualitative analysis and synthesis of five brand identity models: Aaker (1996), de Chernatony (1999), Kapferer (2008), Bartholmé & Melewar (2011) and Urde (2013). In the corporate brand identity framework, the elements must be aligned to form a cohesive whole (Farquhar, 2005; Urde, 2013). Brand elements from these models are being identified, revealing, by the end of the process, the number of authors who include each identity element. This development is expected to make key brand elements and the entire structure of brand identity easily recognizable.

For clarity and ease of interpretation, each author of the analysed models has been assigned a colour in the framework, indicated by small, coloured circles. The color explanation can be found under Figure 1. Large circles (henceforth “discs”) within the framework represent individual identity elements, labelled accordingly. The area to the left of the vertical line represents the internal or brand-oriented side, while the area to the right represents the external or recipient-oriented side. The positioning of each disc on one side or the other indicates whether the element belongs to the sender (brand) or the recipient (audience-consumer) perspective. The small, coloured circles appear on the disc or discs corresponding to identity elements that each author has identified in their model. Discs placed on the vertical dividing line indicate identity elements present on both internal and external sides. For the small, coloured circles, this placement signifies whether the cited author, based on the literature, positions the identity element on both or only one side within their conceptual model.

This method of framework development also reveals the relationships among theoretical concepts, making it clear how concepts with a “brand core” and those without “brand core” are connected. The result is a broader, more complex framework that offers a comprehensive perspective.

RQ1: Which brand identity elements prove to be particularly important in the analysed brand identity models?

3 Results

A common feature among brand identity models is the presence of a central element or core identity. The most prominent representative of this is Aaker (1996), who gave an insightful definition of the basic identity, and it called the “core identity”: “It is the centre that remains after you peel away the layers of an onion or the leaves of an artichoke” (Aaker, 1996, pp. 85-86). In Aaker (1996) model, the core identity is surrounded by the extended identity. This core concept of Aaker’s provides the foundational basis for the synthesized framework created in this study. The structural framework is further supported by Kapferer (2008) concept, which,

in Kapferer's (2008) influential "Brand Identity Prism", shifted the focus from user-centred, external-internal perspectives on image to brand identity, thereby creating the internal-external perspective represented by the vertical dividing line in this study's synthesized framework. Aaker's brand core is positioned on the corporate, internal side of the framework as it represents the essence of corporate identity. Kapferer (2008) placed the elements of "physique", "brand personality" and "culture" on the internal side, which also appear in de Chernatony's (1999) model, although in this model, culture is centrally positioned. De Chernatony's (1999) "relationship" element stands out compared to other models because it defines an internal relationship with the "staff-to-staff" dimension, emphasizing the role of employees as brand builders, while the "staff-to-customer" and "staff-to-other-stakeholders" elements are placed on the external side. Therefore, the relationship element is located on the line dividing the two sides. Urde (2013) CBIM model reaches back to and connects to market-oriented theories. Urde (2013) define the model as a "market and brand-oriented framework" (Urde, 2013, p. 745) that places core values at the centre, along with the brand promise, with the core as the strategic focus point. The concept of the core links to Aaker (1996) model, while the use of external and internal elements aligns with Kapferer (2008) concept. Urde (2013) created a new dimension by establishing a matrix that is simultaneously internal and external. Elements such as the core, visual brand identity, and brand personality belong to this internal-external dimension and are thus placed along the line separating the two dimensions. It is also related to the idea of Aaker (1996) with the elements of position and value proposition, which appear on the outside. The elements of vision and culture, which are located on the inside, are related to de Chernatony (1999), for whom these are central elements. In the synthesized framework of this study, in addition to de Chernatony (1999), Kapferer (2008) also mentions the element of positioning, because although it is not indicated in Prism, it plays an important role in Kapferer (2008) theory. Kapferer (2008) approaches positioning as a key management task, placing it on the internal side. On the internal side, we also find Aaker (1996) product and organization elements. In the sensory identity model of Bartholmé and Melewar (2011), identity areas are defined according to the associated sensory channels. There is no core identity in this model, but it can be well combined with it. This is possible because one of its elements is the visual identity, which is closely related to the core. Based on the model's holistic approach, encoded identity elements are placed on the sender side, while decoded identity elements are placed on the recipient side. The Kapfererian elements "self-image" and "reflection" are also found on the recipient side.

It is important to note that the identity elements within the framework interact with each other; however, these interactions are not explicitly marked to avoid overcrowding the diagram. In designing the new framework, clarity and transparency were key considerations. The new framework can be called the "Brand Identity Disc Framework" because of the "disks" used in it.

4 Discussion

The identity elements featured in the presented models are partly overlapping, though some elements are unique to specific authors. The researchers' concepts align most prominently on the elements of visual brand identity, core identity, brand personality, and relationship. Brand elements that appear in all models discussed in this study are considered strong components of brand identity. Based on these models, the strongest and most definitive brand identity element is visual brand identity, as it is present in all five identity theories. This aligns with findings in the literature, which suggest that "A strong symbol can be the cornerstone of a brand strategy" (Aaker, 1996, p. 85). Bartholmé and Melewar (2011) also regard the visual component as the most dominant factor, stating: "Visual identity can be considered one of the main elements of a brand" (Andrade et al., 2024, p. 70). Four authors – Kapferer (2008), Aaker

(1996), de Chernatony (1999), and Urde (2013) – recognize core identity, brand personality, and relationship as brand identity elements, underscoring their importance. These findings further support conclusions in the literature. Researchers consider the brand core a crucial dimension, describing it as the “timeless essence” (Aaker, 1996) and “promise, core values” (Urde, 2013). In de Chernatony (1999) model, vision and culture are also centrally positioned, so they are placed similarly in this study’s framework. Kapferer (2008) does not place the core within the “Brand Identity Prism” but instead considers it above, referring to it as the “source of identity” in this theoretical concept – an aspect not to be overlooked, thus it is included in this framework (Kapferer, 2008). In this study, the brand core is depicted based on Aaker (1996) concept. Aaker (1996) describes brand personality as an identity aspect that “suggests a brand identity that is richer and more interesting than one based on product attributes” (Aaker, 1996, p. 83) and further notes that “the brand personality concept has considerable face validity; brand strategists and researchers are comfortable with it” (Aaker, 1996, p. 142). Regarding the relationship element, Kapferer (2008) determined that it defines service delivery, operational style, and customer relations, identifying it as critical in banking and financial services. The culture element appears in the work of three authors (de Chernatony, 1999; Kapferer, 2008; Urde, 2013), underscoring its significance.

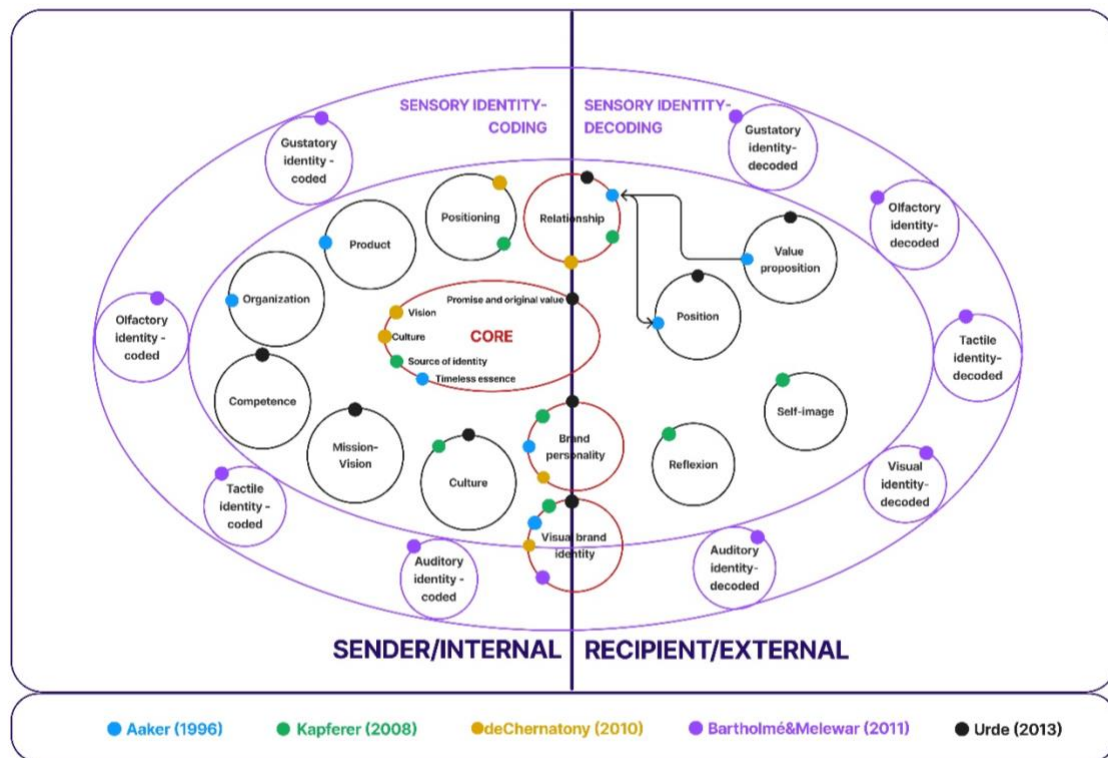


Figure 1: Brand Identity Disc Framework
Source: own processing, 2024

Three elements are conceptualized by two researchers: value proposition, position (Aaker, 1996; Urde, 2013), and positioning (de Chernatony, 1999) and Kapferer (2008). Other elements are uniquely named once in the models, including product and organization (Aaker, 1996), self-image and reflection (Kapferer, 2008), competence and mission (Urde, 2013) and sensory identities such as auditory, tactile, olfactory, and gustatory identity (Bartholmé & Melewar, 2011).

By answering the research question of RQ1, based on the research, visual brand identity, brand core, brand personality and relationship brand identity elements prove to be particularly important in the analyzed brand identity models.

The results partially align with findings by Tourky et al. (2020) found that senior British executives identified six core corporate identity dimensions: communication, visual identity, culture, behaviour, stakeholder management, and the founding leader. Some elements are the same in this list that are also highlighted or of decisive importance in the synthesized framework of this study, however, Tourky et al. (2020) said in their research, brand personality does not appear among the dimensions of corporate brand identity. Meanwhile, Andrada et al. (2024) describe brand design elements as tools for creating perceptions of brand personality.

The new “Brand Identity Disc Framework” uncovers and synthesizes the most significant brand identity theories and summarizes their priorities. It answers the question of where the connections lie among the studied models and identifies which identity elements are deemed of primary importance, while not underestimating the value of other dimensions, especially given their mutual influence. Andrada et al. (2024) illustrate this interconnectedness among identity elements, as does Urde (2013), who emphasizes that the elements in their system form a structured unity.

5 Conclusion

The aim of this study is to review the major brand and corporate brand identity models in the literature and propose a new framework. The research is warranted by the diverse and often fragmented perspectives in the literature, which complicate understanding of the topic. For this study, secondary research was conducted in marketing literature, utilizing the data to develop a framework through a qualitative comparative approach. The new “Brand Identity Disc Framework” synthesizes the conceptual frameworks of Aaker (1996), de Chernatony (1999), Kapferer (2008), Bartholmé and Melewar (2011), and Urde (2013). Core identity, a concept primarily associated with Aaker (1996), is addressed in four of the five theories discussed, underscoring its importance. In the developed new framework, visual brand identity emerges as the most frequently cited element, as all five concepts in the study include it. Brand personality and relationship elements also prove to be significant, appearing in four of the models, while culture is discussed by three authors. The framework uses unique colours to mark elements associated with each author, aiding in quick recognition of key brand elements and the overall structure of brand identity. The identity elements are not independent but interact as part of a system. This comprehensive framework facilitates a clearer and quicker understanding of corporate brand identity and can serve as an effective tool in innovative planning processes for developing new brands.

A limitation of the study is that, out of the many brand identity concepts currently available, only five were analysed and integrated into a single framework. Consequently, not all theories were reviewed and analysed. Including the concepts not covered here in future research could help identify additional brand identity elements and connection points.

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USING ARTIFICIAL INTELLIGENCE IN VIRTUAL REALITY

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Abstract:

Artificial intelligence has been developing in all sectors in recent years. Machine learning was the initial impetus in the emergence of an increasingly advanced version of artificial intelligence. Nowadays, this phenomenon has developed into many sectors of the entertainment industry, healthcare, education and so on. AI can be an effective tool, but it also harbours negatives. For example, one of the negatives is the ethical aspect in training AI or its error rate. Information from AI language models is not 100% correct and does not go through a fact-checking process. Generative AI is another form of AI that can create different types of content such as, graphics (generating images, photos, graphic elements, etc.), sounds (creating soundtracks, loop sounds, etc.), or videos (creating videos based on prompts, script, etc.). Therefore, generative AI has the potential to become an effective tool in the creation of content within Virtual Reality. VR has unlimited possibilities in terms of creativity in creating different virtual worlds. In this paper, we will analyze the AI tools that can be effectively used in different areas of Virtual Reality.

Key words

Artificial Intelligence. Generative AI. Machine Learning. Trends. Virtual Reality.

1 Introduction

The use of artificial intelligence is an increasingly common part of everyday life. Some forms of it we don't see and take for granted. Examples include facial recognition on mobile phones or voice assistants.

In terms of levels, we recognise three basic categories of artificial intelligence (“Čo je to umelá inteligencia?”, n.d.):

- Narrow artificial intelligence is a system designed to perform specific tasks. It is sometimes also called weak. This is because these systems are limited in scope and do not have the ability to perform tasks outside their specific domain.
- A general artificial intelligence is a theoretical system that would be able to successfully perform any intellectual task that a human could do. These systems would also be able to learn from experience and predict patterns and would have the ability to take things a step further. Such a form of artificial intelligence does not yet exist; a lot of effort is being invested in research.
- A superintelligent artificial intelligence is a system that would be able to function as a fully self-aware and surpass the intelligence of a human. It currently exists only as a theoretical model.

In addition to these classic categories – narrow, general, and superintelligent – we also know of several distinct levels of artificial intelligence (“Čo je to umelá inteligencia?”, n.d.):

- Machine learning allows computer systems to learn and improve from experience and data. Based on algorithms for different types of learning methods, the system automatically learns and improves from data without being specifically programmed to do so.
- Neural networks are a fundamental component of artificial intelligence and are inspired by the structure and function of the human brain. During training, neural networks adjust the strength of connections between neurons based on patterns in the data, allowing them to

recognize patterns, make predictions, and solve problems. They use different methods to learn from data depending on the task and the type of data.

- Deep learning is a subset of machine learning that uses neural networks with multiple layers to learn and extract features from huge amounts of data.
- Generative artificial intelligence is a type of deep learning that uses foundation models to create entirely new content, including images, text, audio, ideas, and software code.

Generative artificial intelligence can be thought of as a machine learning model that is trained to generate new data, rather than to make predictions about a particular data set. A generative AI system is a system that learns to create other objects that look like the data it was trained on (Zewe, 2023).

There are many tools for generating audiovisual content using generative AI. They are commonly used and are user friendly. For example, for image generation, these are the DALL-E or Midjourney systems, which can generate an image in seconds based on a string of words. For generating videos, we are talking about Adobe Sensey, Runway or the Sora system, for example. There are also standalone systems for creating music and sounds such as Suno AI, AIVA, Mubert and others.

It is this part of artificial intelligence, which can generate audiovisual content very quickly and relatively easily, that has great potential in the field of virtual reality.

Virtual reality is a three-dimensional computer-generated environment that simulates a real environment. It allows us to enter imaginary worlds or places that are not normally accessible, such as space. We can experience virtual environments through goggles, gloves and full body suits. Virtual reality is a computer-based technology that assimilates specialized input and output devices by allowing the user to interact with an artificially created environment and experience it as if they were in the real world. The virtual reality system also allows the user to search and interact with a three-dimensional virtual or artificial environment created by the designer. In the virtual world, the user can do all kinds of routine-like things, such as throwing a tennis ball or flying through space. And all of these things can happen with just a hand gesture or a motion (Gandhi & Patel, 2018).

Virtual reality is actively used in various fields including gaming and film industry, education and training, healthcare, architecture and design, and others. Within gaming, it is the ability to create a world in which the player is immersed and experiences a multi-dimensional experience. Interactive and virtual classrooms are used in school environments. In many sectors of education, simulations and training through virtual reality are possible and available. It is also possible in the healthcare sector, specifically in surgical simulations or rehabilitation. And in the fields of architecture and construction, virtual tours of buildings, their modelling and interior visits are realised.

US VR Users, 2019-2023

millions

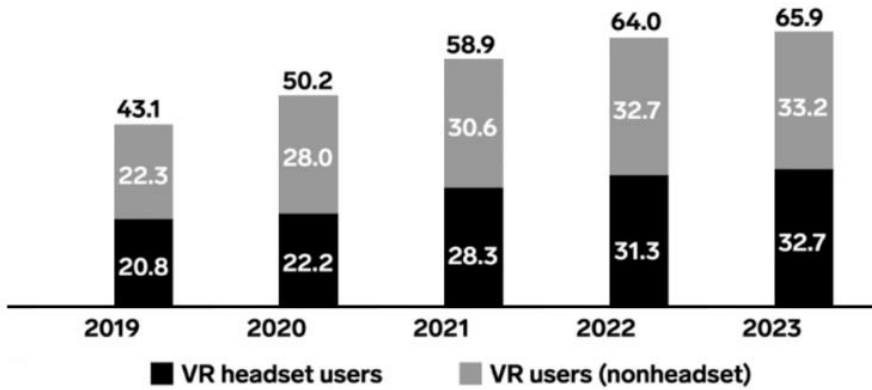


Figure 1: Forecasting the use of VR in the US from 2019 – 2023

Source: Petrock (2021), own processing, 2024

It is also important to mention the concept of augmented reality. This connects the real world with the virtual world. We can experience it simply by using mobile phones and it is very common in games.

This technology requires hardware components such as a processor, sensors, display and input devices. Mobile devices typically already have this hardware available, including sensors including cameras, accelerometers, global positioning system (GPS) and solid-state compasses. This helps make augmented reality accessible to ordinary users. GPS is used to determine the user’s location, and its compass is used, for example, to determine the orientation of the device (Gillis, 2022).

It is in this context that we see the potential for the use and connection of artificial intelligence and virtual reality. We do not have to imagine only digital games. Both technologies have found applications in education, construction, healthcare and other industries. It is time-consuming and technically challenging to model and create every unit that would be part of a virtual environment. For example, on the topic of healthcare, imagine a detailed model of the human heart.

2 Methodology

The main topic of the paper is to define the basic concepts in the field of virtual reality and artificial intelligence. Also, in the paper we analyze selected AI tools that can be beneficial for streamlining the work in the field of content creation for virtual reality.

The aim of the paper is to characterize virtual reality and artificial intelligence in general and to give its division from a theoretical point of view. The paper presents current knowledge in the field of artificial intelligence and its tools that are suitable for streamlining processes in the context of content creation for virtual reality.

In our article we have used several scientific methods. In the theoretical part, we use induction and deduction to process the available sources on the classification of artificial intelligence and virtual reality. In the next step, we use analysis to process the available information about AI tools suitable for creating multimedia content for virtual reality.

3 Results

Artificial intelligence has its limits and risks. On the other hand, it can be used in a wide range of industries. AI tools are also improving thanks to the great public interest and everyday use. Currently, AI is suitable for effective use in the field of virtual reality.

Avaturn

Avaturn is an AI tool suitable for generating 3D avatars. The usability of this tool is in the gaming industry but also in the metaverse or in virtual reality environments, as it is a 3D model. The process of creating an avatar is very simple, based on a selfie image of the face, Avaturn can create a 3D character. This can then be edited by the user according to the desired preferences. It is possible to edit the size of the character, clothes, accessories, hair, etc. The avatar can then be exported to different formats according to the user's needs. Avaturn also allows realistic animations such as facial expressions or movements and gestures to be added to avatars. It works with platforms such as Blender, Unity, Unreal Engine and others. The advantage of this AI tool is the fast and intuitive realization of a 3D avatar without additional experience in 3D modeling. Its other advantage is compatibility with VR and 3D platforms. We consider the limited possibilities for more complex editing and the dependence of the final 3D avatar on the quality of the uploaded selfie photos to be disadvantages. Overall, this tool is an effective complement and a suitable tool for creating virtual reality content.



Figure 2: Developing characters in Avaturn
 Source: “Avaturn | Realistic 3D Avatar Creator” (n.d.)

Luma 3D Capture

Lumalabs has developed an AI-powered app called Luma 3D Capture. This tool can very easily bring real objects into a digital three-dimensional world. You can create 3D objects through the app or the web interface. To create a 3D object, Luma 3D Capture needs input data in the form of video or photos of objects or scenery. It uses Neural Radiance Fields (NeRF) technology to digitize objects to capture accurate textures, lighting, and geometry of the environment.

Neural Radiance Fields (NeRF) works on the principle of machine learning and enables the use of deep neural networks to predict colors and point densities in virtual space, creating 3D models and sceneries, including lighting and shadow effects. It can be used in virtual reality but also augmented reality (Mildenhall et al., 2020).

Efficient creation of 3D objects with realistic lighting, texture and shading is one of the advantages of this AI tool. With a web interface, Luma 3D Capture allows the generated 3D objects to be exported to software such as Unity or Unreal Engine and further manipulated and used in VR. Therefore, it is suitable for efficient, fast and relatively inexpensive creation of 3D objects without the need for prior 3D modelling experience. The application has limitations in its ability to scan large sceneries and is dependent on the quality of the input data.

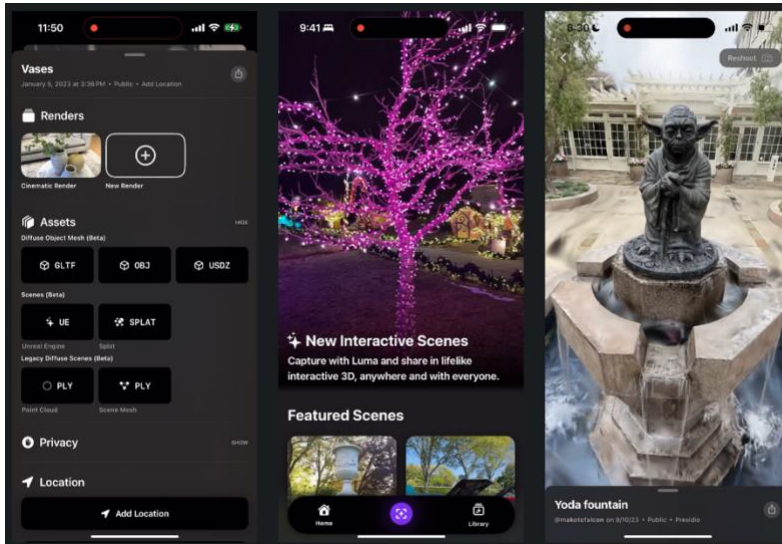


Figure 3: Preview of the Luma 3D Capture app
Source: “Luma AI – Interactive Scenes” (n.d)

Meshy.ai

This AI tool, like Luma 3D Capture, can generate 3D objects for VR, AR but also for film or gaming environments. Different from the app from developer Lumalabs, it also offers the generation of 3D objects using other input data. In addition to Image-to-3D technology, it can also generate objects using text commands (Text-to-3D). As an add-on, Meshy.ai can also generate texture objects by entering text commands (Text-to-Texture). These technologies streamline the generation of images and allow them to be generated based on text commands, which means that it can also generate abstract objects.

Text-to-Texture is a process whereby the AI generates 3D objects based on input data that is entered using text commands. It uses Natural Language Processing (NLP) to interpret text and 3D rendering algorithms to create models (Meshy.ai, n.d.).

Text-to-Texture is the process of generating textures by artificial intelligence into 3D objects based on text commands. The generated textures, such as physics-based rendering maps, are used to create realistic surfaces for 3D objects (Salian, 2023).

The use of Meshy.ai within VR has several positive features and can be considered as an effective tool in terms of speed and quality of processing 3D objects. The advantages of this tool are also versatility, quality and customization in terms of exporting to other file or easy to use tools. Among the positive aspects we also include entering commands using text to generate 3D objects which is to some extent also a limitation of Meshy.ai. The Text-to-3D process cannot 100% execute the user’s instructions and therefore multiple repetition and concretization of commands is necessary to make a 3D object according to the desired attributes. Especially for more abstract models, this AI tool has problems with detail processing. As a result, this tool is efficient. It reduces the long process of creating 3D objects to a minimum. With further post-production processing in other software, it is a quality tool for creating content for VR.

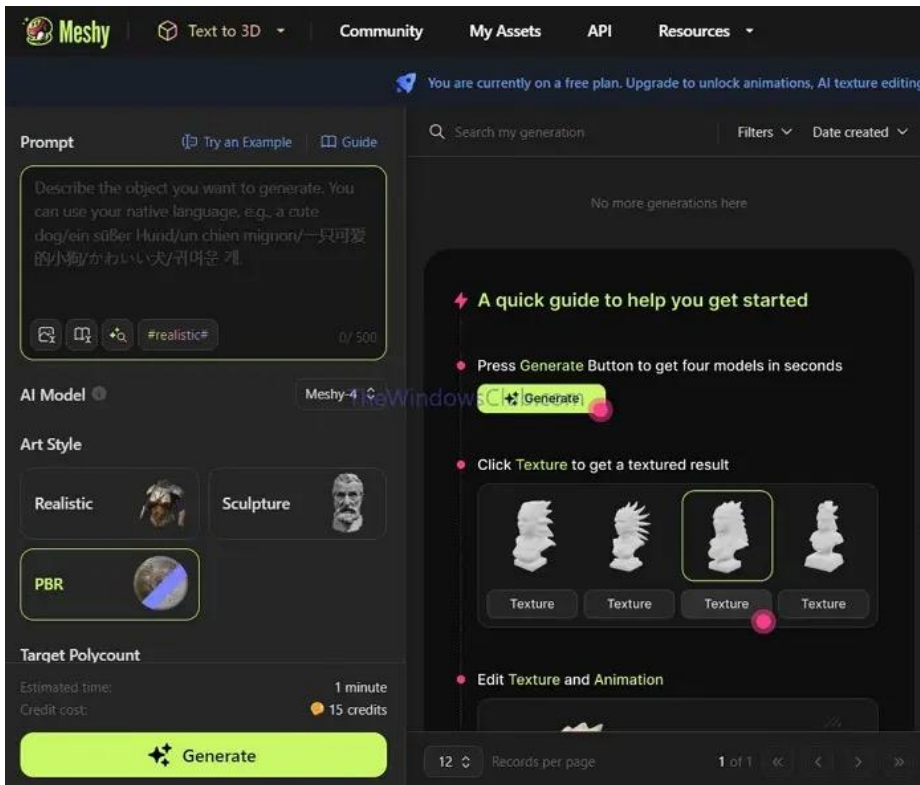


Figure 4: Preview of Meshy.ai app
Source: Mohta (2024)

4 Discussion

Artificial intelligence can be divided into several types and can be used in various areas of business, healthcare, science and everyday life. It is a relatively new technology that has started to develop on the principles of machine learning. It has been improving very rapidly over the last 2 years since it started experiencing popularity among the public. This is also due to the interest of the market and companies that are interested in streamlining processes and saving on costs. Equally, this has been helped by the public who have taken a liking to AI thanks to the AI language module ChatGPT. Later, various brands started implementing this module in their personal assistant models such as Apple's Siri. The advancement in this field in training AI modules is also possible because of the users who test these technologies on a daily basis for entertainment, work, creativity, etc.

In Slovakia, more than 60% of Slovaks do not use artificial intelligence, according to a survey from IPSOS published in November 2024. Taking a closer look at the published results, we can see in Figure 5 that the largest group that does not use AI is made up of retirees. Up to 81% of pensioners do not use AI at all. Which is understandable given the lower computer literacy of seniors than other parts of the population. On the other side of the spectrum are students. 52% of students use AI daily or at least weekly. In contrast, only 12% of Slovak students do not use AI at all.

Artificial intelligence is a relatively new technology, and we can therefore expect that their daily use by the majority of the population will grow in Slovakia as well. Of course, this will depend on the further development of AI and its implementation in a wide range of products and industries.

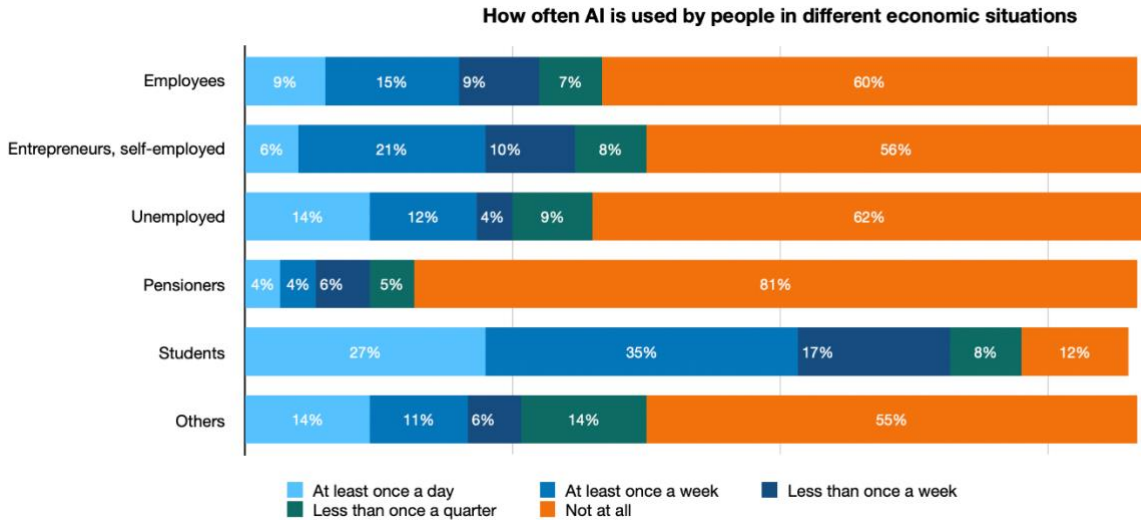


Figure 5: How often AI is used by people in different economic situations
 Source: Hrivňák (2024), own processing, 2024

Figure 6 shows in which areas each economic group uses artificial intelligence. We can see from the data that all groups in Task at work/school are using AI the most. If we are not counting people who just wanted to try AI (Just for trying out), the second most used category is Entertainment. Entertainment is an important part of virtual reality. Therefore, the logical next stage of AI development is to implement it in VR. It is already possible to use AI tools for effective use in creating content for VR. In the future, we can expect other types of implementation in VR, from virtual assistants to generating custom VR worlds based on voice commands.

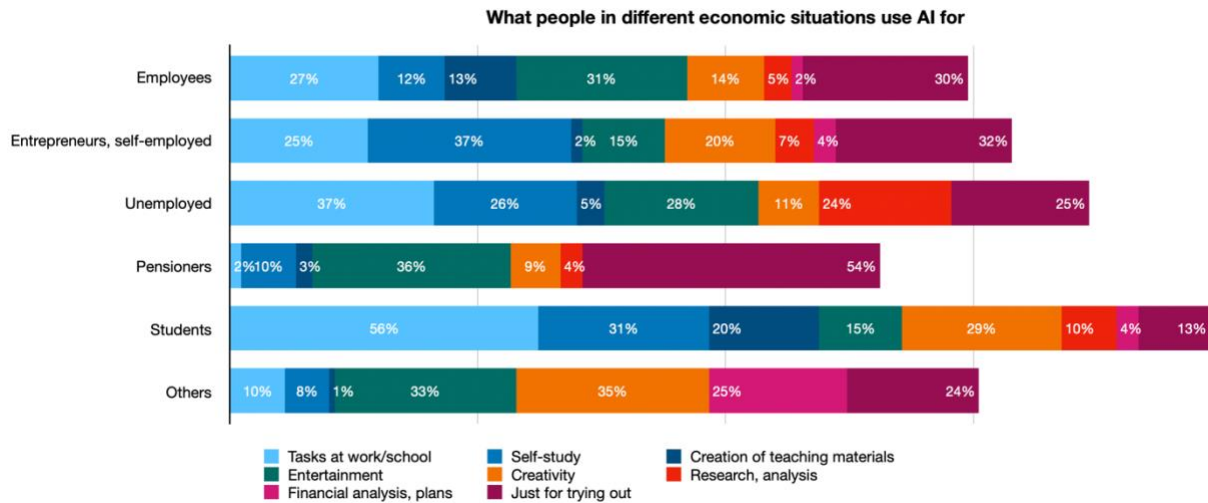


Figure 6: What people in different economic situations use AI for
 Source: Hrivňák (2024), own processing, 2024.

5 Conclusion

The implementation of artificial intelligence in virtual reality is a logical step in increasing the efficiency of content creation for the industry. AI spills over into various spheres and it would make little sense not to exploit its potential.

Virtual reality has been evolving for several years now. Advancements in the production of ever smaller and more powerful processors and energy efficiency have brought users much lighter, smaller and more mobile VR Headsets. Currently, the trend is to link VR

and AR allowing you to move around in real environments. The size of VR headsets is now on par with sunglasses, which are heavier and bulkier, but much more comfortable to wear and use compared to previous versions. Implementing artificial intelligence into virtual reality on a larger scale is only a matter of time.

The AI tools analysed now have great potential to contribute to a faster and more accessible way for the general public to generate 3D objects, avatars and scenes for virtual reality. VR will evolve both in hardware and software in the coming years. The use of haptic feedback is foreseen, which will interact with the environment and the user will be able to feel virtual objects. The implementation of AI in the field of virtual reality can also be very beneficial in this respect. Interacting with objects and triggering haptic feedback can be fully autonomous thanks to AI.

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DEVELOPMENT OF MARKETING STRATEGY OF THE COMPANY IN THE SPHERE OF RESTAURANT BUSINESS ON THE BASIS OF ECONOMIC AND MATHEMATICAL MODELING OF CONSUMER BEHAVIOR

Veronika Grimberger

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Abstract:

When many areas of the service sector are studying and marketing analysis is carrying out, it is important to apply methods and models aimed at understanding the peculiarities of individual consumer behaviour. Demand for services of companies in the restaurant business depends on many socio-economic factors, as well as individual preferences of consumers. Restaurant business enterprises, as a rule, focus on a certain segment of visitors, taking into account the formed preferences concerning the localization of the restaurant, its image, assortment of offered dishes and drinks, quality of service and pricing policy. Representatives of different age and social groups were chosen as respondents, who filled out questionnaires and put the degree of comparison of the influence of factors on the basis of pairwise comparison and application of a certain quantitative scale to assess the degree of influence of this or that factor on a given indicator. Also, to analyse the dependence of the influence of various factors on the choice of restaurant, menu type, price preferences, a logit model was used, which allows you to make a forecast of the choice of the consumer taking into account his/her individual characteristics. On the basis of the constructed models recommendations for the development of marketing strategy for small enterprises specialising in the restaurant business were given.

Key words:

Consumer Behavior. Logit Model. Marketing Strategy. Modelling Method of Hierarchy Analysis. Restaurant Business Enterprises.

1 Introduction

The importance of sound and strategically oriented marketing planning in the hospitality industry and restaurant business is of central relevance in order to assert oneself in an increasingly saturated and competitive market environment. In view of the challenges arising from the intense competition between large, corporate-backed chains, franchises and regional, locally based businesses, it is essential to develop a differentiated and customized marketing strategy. Such a strategy must not only reflect current consumer needs and preferences, but also take into account dynamic market conditions and future trends. In this context, economic and mathematical modelling of consumer behaviour is of paramount importance, as it enables a systematic and data-based analysis.

A well-founded marketing strategy in the hospitality industry and restaurant business takes into account the different needs of the target groups and enables companies to position themselves in a differentiated way. According to Kotler et al. (2017), marketing in the hospitality industry and restaurant business is more than just customer acquisition – it is also about creating long-term customer and brand loyalty. This is especially true in an environment in which customers are increasingly looking for personalized experiences and customized offers. To meet these expectations, companies must have a precise understanding of the needs of their target groups and continuously adapt their marketing strategies. The scientific literature

underlines that, above all, a differentiated approach to target groups through a combination of traditional and digital marketing channels is necessary to ensure sustainable competitiveness.

The research by Pizam and Shani (2009) shows that in the hospitality industry, a differentiated marketing strategy that integrates both qualitative and quantitative approaches can lead to a significant increase in profitability. Companies that are able to precisely identify market segments and develop tailored offers create a clear competitive advantage. This is particularly true for locally based businesses that can differentiate themselves through their regional roots and individual offers. By contrast, corporate-backed chains and franchises benefit from broad brand recognition and standardized processes that help them respond quickly and efficiently to changing market conditions.

The increasing digitalization is significantly changing marketing in the hospitality industry and restaurant business. Technologies such as *big data*, artificial intelligence and social media offer new possibilities for analysing consumer behaviour in real time and implementing targeted marketing measures. Chaffey and Ellis-Chadwick (2019) point out that a data-driven marketing strategy not only enables companies to address the needs of their customers more precisely, but also to use their marketing resources more efficiently. With the help of big data, companies can identify specific consumer habits and preferences and develop personalized offers and advertising measures that promote greater customer loyalty. This personalized approach is particularly important for achieving long-term success in a highly competitive market environment such as the hospitality industry and restaurant business.

In summary, a well-thought-out and adaptable marketing strategy is essential in the hospitality industry and restaurant business. It enables companies to differentiate themselves from the competition, accurately identify consumer needs and develop tailored offers. In this context, scientific models and data-based analysis play a central role in understanding consumer behaviour and developing targeted, effective marketing measures. Companies that successfully integrate these methodologies into their strategies can not only strengthen their market position, but also ensure long-term customer loyalty and business success.

Recently, due to the increased competition in this sphere and the economic consequences of the pandemic of Covid-19 caused by restrictions and deterioration of the conditions of entrepreneurship in the restaurant business, many enterprises in this sphere have faced the problem of unprofitability and the need to change the existing business model.

In this regard, it is necessary to develop a new marketing strategy based on the analysis of new challenges and the study of the peculiarities of individual consumer behaviour. In this study, a model was developed using the method of hierarchy analysis described by T. Saaty (Saaty, 1980, 1990; Saaty & Vargas, 2012; Matrosova et al., 2021) and revealed the influence of factors that, according to individual consumers, have a greater or lesser impact on the choice of a particular restaurant, dishes and drinks offered in a given restaurant, frequency of visiting the restaurant, budget constraints, etc.

2 Methodology

The methodology of this study is based on the application of the concept of system analysis and empirical data research, which allows the development of statistical and mathematical models to improve the marketing strategy of companies in the restaurant and catering business.

This study used methods of questionnaire and data collection, statistical analysis of sample data, econometric modelling (construction of regression model – logit model) and the method of hierarchy analysis developed by T. Saaty (Saaty, 1980, 1990; Saaty & Vargas, 2012; Matrosova et al., 2021).

Several questionnaires were developed to determine individual characteristics of consumers (age, gender, place of residence, income level, etc.) and peculiarities of their behaviour, decision-making in choosing restaurants or catering outlets, selection of dishes and drinks from the offered menu and set prices.

The questionnaires were designed with open and closed questions, and electronic questionnaires were used to survey respondents using Google Forms. Respondents from several countries in Europe and Asia, most of whom were young and middle-aged people, took part in the survey. The total number of respondents was more than 300. Excel databases were used for analyses, which were obtained using Google Form tools (Bhandari, 2023; Sopact University, 2024). Then the obtained data were analysed using Statistica statistical package, and MPriority software was used to calculate the indicators of the restaurant choice model using the method of hierarchy analysis.

3 Results

This research was divided into three main stages. The first stage involved the design of questionnaires that contained questions both about individual characteristics of respondents, such as: gender, age, place of residence, country, income level, etc., and about the specifics of their consumption and nutrition behaviour. For example, respondents had to indicate the specifics of their individual daily diets (vegetarian diet or mixed diet), consumption of certain food and beverages, preferences when choosing certain food products, preferences and criteria that may have different degrees of importance when choosing a restaurant or café. The first stage also involved statistical analysis of the sample data and visualisation of the results obtained from the data using various graphs and charts (Statista Research Department, 2012; Phoebe, 2022).

At the second stage, the choice of certain indicators was analysed depending on individual characteristics of consumers and criteria important for them using logit models. The dependent variable took binary values: 1 if the given attribute, factor or criterion was observed and 0 otherwise. Dummy variables were included as explanatory variables, which characterised age group, gender, place of residence, income level, etc., as well as various other factors such as the degree of importance of a criterion, favourite drinks, etc. The parameters and other characteristics of the logit models were calculated in Statistica package. Based on analysing the constructed logit models, conclusions were drawn about their feasibility to be used for predicting the result of respondent's choice taking into account their individual characteristics.

At the third stage the structure of hierarchical models of consumer choice based on the method of hierarchy analysis were developed. These models contained matrices for pairwise comparison of the degree of importance of the influence of the elements of the previous level on the corresponding elements of the next level. Respondents were asked to fill in the matrix data taking into account the scale for pairwise comparison and then this data was entered into the MPriority programme to calculate the degree of influence of each factor of the previous level on the different elements of the next level. Then, the values of the priority vector were calculated which indicated the influence of the first level elements on the final element (goal) in this model.

Let us present the main results of this study. 275 respondents took part in the first round of the questionnaire, of which: 111 respondents (40%) aged under 20 years; 112 respondents (41%) aged 20 to 30 years; 15 respondents (5.5%) aged 31 to 40 years; 26 respondents (9.5%) aged 41 to 50 years; 6 respondents (2.2%) aged 51 to 60 years, and 5 respondents (1.8%) aged over 60 years.

There were 113 male respondents (41%) and 162 female respondents (59%) who participated in the questionnaire. The majority of respondents (54.5%) lived in big cities; 24%

of respondents lived in medium and small cities; 8.4% of respondents lived in a settlement and 12.7% in rural areas. The charts in Figure 1 show the distribution of respondents by age and place of residence.

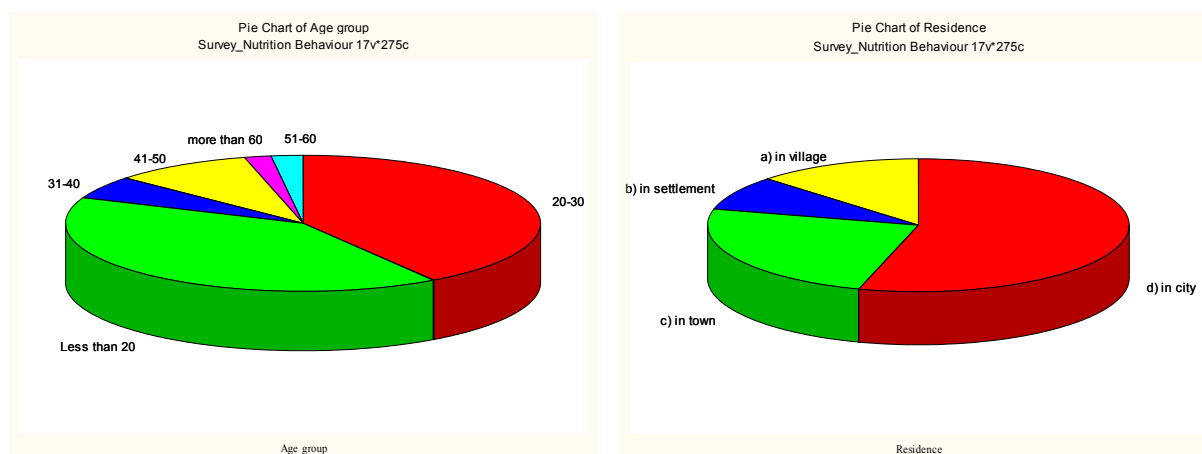


Figure 1: Characteristics of the respondents by age groups and place of residence
 Source: Statista Research Department (2024), own processing, 2024

The majority of respondents indicated that their monthly income was less than 100€ (109 respondents or 40%); 49 respondents (18%) indicated that their monthly income was between 100€ and 200€; 38 respondents (14%) indicated an income between 201€ and 300€; 79 respondents (28.8%) indicated that their monthly income was more than 300€.

Based on the obtained data, a logit model was constructed (Table 1), in which the dependent variable was a binary variable characterising the use of vegetarian diet in everyday nutrition.

Table 1: Logistic regression (logit) for dependent variable D_veget_3

Model: Logistic regression (logit) N of 0's: 170 1's: 105 (Data_Nutrition)					
Dep. var: D_veget_3 Loss: Max likelihood					
Final loss: 175,20652583 Chi sq. (4)=15,308 p=0,00411					
	Const.B0	D_age_gr1	D_city	D_income_gr1	D_income_gr2
Estimate	-0,388886	0,767070	-0,600871	-0,179261	-0,187012
Odds ratio (unit ch)	0,677812	2,153447	0,548334	0,835888	0,829434
Odds ratio (range)		2,153447	0,548334	0,835888	0,829434

Source: Statista Research Department (2024), own processing, 2024

The explanatory variables were dummy variables characterising the respondent's belonging to age group 1 (20 to 30 years); urban residence and income level up to 100€ and 100 to 200€. This model was chosen as the best version compared to other models that analysed the influence of more factors on the choice of vegetarian diet.

At the same time, the model correctly identifies 86.5% of cases where the respondent does not use a permanent or temporary vegetarian diet in their daily diet and only 28% of cases where the respondent chooses a permanent or temporary vegetarian diet in their daily diet. The overall classification accuracy of cases of respondent choosing or not choosing a vegetarian diet is 64%. In other words, this model can be used as a prediction tool, but for more accurate classification of vegetarian dietary choices, additional refinement models should be considered or models based on artificial intelligence methods, such as neural networks or machine learning techniques, should be used.

Another logit model was constructed to analyse respondents' choice of a daily diet with meat or fish and vegetables (mixed diet). The characteristics of this model are presented in Table 2.

Table 2: Logistic regression (logit) for dependent variable *D_meat_fish_1*

Model: Logistic regression (logit) N of 0's: 188 1's: 87 (Data_Nutrition) Dep. var: <i>D_meat_fish_1</i> Loss: Max likelihood Final loss: 166,02629595 Chi-sq. (6)=11,201 p=0,08239							
	Const.B0	D_age_gr1	D_age_gr2	D_gender	D_city	D_income_gr1	D_income_gr2
Estimate	0,103664	-0,499327	-1,03434	-0,257958	-0,394493	0,085790	0,257137
Odds ratio (unit ch)	1,109228	0,606939	0,35546	0,772628	0,674022	1,089578	1,293223
Odds ratio (range)		0,606939	0,35546	0,772628	0,674022	1,089578	1,293223

Source: Statista Research Department (2024), own processing, 2024

As can be seen from the results presented in Table 2, the model parameter estimates are statistically significant at the $p < 0.1$ level. Income level had the greatest influence on the choice of this type of diet, while other variables such as: age groups, gender and respondent's place of residence had less influence. The overall classification accuracy of this model is 68%, with an accuracy of 96.5% for cases where the respondent uses a permanent mixed diet in their daily diet, and an accuracy of 5.74% for cases where the respondent does not use this type of diet or uses it temporarily. Thus, it is possible to identify cases of permanent use of mixed diet in daily nutrition quite accurately, and there are difficulties in recognising cases of temporary use of mixed diet or cases when the respondent does not use mixed type of diet at all.

The next round of questionnaires involved 47 respondents who rated the importance of choosing a restaurant and recommending it to other consumers based on criteria such as: design; price of food and beverages offered; distance and popularity of the restaurant in question. Of the 47 respondents, 32% of the respondents were under the age of 20 years; 34% of the respondents were between the ages of 21 and 30 years; 12.8% of the respondents were in the age group of 31 to 40 years; 15% of the respondents were in the group of 41 to 50 years; and the remaining respondents were in the group of over 50 years. 76.9% of the respondents lived in the city; 8.5% of the respondents in the urban type settlement and 14.9% of the respondents lived in the rural areas. The results of the model construction are shown in Table 3.

Table 3: Logistic regression (logit) for dependent variable *Recommendaton_yes*

Model: Logistic regression (logit) N of 0's: 126 1's: 65 (Spreadsheet_restaurant); Dep. var: <i>Recommendaton_yes</i> Loss: Max likelihood; Final loss: 110,61994463 Chi-sq. (10)=23,715 p=.00841											
	Const.B0	Data_age_gr1	Data_age_gr2	D_design_top	D_design_modern	D_design_classic	Criterion_Price_very_important	Criterion_design_very_important	Criterion_Distance_very_important	Criterion_Popularity_very_important	Gender_F
Estimate	-0,91132	-0,55402	-1,0992	-0,6233	0,37448	-0,2789	0,6972	-0,6015	-0,28828	-0,41437	1,2350
Odds ratio (unit ch)	0,40199	0,57463	0,3331	0,5361	1,45424	0,7565	2,0082	0,5479	0,74954	0,66075	3,4386
Odds ratio (range)		0,57463	0,3331	0,5361	1,45424	0,7565	2,0082	0,5479	0,74954	0,66075	3,4386

Source: Statista Research Department (2024), own processing, 2024

As shown in Table 3, the model parameter estimates are statistically significant at $p < 0.01$ level. The overall prediction accuracy based on this model is 70.68%; while the

prediction accuracy of positive restaurant recommendation cases is 92.85% and the accuracy of negative recommendation cases is 27.69%.

Since the constructed logit models do not accurately recognise some individual cases of nutrition behaviour or restaurant choice, our study-built models using the hierarchy analysis method to account for more complex algorithms of consumer behaviour and the extent to which certain criteria influence restaurant choice.

The description of this model is presented in Table 4. This model demonstrates a hierarchical network represented by 5 levels with different number of elements. The first level is represented by 8 elements characterising economic factors. The next second level represents factors related to the characteristic of the restaurant; the third level represents cultural factors influencing individual consumer preferences; the fourth level represents motivation factors determining the choice of restaurant. The final element (goal) represents the choice of restaurant.

Table 4: Description of the blocks (elements) for chart diagram

Level	No. element	Description	Name
I Economic factors	1	Price	PR
	2	Assortment breadth	ASB
	3	Portion size	PSZ
	4	Ingredient quality	INGQ
	5	Quality of service	QSRV
	6	Advertisement	ADV
	7	Possibility of takeaway food	PTWF
	8	Method of payment (cash, credit cards, online payment)	MPAY
II Characteristics of the restaurant	1	Localisation	LOC
	2	Level of culinary skill	LCS
	3	Room design and furniture	RDF
	4	Sanitary and hygienic standards	SHS
	5	Mode of operation	MODO
	6	Type of restaurant (universal, family, thematic, national, etc.)	TYRE
	7	Car parking	PARK
	8	Additional features (for children, pet owners, people with disabilities)	ADDFE
III Cultural factors	1	Atmosphere, comfort, Exclusivity	ATCE
	2	Social environment (friends, acquaintances, colleagues, neighbours)	SOEN
	3	Nice music	NMUS
	4	Dance area	DANA
	5	Internet	INT
	6	Green area, terraces	GRT
	7	Quiet environment (Possibility of business communication or working on a laptop, etc.)	QENV
	8	Various events, Children's area	VACH
	9	Popularity	
IV Motivations determining the frequency of visits	1	Traditions	TRDN
	2	Habit	HBT
	3	Spontaneous interest	SPOI
	4	Situational necessity	SINE
	5	Bonuses, discounts	BDIS
	6	Special offers	SPOFF
V (Final purpose)	1	Utility function for restaurant selection	UFRS

Source: own processing, 2024

This model was presented to the respondents who participated in the third round of the study. These respondents were young people of both sexes under 30 years of age. The survey participants had to fill in the elements in the pairwise comparison matrices, taking into account the scale characterising qualitative and quantitative measures of the degree of influence of the factors (elements) of the previous level on the elements of the next level. Then the data of individual questionnaires were entered into the MPriority programme, and the values of priority vectors were calculated on the basis of the hierarchy method developed by T. Saati. Based on this method it is possible to calculate the degree of influence of elements of the first level on the final goal.

For example, as a result of calculations on the data provided by a 19-year-old female respondent from Ukraine with a monthly income from 100 to 200€, the price factor PR (0.2846) had the highest importance on the choice of restaurant; then the method of payment for services MPAY (0.2352); then in third place in terms of importance was the factor ASB, associated with the breadth of choice of the range of food and drinks offered (0.1303); in fourth place in terms of importance was the factor INGQ. The other factors were not so significant and had the following degrees of importance of influence on the choice of restaurant: PTWF (0.0989); PSZ (0.0543); ADV (0.0469); QRSV (0.0262). As can be seen, the sum of the values of the elements of the vector of priorities, characterising the degrees of importance of the influence of the factors of the first level on the final goal, is 1.

This model allows to take into account more complex interrelationships between factors determining consumer choice and can be used to characterise the peculiarities of individual choices of certain consumers.

4 Discussion

The models proposed in this study can be tested in the future on a larger number of respondents (Rouder et al., 2021; Oldham, 2024). In addition, some of the qualitative attributes can be more precisely formulated or supplemented with quantitative characteristics (Kuckartz & Rädiker, 2019). At the same time, it should be noted that the task of predicting individual consumer choice is quite complex and it is necessary to take into account quite a large number of both qualitative and quantitative attributes. In addition, the use of a sufficiently large number of attributes leads to the problem of multicollinearity, as a result of which the estimates of parameters of econometric models may not be statistically significant. Due to the difficulties of using econometric models, especially in the presence of a large volume of observations and the number of various factor variables, it is advisable to use consumer choice models with the use of neural networks or machine learning methods.

5 Conclusion

In order to develop an effective marketing strategy of companies specialising in restaurant or catering services, it is necessary to take into account many factors that determine the peculiarities of both individual consumer choice and the peculiarities of choice in certain consumer segments or in certain social groups.

In this regard, marketing research of consumer characteristics and peculiarities of their behaviour is important, which leads to the need to collect information on the basis of a survey or questionnaire of respondents and further statistical processing of the results using econometric models. At the same time, there are certain difficulties of modelling using econometric models, which affect the accuracy of classification of individual cases on the examples of using logit models.

This study presented the results of building different logit models to analyse consumer choice using different diets and restaurant choice recommendations as examples. It was shown that in the logit models not always individual features of consumer behaviour resulted in the required accuracy of the model to classify certain cases.

In this regard, a model of restaurant choice based on the method of hierarchies was proposed, which allows to take into account individual features of consumer behaviour, more complex mechanisms of decision-making when choosing a restaurant by this or that consumer, taking into account his assessments of the degree of importance of certain attributes.

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COMMUNICATION STRATEGIES TO INFLUENCE THE PURCHASING BEHAVIOUR OF YOUNG CONSUMERS FOR REUSABLE PRODUCTS USING AI

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Abstract:

In today's world full of digitalization, the attitude of the young generation towards environmental sustainability is a fundamental and crucial issue for the future. One way to strengthen this attitude is to create a communication service within the marketing strategy that significantly influences their awareness of the possibilities of returning value to the consumer cycle. Expanding cities and urbanisation, together with climate change and business dynamics, are leading to a reduction in natural spaces and high pressure on the use of natural resources. This is an unsustainable situation for the future. The paper therefore explores the construction of marketing communication strategies to convince young consumers of the necessity of a sustainable approach to the purchase of consumer goods, the use of used product purchases in re-use centres and/or swap events where available resources are used on a barter basis, also with the help of AI. The proposed communication strategies fulfil educational, social, environmental, and economic functions. By appropriately assembling marketing communication tools into a coherent strategy, the awareness of the younger generation can be raised about the return of value to the consumer cycle and thus contribute to a significant reduction of waste and carbon footprint.

Key words:

Artificial Intelligence. Circular Economy. Digitalization. Generation Z. Marketing Communication. Strategy. Waste Management.

1 Introduction

Today's young generation represents a generation that is closely linked to the digitalization of their lifestyle. For this generation, the Internet has become an important parallel world in which almost all their life needs and stories are played out and fulfilled. Generation Z is the generation that has attracted the most attention from sociologists and psychologists, all of whom are trying to define their attitudes, opinions, and lifestyles and how they are influenced by social networks and artificial intelligence. Members of Generation Z were born in the period 1995 to 2002 and have been living virtually online since the beginning.

This is a generation that has been raised by digital immigrants and is also the generation of interactive media. It is the new digital media and the very rapid development of technologies using artificial intelligence that represent new directions in the standard of living for this generation. The cause of this behavior of theirs is a different approach in upbringing by their parents. In the past, parents were able to control the content of perceived information for their children; nowadays, this generation could find content that would not be considered appropriate in an era of printed and controlled words on television, radio or in print. Artificial intelligence offers them a tremendous wealth of information that they can use both in a positive sense of their behavior and in a negative sense.

Members of the young Generation Z love the digital environment are constantly online-offline and are thus strongly influenced by the content that this environment offers them. They are constantly in the system of sharing news and information from their lives on various social networks, leaving a digital footprint behind them and shaping themselves accordingly. However, through the digital environment and artificial intelligence, it is

necessary to explore their perspective and relationship to sustainability, the environment and, in general, to the values that can still be put back into circulation, thus minimizing waste management. This generation does not want to drown in the waste generated by their sometimes-uncontrolled consumer and consumption behavior. Young people are very sensitive to environmental issues, fighting climate change and promoting sustainable lifestyles. Many are involved in environmental initiatives and strive for a greener future. And this is a big opportunity for creating marketing communication strategies using AI in this area.

1.1 Theoretical Background

Nowadays, more and more attention is being paid to sustainability issues and reducing the ecological footprint, which are key aspects for preserving the environment for younger generations. One approach to achieving these goals is to minimize waste production at the individual level through alternative forms of consumption and creating an environment for value re-circulation. For example, swap events, which involve the free exchange of items between individuals, are proving to be an innovative solution in this area. These events offer the potential to reduce waste by encouraging the reuse of items and changing consumption habits towards more sustainable behavior. Swap events are becoming increasingly popular in some regions. Another step in the youth approach to waste minimization is to encourage the establishment and operation of re-use centers/points in communities at different levels.

The current state of scientific knowledge in this area provides different perspectives on the potential and challenges of swaps. While some studies (e.g., Buczynski, 2013; Pietzsch et al., 2017) highlight their community and environmental benefits, others highlight the need for further research, particularly regarding the demographic factors influencing participation in these events and the long-term impact on purchasing behavior and consumption (Bieniek, 2021). This paper seeks to answer questions regarding participant motivations, frequency and types of items swapped, and also examines how demographic factors influence participation in these events. The aim is to identify key success factors and potential barriers to the further development of swap events as an effective tool for reducing waste and promoting sustainable lifestyles.

Companies are moving towards sustainable solutions in waste management, converting waste into energy and reusable products, while emphasizing the importance of educating end-users to increase their awareness and participation in waste reduction efforts (Gollnhofer, 2017). End-user education plays a vital role in increasing awareness and participation in waste reduction efforts. Studies have shown that different approaches of educational campaigns, such as passive handouts, community engagement, and gamification, can effectively raise awareness of food waste, for example, and lead to a reduction in food waste levels (Kountouris, 2022).

Moreover, research in Romania suggests that consumers' familiarity with food waste campaigns may also influence their subsequent actions towards reducing waste, highlighting the importance of educational initiatives in shaping behavior (Soma et al., 2020). In addition, a survey (Chinie et al., 2021) showed that households are willing to participate in e-waste management if they are provided with adequate knowledge on safe disposal and recycling, highlighting the importance of educational interventions in waste management. Overall, empowerment activities and access to education are key factors in shaping individuals' awareness and engagement in waste management efforts, underscoring the importance of end-user education in promoting sustainable waste management practices (Miner et al., 2020).

Understanding the influence of local waste management culture on individuals' recycling behavior further highlights the importance of developing sustainable waste management practices that drive pro-environmental actions and policies (Farooq et al., 2022). Integrating pre-use centers into traditional waste management chains can bring significant

waste prevention benefits, given the multifaceted influence of economic, social, and environmental factors on these initiatives. Factors such as perceived behavioral control, moral commitment and policy effectiveness significantly influence waste sorting behavior, highlighting the importance of intention and control in waste management programs (Babazadeh et al., 2023).

Re-use centers and Re-use points play a key role in waste management by promoting the reuse of products, which significantly reduces the overall volume of waste produced (Gusmerotti et al., 2019; Vincevica-Gaile et al., 2023). By incorporating reuse preparation activities and strategically placing recycling stations close to residential areas, cities can increase the attractiveness of neighborhoods while effectively managing waste and promoting the circular economy (Gusmerotti et al., 2019; Wilhelmsson, 2022).

Community centers and activities promoting responsible consumer behavior play a crucial role in sustainable waste management. Studies conducted point to various initiatives that contribute to this, such as re-trading practices on platforms like Facebook, sustainable food waste management and circular economy approaches in, for example, tourism and hospitality (Arman & Mark-Herbert, 2021; Camilleri, 2021; Kattiyapornpong et al., 2023). Research on consumer behaviour highlights the importance of redistributing products through resale, giveaway, or donation in order to extend their lifetime and reduce waste production (Camilleri, 2021).

Consumer engagement in product redistribution behaviors such as resale or donation contribute to waste management and product life extension (De Ferran et al., 2020; Sarigöllü et al., 2021). Research highlights that consumers' attitudes and aversions towards waste minimization, rather than general environmental concerns, have a significant influence on the choice of product redistribution (De Ferran et al., 2020). In addition, factors such as product price, quality, and conformity to self-perception influence consumers' decisions to engage in resale or donation behavior, thereby extending product lifetime (Sarigöllü et al., 2021).

Research also highlights that consumer-specific motivations and attitudes rather than product-specific factors play a key role in favoring redistribution over disposal, highlighting the importance of instilling positive perceptions of redistribution behavior (van den Berge et al., 2023). Overall, consumer participation in product redistribution behavior is essential for sustainable waste management and the promotion of a circular economy (Corsini et al., 2020).

For the younger generation, this research are a challenge and motivation to really encourage environmental thinking through their behavior and to become more interested in returning value to the economic cycle either through swaps or re-use centers/points. And to do this, artificial intelligence needs to be involved.

2 Methodology

Two methodologies were used to research the behavior of the young generation towards the environment. The first one is based on a study on young consumers' awareness of circularity opportunities through re-use centers/points and on the identification of suitable commodities to return to the circular economy. The aim of the study was to gather comprehensive empirical evidence on the reuse potential of products and to formulate marketing strategies for product portfolios as well as using AI, which are crucial for the operation of re-use centers/points.

A representative sample (the total sample-base was 18+, which is 8,533,116 inhabitants) of the population of the Czech Republic, i.e. 1,300 persons, was formed by quota sampling and by means of a structured questionnaire of approximately 15 minutes in length through online questioning of the Populace.cz panel members. IPSOS agencies to obtain representative and valid results. The questionnaire was designed using the Consumer Behavior

Patterns method in Ajzen theory and the data collection was carried out in June 2024. The results of the questionnaire survey were generated from the young generation to provide the basis for the formulation of relevant and functional marketing strategies. The research questions were conceptualized as aspects influencing the consumer decision to purchase the products used. The research results were evaluated by quantitative comparative analysis.

The procedure for testing the hypotheses is to compare the two districts and their statistically significant differences. The z-test will be used to compare the two sites and find significant differences:

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

Where:

- z is the z-score, which indicates how many standard deviations the sample mean is from \bar{x} the hypothetical population mean (μ),
- \bar{x} is the sample mean,
- μ is the population mean (average) under the null hypothesis,
- σ is the population standard deviation, and
- n is the sample size.

The p-value then tells us whether the difference is statistically significant. If the p-value is less than a predetermined significance level (usually 0.05), then we consider the difference to be statistically significant.

3 Results

Consumers' reuse behavior is influenced by various factors. Traits that influence product redistribution include attitudes towards waste, product price, quality and demographic characteristics such as age, education level and income (Sarigöllü et al., 2021). Factors such as attitudes towards waste minimization and waste aversion, rather than just general environmental concern, play a significant role in determining whether individuals choose to redistribute products through resale, giveaway or donation (Northen et al., 2023). In addition, product price is positively correlated with behaviors such as resale and donation, while product quality and self-reported conformity reduce the likelihood of product discarding (Macklin et al., 2023). Demographic characteristics such as age, education level and income also influence the choice to redistribute products, demonstrating the multifaceted nature of consumer behavior in sustainable product disposal (De Ferran et al., 2020).

These findings highlight the importance of considering a range of factors, not just price and quality, when understanding and promoting product reuse behavior. However, the environmental impact of reuse is not always straightforward; it is essential to consider factors such as the energy required to refurbish products. Reuse is generally beneficial for standardized products where repairing items is less energy intensive than manufacturing new ones (Truttmann & Rechberger, 2006). However, the availability of cheap, reused goods can lead to additional consumption, which may not always lead to a net environmental benefit (Cooper & Gutowski, 2017). Overall, reusable products include durable goods, industrial materials, and components, each of which, when managed effectively, contributes to a more sustainable and circular economy (O'Connell et al., 2013). Promoting end-use through encouraging creativity and end-use ideas has also been shown to inspire consumers to adopt more sustainable practices, highlighting the potential of product reuse areas to encourage creative and environmentally friendly behaviors among the population (Tarabashkina et al., 2022). In addition, the mobility of residents, which increases openness to new experiences,

may enhance the adoption of new products and services, suggesting that frequently relocating people may be more inclined to use product reuse areas if they are conveniently located and accessible (Zeng et al., 2023).

Swap, as a direct exchange of goods or services without the involvement of money, is an essential element of a circular economy that focuses on sustainability and reducing consumption and waste. The swap price is usually, not different from the market price, swap offers a unique approach to transactions, different from the secondary market. Swap can activate social, economic, and environmental value from underutilized resources and is particularly relevant in contexts. Swap can also bring some negative aspects, such as obstacles related to the organization of work and the potential commercialization of personal life, which shows its complexity and multifunctionality in society. The concept of *coincidence of wants* describes a situation where a successful exchange requires both parties to simultaneously offer what the other needs, which in practice can be difficult to achieve and often limits the possibilities of swap. Despite these difficulties, swaps have evolved and adapted to modern conditions thanks to the Internet, which has enabled the emergence of online exchange platforms. This modern approach to swap offers an environmentally friendly and practical alternative to traditional shopping and allows people to more effectively deal with the problems associated with surplus unused items (Bieniek, 2021).

Motivations to swap can be varied, either positive (minimalism, Zero Waste, Frugalism) or negative (consumerism, materialism, and fast fashion). Minimalism is an alternative view of success and prosperity that is not defined by the accumulation of wealth, but rather by the quality-of-life experiences and relationships. This requires challenging social norms and values that place a high value on material possessions and consumerism. Consumers who behave carefully and consider their purchasing decisions are better able to manage their spending within a given budget, thus avoiding debt and financial overload. Sustainable consumption satisfies basic human needs, without the constant search for luxury and material standards, while taking care to limit resource use, waste, and pollution, with a view to future generations. Financial well-being is defined as having control over finances, sufficient resources to meet needs and the ability to cope with financial shocks. It includes the ability to cover daily expenses such as food and housing, to have savings for emergencies, and to achieve long-term financial stability (Malik & Ishtiaq Ishaq, 2023).

The Zero Waste concept offers a comprehensive framework for reducing waste and promoting sustainable development, benefiting not only the environment but also the economy, society, and industry. It is essential to understand that the pursuit of zero waste is a long-term process that goes beyond the final treatment of waste but starts with the efficient management of raw materials and innovation in industrial design. Zero Waste is a strategy focused on waste prevention, reuse and recycling with the aim of reducing the amount of waste going to landfill or incineration. This approach promotes a circular economy where resources are used more efficiently and sustainably through responsible production, consumption, reuse and sourcing of products, packaging, and materials without harmful discharges to the environment (Bogusz et al., 2021).

Frugalism is a movement focused on a frugal and modest lifestyle. The main goal of frugalism is to achieve financial freedom by investing money in sensible financial instruments that generate returns and allow the individual to live off those returns without the need for additional work income. This lifestyle requires a certain amount of sacrifice and the ability to resist the consumerist pressures of contemporary society. Success within this movement is therefore not just about financial wealth, but about achieving a life satisfaction and freedom that allows for individual self-realization without dependence on traditional employment.

3.1 The Relationship between the Young Generation’s Lifestyle and Their Interest in Swapping Activities and the Young Generation’s Primary Motivation for Swapping

The research sample (150 participants), mainly from the young generation, commented on swap activities as follows. The categories of items exchanged through swapping with zero statistical significance include textiles and clothing, electronics, household items and furniture, books and magazines, toys and games sports equipment, and cosmetics. The materials that most often pass through the swap are glass, metal, wood, textiles, paper and electronic components. When asked how often they swap, respondents answered as follows:

Table 1: Frequency of swapping

Frequency	Z-score	P-value	Relevance
Daily	0,795	0,427	No
Several times a week	0,149	0,881	No
Weekly	-0,416	0,677	No
Monthly	0	1	No
Several times a month	-1,19	0,234	No
Occasionally	1,421	0,155	No

Source: own processing, 2024

There is a significant relationship between an individual’s lifestyle and their participation in swap events, but this relationship varies depending on the specific lifestyle and location. Some lifestyles (such as minimalism and sustainable lifestyles) have a stronger association with participation in swap events. Environmental benefits, although often cited as a motivation, were not statistically significant when compared to financial savings and strengthening community ties. Analysis of swapping frequency showed no significant differences between the different frequencies, suggesting that regardless of primary motivation, young people swap with varying frequency.

Ecological benefits as the factor were not statistically significant, but it is among the high motivators and indicates that environmental considerations play an important role in the decision-making of the younger generation (participants), even if they are not the main motivation in swapping. The data showed that the frequency of swapping is influenced by the primary motivation of participants, with financial savings and strengthening community ties being statistically significant factors influencing participation in swap events. While environmental benefits are important to many, they were not found to be a statistically significant motivation in the analysis compared to other factors.

3.2 Young Generation and Re-used Product Values

Re-use centers/points in residential communities represent a great potential for how the younger generation can cope with society’s increasing consumerism, economic and social disparity and the associated waste. In a study conducted on a representative population of the Czech Republic with generated results of the young generation Z, aspects that positively or negatively influence the real functionality of re-use centers/points by significantly influencing their consumption behavior and decision to buy used products were investigated. The following aspects of the product portfolio suitable for re-use through re-use centers/points were identified and examined in the study.

Products suitable for resale were cars (75%), art products (71%), books, CDs, DVDs (70%), clothing (64%) and furniture (61%). The least suitable products for reuse and their return to the economic cycle were shoes (19%), gifts for family (22%), sanitary ware (26%). The most frequently purchased second-hand products among the young generation were

clothes (casual) (48%), cars (37%), books, CDs, DVDs (28%), furniture (27%), games, and toys (25%). Shoes (11%), sanitary ware (13%) were among the least purchased used items.

Here we can confirm a slight adhesive relationship between the products suitable for resale and the products that are bought the most. The most common barriers to buying used products identified by the younger generation are uncleanliness, lack of service, lack of warranty, lower product longevity, wear and tear, lower product performance, obsolescence, lack of information about product features, limited product offer. The most important factors that motivate Czech consumers to buy second-hand items include low prices, concern for the environment, helping the disadvantaged, collecting oddities, no one else has the item, the shop is close to home, the owner (seller) is well-known.

3.3 The Young Generation, Circularity, and Artificial Intelligence

In the area of circularity, the younger generation is hard to read. While it is environmentally focused, it is not certain whether it will actively engage in swapping or in the use and promotion of re-use centers/points. It is almost certain that this generation, especially Generation Z, will explore this area through digital environments using artificial intelligence. Organizers and operators of re-use centers/points or swap activities will need to prepare for this. Hutchinson (2019) reports that 55% of marketers feel that content marketing increases business sales because content can generate business traffic, and 28.2% of marketers worldwide feel that revenue increases primarily through social media marketing.

Today, it is absolutely proven that marketers are using artificial intelligence to create marketing content. They can use four models to manage human involvement in AI-influenced decision-making processes, depending on the nature and human intervention.

1. HITL (Human in the Loop) – humans make active decisions, aided by AI.
2. HITL (Human in the Loop for Exceptions) – AI takes care of most decisions, using human knowledge only for exceptions.
3. HOTL (Human on the Loop) – AI makes the decisions and humans review the results and adjust the default settings if necessary.
4. HOOTL (Human Out of the Loop) – AI makes decisions independently, guided by constraints and goals (Knihová, 2024).

Artificial intelligence has already become a key companion to the marketing manager in the modern business world. It uses machine learning, neural networks, natural language processing and robotics. Most marketing strategies are built around optimizing marketing processes, enhancing consumer interaction, and staying ahead in a competitive environment. When AI is used in the construction of a marketing strategy, it is obvious that it offers certain capabilities that humans cannot yet do over time.

Very quickly, AI can analyze complex data, identify patterns to follow and generate strategies. Thus, AI-linked education is almost essential to raise the awareness of the younger generation, especially Z, about activities related to waste management and reduction. And it is a challenge to create proper and understandable trigger guidelines (prompts) for AI.

4 Discussion

Generation Z represents the epitome for changing the marketing world by far more demanding the implementation of digital marketing strategies and digital content (Artemov, 2018). Therefore, it is imperative to find and formulate functional prompts when creating an appropriate marketing strategy.

1. Micro moments strategy. Micro moments are generally a reflexive action of users that directs them to buy a product or to learn more about a product, about a brand. Here is an important prompt for product descriptions and it is necessary for the younger generation to

understand the importance of reused products. Here it is necessary to describe the characteristics of reused products, to give information about the manufacturer or provider. AI can automatically evaluate the information, automatically process it, it can portray the creative side of the products. Another use for describing products using AI is to use prompts for blog posts. The younger generation can work with this information because a thoughtfully maintained blog can make re-use centers/points, their offerings more visible. There can be descriptive posts of an educational nature that can motivate and initiate the young generation towards re-use values. They can also strengthen the awareness of swap activities and re-use centers/points.

2. Instagram Story Marketing Strategies. Generation Z is highly active on social media platforms and Instagram stories are a very effective digital marketing strategy that marketers cannot ignore because this strategy never goes unnoticed. In the Instagram platform, with the help of a well-formulated prompt, it is possible to create an AI-powered story that will pique the interest and motivation of the younger generation to be inspired by it. Here AI can convince the young generation about the functions of re-use centers/points and swap activities, which covers the following areas: economic, social, and environmental.
3. Chatbots for Marketing. Toth (2017) found that with the continuous development of artificial intelligence, chatbots have great potential in business and personal life. Chatbots have 24/7 interaction with customers. Moreover, chatbots do not make many mistakes, which makes goal fulfillment even more constructive. Chatbots are widely used and promoted. Chatbots represent the brand and image of the company. Therefore, it is the perfect embodiment of branding re-use centers/points and swap activities. Chatbots represent the easiest form of usage, but it is necessary to choose a usage guideline that meets the expectations of the sponsors.
4. Push Notifications. Push notifications refers to businesses that notify customers of updates and offers from time to time based on customer preferences (Sampat, 2019). Similarly, it has been found that (Patel, n.d.) conveying information through push notifications is an ideal digital marketing strategy that businesses can use. Generation Z, who is interested in communication from business, still needs to be considered. They expect accurate information from businesses, so marketers should always provide them with the right information and not spam the customer's inbox (Kaur & Sharma, 2018). And AI could clearly and quickly solve this.
5. Content marketing. Content marketing is a digital marketing strategy that focuses on inventing and distributing relevant, valuable, and understandable information to retain customers. The definitive goal of content marketing is to be more accurate in communicating with the customer and to drive profits into the business (Ruffolo, 2017). Patrutiu Baltes (2015) states that content marketing is a fundamental digital marketing strategy that businesses should consider because the success of business online communication depends on the quality of its content. This is where AI asserts itself very well based on a comprehensible prompt.
6. Influencer Marketing. A study (Rolson Admin, n.d.) found that audiences want to learn more about product information that is not always available on a company's website. This is where influencers are tasked with informing customers about all the features that customers didn't know about, and it's almost impossible to do that without the help of AI today.
7. Attractive GUI: Clarke (2015) found in his study that an attractive and creative graphical web interface is always more appealing than a static one, which AI can do. AI has the ability to analyze and adapt to the preferred visual style of the target audience. When combined with content, AI can create visual content that is tailored to the specific needs and preferences of the visual message (Knihová, 2024).

5 Summary

Re-use centers/points and swap activities have considerable potential for viability in the future period. They fulfil important economic functions and provide solutions to reduce product waste and prevent waste. According to the principle of the waste hierarchy, which underpins European waste legislation, waste prevention and reuse are considered better ways of managing waste than recycling. For the younger generation, especially Generation Z, this is a challenge that may partly solve the waste management they will have to deal with in the future.

Re-use centers/points have a significant challenge ahead of them, as demonstrated by a study conducted in the Czech Republic. The main aspects of the use of re-use centers/points are to create a quality and credible portfolio of used products and to remove the shortcomings of used products compared to new ones and to minimize the barriers that influence consumer decision-making on the purchase of used products. Influencing factors on consumer decisions to buy second-hand products include the non-returnability of the product, little information on where the product comes from, inadequate price and poor quality of the product. It is also crucial for re-use centers/points to minimize reluctance to buy used products due to uncleanliness, lack of service and warranty and low awareness of product features.

Another supporting tool to make re-use centers/points more visible are influential motivational factors that change consumer behavior towards a greater understanding of the multifunctionality of re-use centers/points. The most important motivating factors for buying second-hand products are low price, environmental concern, helping disadvantaged people and collecting specialties. The study showed that there are several products that do not need to become part of the waste stream. Motivational and educational activities acting on the whole population is a way to influence consumer thinking in favor of fulfilling all three functions of re-use enter/points, thus ensuring waste prevention, efficient circulation of used products and addressing social disparities.

On the other hand, the available sources of information on the development and status of swaps in the Czech Republic compared to the European context are limited. This finding points to the need to expand the database of studies and analyses to make a more comprehensive comparison and identify the specifics of the Czech environment in the context of global trends. The influence of demographic factors and geographical distribution of respondents on participation in swap events showed that more diversity in the geographical and social composition of the sample would have yielded more accurate results. Specifically, the inclusion of data from smaller communities and large cities, as well as a more detailed breakdown by age, education, and financial situation, could reveal deeper connections between individuals' lifestyles and their motivations for participating in swap events.

Another finding was the need to consider social structure and financial situation as key factors influencing people's motivation to engage in swapping. The motivation to participate is complex and includes not only ecological and financial aspects, but also the search for social interaction and fun. This multi-factorial motivation suggests that a more individualized and targeted approach to the public is necessary to effectively promote swap events.

In the context of the larger impact and theoretical implications, the paper showed that there is significant potential for developing and promoting swaps as a tool for sustainable lifestyles. It also highlights the need for the creation of structured and accessible platforms, such as re-use centers, which could serve not only as venues for swap events but also as community hubs for sharing and recycling.

Finally, recommendations for practice are based on the need for further research and experimentation with different models to support swap actions. In particular, the prospect of creating re-use centers/points and integrating online platforms for swap events offers

interesting possibilities for developing sustainable communities and promoting green behavior. In the future, there should be increased collaboration between cities, counties, and community organizations to create sustainable infrastructures that support swap events and re-use centers/points. These initiatives could contribute significantly to waste reduction and strengthen social cohesion in communities. All this cannot be done without promoting awareness of these activities and the younger generation. Marketing strategies with influential AI support can be relied upon.

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THE IMPACT OF VIRTUAL INFLUENCERS ON THE REPUTATION MANAGEMENT OF BUSINESS ENTITIES

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Abstract:

Virtual influencers, as digitally constructed entities, represent an innovative tool in the field of reputation management for business entities. These are virtual personalities created through artificial intelligence, offering companies a high level of control over communication, ensuring message consistency, and enabling effective targeting of younger demographic groups with a preference for using digital technologies and personalized content. The scientific contribution addresses these phenomena, analyses their impact on the strategic building and maintenance of business reputation in the digital environment, and identifies the advantages and risks associated with their application. Through analytical-synthetic methods and comparative analysis, virtual influencers are compared with traditional influencers, examining their different approaches to reputation management and their potential in the context of various geographical and cultural specifics. The contribution also addresses ethical implications, such as issues of transparency and authenticity, which are crucial for building trust and consumer loyalty. The findings suggest that virtual influencers represent an effective tool for managing reputation but require continuous technological innovation and regulatory measures to ensure their long-term sustainability and ethical use in marketing communication.

Key words:

Artificial Intelligence. Business Entity. Digital Marketing. Information and Communication Technologies. Reputation Management. Virtual Influencer.

1 Introduction

Through various software tools, internet users are currently able to spread digital content at any time and anywhere, in either unchanged or modified form. Each subsequent derived interpretation of the content can influence the overall perception of the presented message, which in turn affects public opinion of the subject in question. This is particularly relevant for business entities, whose success in the market depends on the affinity of the target audience and the retention of existing customers. It seems essential that responsible managers systematically plan and manage the company's public presence to maintain its good reputation and retain the competitive advantage associated with the product offering. Reputation management can thus be considered one of the key areas of strategic business management, as it affects how the company is perceived by customers, business partners, and its own employees. It is a complex process that includes strategies and tactics aimed at building, maintaining, and protecting the company's good name and reputation (Jankauskaite & Urboniene, 2016). Reputation of a company can subsequently be defined as a collective judgment of the entity reflecting the value attributed to it by others based on its past activities and outputs of creative work (Becker & Lee, 2019). Typically, it will be a mass or group assessment of the company's characteristics, which may stem from the assessment of the quality of the products and services offered, the ethical values promoted, or the corporate social responsibility activities undertaken. In the long term, the significance of a company's reputation lies in its ability to influence public trust, customer loyalty, or its overall market value. An innovative tool that allows controlled and consistent communication of a business

entity in the digital environment, while also having a considerable impact on its reputation, can be considered virtual influencers.

2 Objective and Methodology

The objective of this scientific contribution is to examine the impact of virtual influencers on the reputation management of business entities, with an emphasis on identifying their potential as an effective tool for building a company's good reputation in the market environment. Virtual influencers offer businesses the opportunity to reach audiences in an innovative way that can influence the perception of the presented products, as well as their manufacturer or seller. The authors' task was not only to highlight the positives of involving a virtual influencer in promoting a business entity's offerings, but also to analyse potential risks that could undermine the trust and loyalty of the target audience. In preparing the scientific contribution, several analytical-synthetic procedures were applied, allowing for a detailed examination and further interpretation of various aspects of the impact of virtual influencers' activities on a company's reputation management. Inductive and deductive approaches were also used to draw appropriate logical conclusions. Analogy was simultaneously used to compare virtual influencers with traditional influencers. Special attention was also given to defining the similarities and differences between these types of influencers from the perspective of reputation management, with a focus on both the advantages and disadvantages of using virtual influencers in practice. The application of scientific abstraction helped create the key terminological framework, primarily based on studies by foreign authors published in scientific journals indexed in internationally recognized citation databases such as Web of Science and Scopus.

3 Results and Discussion

Virtual influencers, as representatives of technological innovation, contribute to shaping the modern image of a business entity. Due to their digital nature, visual originality, and, not least, interactivity, their practical application is closely related to technologies such as artificial intelligence, augmented reality, and virtual reality, which are widely regarded as trends of the near future. Since they often enable businesses to interact with customers in ways that go beyond traditional marketing boundaries, they can be considered a communication tool for differentiating from others and capturing the attention of audiences on digital platforms, where competition is relatively high, and content is largely saturated.

A virtual influencer is a digital personality that is created and controlled by artificial intelligence and a responsible team of creatives. It is a fictitious character designed with the help of CGI technologies or 3D modelling software for the purpose of promoting products and services, most often in the field of fashion, sales of cosmetics, health promotion or a certain lifestyle, etc. (Lim & Lee, 2023). An ideal virtual influencer should appear realistic and resemble a real person in appearance and behaviour. He or she should communicate and interact with the audience in a similar way as traditional influencers do when presenting a business partner's offer. However, the essence of the involvement of a virtual influencer in the company's communication lies in his or her ability to fully adapt to the preferences of different target groups and provide them with personalized content in the required quality and form over a longer period under maximum control by the business entity. In principle, a virtual influencer can be understood as a safer alternative to a real influencer, since he or she is not at all subject to surrounding pressures that could otherwise have an impact on the mental well-being and performance of a real person.

Several studies (Mouritzen et al., 2024; Haikel-Elsabeh, 2023) show that the use of virtual influencers to promote the subject's offer makes it possible to reach specific demographic and psychographic groups that prefer personalized content and are interested in digital technologies. Their primary target group is younger consumers, especially from generation Z and Y, whose members grew up in an environment of digital technologies and are well acquainted with the use of social media. These consumers tend to be open to innovation, prefer visual content and have a high level of digital literacy, making them an ideal audience for virtual influencers. At the same time, they are strongly influenced by the values of brands that support sustainability and diversity, which should form the basis of creating the personality of a virtual influencer. In addition, it has been proven that for more than 70% of consumers of generation Z and Y, it is extremely important that business entities, in the process of presenting their activities to the public, reflect social topics close to them, with which they will be able to identify as potential customers (Stein et al., 2024). This should subsequently be the starting point in the effort to build strong emotional ties with the audience in the online environment and in increasing the level of their engagement. Virtual influencers can appeal mainly to consumers who identify with values such as individuality and self-expression in the virtual space.

When defining the target group of virtual influencers, it is also necessary to consider certain geographical and cultural factors. Although virtual influencers can relatively easily reach consumers located anywhere in the world with the help of artificial intelligence tools applied in the automation of communication processes, their effectiveness can be affected by different cultural preferences and local trends. In Europe or the USA, they can be seen as an innovative, progressive communication tool – they often appeal to innovative solutions and authenticity in the online space, their popularity is constantly growing, especially among young adults and Gen Z, who emphasize digital identity and personalization (Angmo & Mahajan, 2024). On the contrary, in Asia (primarily in Japan and South Korea) they have been part of the marketing communication of business entities for several years. Here, they have established themselves as the preferred element not only due to their capabilities, but mainly due to their embrace of a culture of digital visual aesthetics, which allows for adherence to traditional norms related to appearance (Carrillo-Durán et al., 2024). At the same time, the trend is the so-called “culture of cuteness” expressed by the Japanese term *Kawaii*, which refers to the labelling and perception of various objects, fictional as well as real characters as charming, sweet and innocent, which results in interaction in the online environment (Stein et al., 2024).

Based on the specific processes used in their creation, virtual influencers can be divided into four categories:

- CGI characters – the character of the virtual influencer is designed in such a way that it resembles a real person or animal as faithfully as possible. To create CGI characters, software programs such as Blender or Maya are used, which allow a wide range of design possibilities – from simple cartoon style to very realistic models. Studies (Allal-Chérif et al., 2024; Wan & Jiang, 2023) indicate that realistic CGI characters can achieve a higher level of interaction with consumers because they more closely resemble real persons, which promotes their perception as “real”.
- 3D models – a similar procedure as for CGI characters is also applied to 3D models, while these models are created in tools such as ZBrush or Cinema 4D. Depending on the difficulty of the modelling itself, these characters can take form from simple to extremely elaborate and realistic characters. Research (Laszkiewicz & Kalinska-Kula, 2023) suggests that 3D models are often successful in visual effects campaigns that emphasize unique design and aesthetic value, creating a specific stylish brand image.

- Deepfake avatars – this category uses artificial intelligence and machine learning algorithms to create avatars that are very similar to real people. With the help of deepfake technology, it is possible to manipulate visual and audio material, which makes it possible to create avatars evoking the appearance of well-known personalities or publicly known persons. In studies (Conti et al., 2022; Li et al., 2023), deepfake avatars are often criticized from an ethical point of view for their potential for manipulation, but at the same time they are recognized as an extremely effective tool for attracting attention.
- Hybrid influencers – this category integrates elements of the real and virtual world. Hybrid characters are created by combining actual footage of a real person with digital editing that adds or modifies their features using software. This approach allows businesses to combine authentic human aspects with virtual elements, creating a unique mix of real and digital (Park & Sung, 2023). Hybrid influencers are increasingly popular in campaigns that emphasize authenticity but also take advantage of digital editing.

One of the advantages of involving a virtual influencer in the company's marketing communication is a high level of control over the content and the way in which he or she communicates with the surrounding audience – virtual influencers therefore represent a significant contribution, especially in the field of reputation management. However, businesses must carefully monitor how the public reacts to them and adapt their communication strategy to minimize possible negative reputational impacts. This control therefore ensures the consistency of messages and minimizes reputational risks, which, on the contrary, can arise because of the unpredictable behaviour of real influencers.

Traditional influencers operating in the offline world can bring certain threats associated with unplanned inappropriate behaviour that can damage the subject's image. Foreign studies (Duong & Tran, 2024; Ozdemir et al., 2023) have shown that the reputation of several brands has been negatively affected or a certain loss of credibility has been recorded due to the inappropriate behaviour of influencers that contradicted the company's values and messages. Thanks to the ability of virtual influencers to be fully under the control of business entities acting in the position of their administrator, it is possible to prevent such situations and create content exactly in accordance with the company's strategy and values. Their behaviour, visuals and communication style can thus be precisely adapted to the needs and values of the brand. In this way, business entities can easily minimize the risk of any controversial or unethical behaviour that could threaten brand credibility.

Creators of virtual influencers can optimize the content and time of each communication, adjust the tone of the communication according to the target group and directly influence the impression the influencer creates. Control over communication allows businesses to flexibly respond to changes in target market trends and preferences. A virtual influencer can also be modified based on current marketing needs or external factors that may affect the subject's public image. This adaptability gives businesses the ability to instantly modify the content and tone of communications without the need for training or the intervention of human influencers. The ability of virtual influencers to be fully managed entities makes it possible to minimize reputational risks, create a consistent image and adapt to dynamic market changes. They thus represent a unique opportunity for businesses in terms of reliability, predictability and adaptability, which makes them effective tools to support reputation management.

In the case of a virtual influencer, there is no risk of emotional exhaustion or personality conflicts that can occur with traditional influencers, which guarantees the consistency of communication in the long term. Virtual personalities will never face personal issues that could affect their engagement or way of communication, which is an important factor for businesses that want to ensure stability and continuity of communication.

While traditional influencers are limited by their availability and often the need to participate simultaneously in several different projects while fulfilling agreed obligations, virtual influencers are available to the company 24 hours a day, seven days a week, which represents a significant advantage in terms of time flexibility. In the case of virtual influencers, businesses are not influenced by any schedule compiled by the influencer and can effectively optimize the frequency of communication on digital platforms on their own. The availability of a virtual influencer allows managers to immediately respond to market trends and quickly adapt content to current demand or social changes, which is often costly and time-consuming when working with traditional influencers.

Virtual influencers also represent an economically advantageous solution for many businesses because, compared to traditional influencers, cooperation with them rarely involves any unexpected expenses. When budgeting for a marketing campaign, we can therefore talk about financial predictability and flexibility, which is particularly evident in a long-term communication campaign. Automating posts, managing accounts and interacting with customers allows virtual influencers to operate effectively without the need for constant supervision and management. Additionally, customizing a virtual influencer based on data collected from customer interactions allows creators to create content that more precisely targets audience preferences, resulting in greater campaign effectiveness and cost optimization. The costs of cooperation with traditional influencers, on the other hand, can be very variable and often depend on their popularity, reach and current market situation. Businesses often also must deal with high one-off fees for engaging an influencer in a short-term communication campaign, and these expenses can increase significantly when, for example, adapting a campaign to multiple regions or cultures. However, in the case of a virtual influencer, this problem is eliminated, because the initial investment in their creation and development is one-time, and the subsequent costs of their use are much lower. At the same time, the virtual influencer can be used for a long time without the need to repeatedly pay a fee or pay for the exclusivity of the influencer, which helps the company save financial resources. In addition, with virtual influencers, company managers do not have to deal with the expenses associated with the influencer's travel or accommodation. Due to the relatively low operating costs incurred in the activity of a virtual influencer, a business can shift its resources to other areas related to the provision of marketing activities or product development, thereby increasing its sales efforts.

Their relatively simple transferability between different digital platforms or regions also makes virtual influencers an effective communication tool, thanks to which it is possible to increase their reach on the international market. When using the services of a traditional influencer, on the other hand, we could encounter a problem based, for example, on his or her limited popularity only within a relatively narrowly defined group of consumers on the domestic (national) market. However, the virtual influencer can be designed in such a way that he or she acts culturally neutral, which will eventually be reflected in the reduction of costs that would otherwise be necessary to adapt the communication campaign to the changed market conditions abroad.

On the contrary, one of the main disadvantages of using a virtual influencer is the potential loss of authenticity and trust on the part of consumers, which can negatively affect the effectiveness of marketing campaigns. Authenticity is a key factor in building a relationship between influencers and their audience. Basically, consumers perceive authenticity as the degree to which an influencer is truthful and honest in their speech, which increases their engagement and loyalty to the brand. However, with virtual influencers, emotional expressions are always limited by programmed reactions, which can seem insincere and not believable. Virtual influencers as digital constructs can thus be perceived as less authentic compared to real influencers, which can weaken the emotional connection with

consumers. Emotional connection is often a key factor in building long-term relationships with consumers, as it increases the likelihood of repeated purchases and loyalty. This will be particularly evident in the case when consumers will not be able to identify with the virtual influencer, because he or she will act on them unnaturally, too artificially, he or she will not be capable of real empathy, since he or she has not lived a real life or any authentic experiences.

Research (Li et al., 2023; Melnychuk et al., 2024) shows that if the consumer is not aware from the beginning that a virtual influencer is talking to him or her and only finds out afterwards, he or she feels cheated. The feeling of intentional manipulation can negatively affect his or her trust in the brand and the outcome of the purchase decision itself. In connection with the use of a virtual influencer to influence consumer behaviour in the physical world, ethical questions regarding transparency and responsibility in marketing communication come to the fore. Ethical questions mainly concern whether it should be clearly indicated that virtual influencers are not real people and that their opinions and attitudes are not authentic personal experiences but, on the contrary, are fully controlled by the business entities they promote. Future regulatory restrictions could therefore include, e.g., mandatory labelling of digital characters and a clear distinction between real and virtual influencers to prevent possible manipulation of public opinion (Olšovská & Švec, 2017). Legal regulation may also affect the way in which virtual influencers will be allowed to communicate with minors or other vulnerable groups, which are generally considered more susceptible to coercion associated with the promotion of products. The consequences of the use of artificial intelligence and virtual entities in the interaction with the consumer can currently lead to negative reactions from the public and, consequently, damage to the company's reputation.

Older generations of consumers, who tend to be less inclined to various innovations, can also be a barrier to the application of a virtual influencer in practice, and therefore it can be assumed that they will be more sceptical of digital personalities that do not show “real human characteristics” and their perception as a trustworthy source of information. If the product does not have a sufficiently broad user base consisting of consumers of different age categories, the use of a virtual influencer may appear disadvantageous for it. Especially if the target group of consumers prefers traditional values and personal experiences when communicating with business entities.

4 Conclusion

Even though virtual influencers provide businesses with numerous advantages in the field of digital marketing, their further development is conditioned by the efforts of competent individuals to effectively address the issues that arise in the pursuit of effectively reaching the target audience. Additional updates to relevant software in response to rapid technological advancements or changes in consumer preferences, ethical issues related to communication transparency, or potential regulatory interventions arising from adopted legislation represent significant challenges that will require increased attention in the future. However, the low operational costs and the ability to utilize automated artificial intelligence tools in various processes related to virtual influencer communication with diverse audiences also create opportunities for small and medium-sized enterprises that have long-term plans to enter foreign markets, expand their business activities, and strengthen relationships with customers across different cultural environments, all while minimizing the financial resources allocated to digital marketing communication.

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EXPLORING THE LINK BETWEEN POSITIVE ONLINE SHOPPING EXPERIENCES AND ONLINE SHOPPING FREQUENCY: INSIGHTS FOR MOBILE MARKETING STRATEGIES

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Abstract:

Mobile marketing is nowadays one of the most popular ways not only to search for information about goods and services, reviews, and experiences of other customers, but also to make the actual purchase. The main objective of the paper is to identify whether there are statistically significant associations between positive experiences with online shopping via smartphone and the frequency of online shopping. Artificial intelligence (AI) is bringing revolutionary innovations to e-commerce by enabling personalization of the shopping experience, automation of processes, and more accurate demand predictions. The questionnaire survey included 194 respondents of the Generation Y (Millennials). Data was collected over the course of the first half of 2024. Based on the results, it can be concluded that most respondents have positive experiences with shopping online via smartphone. The Spearman correlation test confirmed the association between the above variables. The COVID-19 pandemic brought about significant changes to the buying behaviour of people. The findings of our survey add to the overall picture of the share of mobile marketing in e-commerce, which can be a real game changer for companies that offer their products and services online.

Key words:

AI. Consumer Behaviour. Mobile Marketing. Online Shopping Frequency. Smartphone. Trust.

1 Introduction

The e-commerce has a fundamental impact on the contemporary society. Businesses these days can easily offer their services all over the world and are not limited to local markets, as was the case in the past (Tong et al., 2019). Consumers have instant access to an unlimited amount of information regarding the products and services they are interested in. Global connectivity and free access to information are fundamentally changing the purchasing behaviour of consumers and companies alike (Cardona et al., 2015). The growth of e-commerce over the last ten years has revolutionized the retail industry. For the first time in history, consumers have access to a globally connected marketplace where they can shop for or sell goods at any time of the day (Pierce & Jiang, 2021). Consumers have at their disposal an endless amount of information about the offered products from the comfort of their homes. At the same time, customers are not limited to the local offer, but can buy goods from sellers all over the world (Chaffey, 2014). E-commerce thus has a positive impact on the number of cross-border business transactions. However, the growing cross-border trade also means tighter competition on local markets. In the past, entering new markets would entail considerable costs (Mulier et al., 2021). The e-commerce puts a downward pressure on prices of goods, increases the overall quality of services, and brings along a wider range of products. In smaller economies, the effect of e-commerce can be stronger, because Internet merchants can now offer goods that are not normally available on the local market. E-commerce thus has a positive effect on the satisfaction of customers and the total consumption of households (Labanauskaite et al., 2020). Another fundamental change brought about by the gradual digitization of the retail industry is the interconnectedness and 24/7 availability of services and information to customers. It could

be said that the retail markets today, thanks to the growing popularity of e-shops, have never been more competitive. Merchants today cannot just passively present their goods (a catalog on the Internet), they must be open to two-way communication with the customer. At the same time, merchants are exposed to the pressure of growing competition, as thanks to the Internet, barriers to market entry are becoming easier to overcome (Laudon & Traver, 2016).

2 Literature Review

Most e-shops are available globally, seven days a week, 24 hours a day. Customers with an Internet connection can communicate with sellers anywhere in the world and get instant feedback (Tomaskova, 2010). Therefore, customer involvement and awareness are significantly higher than in the past. At the same time, the costs associated with obtaining additional information are being reduced on an unprecedented rate (Nguyen, 2021). Consumers can communicate with merchants via websites, e-mail, or social networks from anywhere and for free (Eger et al., 2015). If the customer is not satisfied, he is able to find another supplier within a few minutes. Today's consumers therefore prefer a personal approach and a quick response from the merchant. Merchants use customer feedback to plan innovations and further enhance their services and products (Rivza et al., 2020). It is very likely that in the future, new ICT tools such as artificial intelligence or virtual reality will bring even more dramatic changes in the way consumers choose and purchase goods. Thanks to the Internet, customers thus become much more sensitive to differences in prices and the quality of services offered, as they can easily find all the necessary information about products or use price comparators to compare offers from hundreds of merchants at once (Goggin, 2020). Companies must therefore make every effort to attract and satisfy customers. Thus, competition between online stores and the retail businesses is getting fierce (Chaffey & Smith, 2017). The fundamental advantage of digital media over conventional media is that apart from providing information, digital media allow businesses to obtain feedback (Macek, 2011). Currently, feedback is a standard element of marketing communication. Digital marketing communication also includes tools from the field of mobile communications, the Internet, and other digital means of communication (Frey, 2005). Digital marketing also makes use of various "new media" tools (especially for promotion purposes). Given their digital nature, these tools offer marketers a variety of options, in the field of direct-to-consumer marketing (Bernritter et al., 2021). The interaction brought about by direct-to-consumer marketing makes it possible for marketers to analyse not only the feedback (direct and active) but also the effectiveness and return on investment of specific marketing campaigns (Kotler et al., 2017). The use of artificial intelligence (AI) in e-commerce brings a wide range of benefits that improve the efficiency and competitiveness of online businesses. One of the main advantages is the ability of AI to analyse large volumes of data in real time and generate accurate predictions, which enables more effective decision-making. Offer personalization is another significant benefit - AI can identify customer preferences and adapt products to them, thereby increasing conversion rates and customer satisfaction. Chatbots and virtual assistants, powered by natural language processing (NLP) technologies, provide instant customer support, which reduces the burden on human staff (Cheng, 2023).

3 Methodology

The main goal of the paper is to identify whether there is a statistically significant relationship between the frequency of shopping online via smartphone and the perception of the safety of shopping via smartphone.

Based on the set goal, the following research question was formulated:

RQ: Is there a statistically significant relationship between the frequency of shopping online via smartphone and the perception of safety when shopping online via smartphone?

Based on the research question stated above, the following research hypothesis was formulated:

H: It is assumed that there is a statistically significant relationship between the frequency of online shopping via smartphone and the perception of safety when shopping online via smartphone.

The inputs to the analyses hereunder were obtained based on the primary research conducted through the questionnaire method. Data was collected via an electronic questionnaire in July 2024. The link to the electronic questionnaire was distributed via e-mail using the authors' private database. The research sample consists of 194 respondents. The first part of the analysis points to the rough data presented through descriptive statistics. The second part of the analysis examines deeper relationships using inductive statistics. Considering the outlined hypothesis and the nature of data, Spearman's correlation test was used. The statistical analysis was carried out using the SPSS 22 program. The research sample consisted of 194 respondents, of which 109 (56.2%) were women and 85 (43.8%) were men. The gender composition of the research sample reflects the fact that women are generally more willing to take part in questionnaire surveys. As the research sample was selected based on availability and willingness of participants to participate, a certain level of disproportion compared to the general population in Slovakia is expected.

4 Results

This section outlines the research findings using descriptive statistics, predominantly in the form of tables.

Table 1: Frequency of shopping via smartphone

	No.	Percent
Very rarely (a few times per year)	56	28,9
2	43	22,2
3	50	25,8
4	37	19,1
Very often (every week)	8	4,1
In total	194	100,0

Source: own processing, 2024

Table 2: Perception of shopping safety

	No.	Percent
Strongly disagree	17	8,8
2	10	5,2
3	48	24,7
4	55	28,4
Strongly agree	64	33,0
In total	194	100,0

Source: own processing, 2024

Based on the results presented in Tables 1 and 2, it can be observed that in terms of the frequency of shopping online via smartphone, most respondents (28.9%) indicated that they shop this way very rarely. Only a few respondents (4.1%) stated that they shop like this every week. In terms of the perception of the security of smartphone shopping, most respondents (33%) marked the answer *Strongly agree*. The option 2 on a scale of 1-5 was the least popular (it was chosen by 5.2% of the sample).

The hypothesis in question examines whether there is a statistically significant relationship between the frequency of shopping online via smartphone and the perception of security of shopping via smartphone. After considering the nature of the variables, the non-parametric Spearman correlation test was used to verify the hypothesis.

Table 3: Spearman’s correlation test

Spearman’s rho	Correlation Coefficient	,401
	Sig. (2-tailed)	,000
	N	194

Source: own processing, 2024

Based on the results shown in Table 3, it can be concluded that there is a moderate positive relationship between the frequency of shopping online via smartphone and feeling safe while doing so. Thus, it can be concluded that the hypothesis has been confirmed.

5 Conclusion

Over the last 20 years, electronic commerce or e-commerce has become a phenomenon that has changed not only the retail market but also the purchasing behaviour of consumers around the world. E-commerce around the world continues to grow at a pace that exceeds traditional retail several times (Anvari & Norouzi, 2016). However, the rapid growth of e-commerce is not an isolated phenomenon, as digitization and e-business are considered significant driving forces shaping the future of the field.

Artificial intelligence (AI) is significantly transforming the e-commerce industry, bringing new possibilities for personalization, automation, and efficiency. Thanks to advanced machine learning algorithms, e-shops can analyse customer behaviour in real time and offer them tailored recommendations, which increases conversion rates and customer satisfaction. Automated chatbots equipped with NLP technologies facilitate communication with customers and provide instant support 24/7. AI also optimizes processes such as inventory management, demand prediction, and pricing strategy, thereby contributing to reducing costs and increasing profitability. Companies that implement AI in e-commerce gain a competitive advantage by being able to better respond to customer needs and adapt to a dynamic market (Zhang & Xiong, 2024).

The results of the research show that most respondents shop via their smartphones very rarely (28.9%) with only a handful of shoppers doing so every week (4.1%). In terms of the perception of the safety of shopping via smartphone, most respondents (33%) feel safe when shopping online. Those who do not feel safe when shopping online forms a small minority (5.2%).

The hypothesis postulated hereunder aimed at finding out whether there is statistically significant relationship between the frequency of shopping online via smartphone and feeling safe while doing so. Spearman’s correlation test confirmed that there is a moderate positive relationship between the frequency of shopping online via smartphone and feeling safe while doing so. Based on the above, it can be concluded that the hypothesis was confirmed.

Other authors, namely Pentina and Amialchuk (2011), Groß (2015), as well as Natarajan et al. (2017) and others have also researched the issues discussed herein. The results of the research hereunder go hand in hand with results of research carried out in the past – even though the frequency of online shopping does not increase significantly over time, trust in online shopping increases over time.

The most significant limitation of research hereunder is geography – research was carried out almost exclusively in Prešov and Košice regions (eastern Slovakia). In the future, research should focus on respondents from all eight regions of Slovakia, so that the obtained results can be generalized to the general population of the Slovak Republic. Similar research could also be carried out across Visegrad Group countries with an aim of comparing the results among the countries involved.

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SOCIAL MEDIA AND NEOLIBERAL AGEISM: SKINCARE TIKTOK AND AI “AGED FILTER”

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Abstract:

This paper examines how the AI aged filter on TikTok perpetuates neoliberal ageism by promoting individual responsibility for maintaining a youthful appearance through scientific-sounding discourse. Analysing 300 TikTok videos related to SkinTok, where dermatologists, influencers, and ordinary users engage in skincare discussions, this study identifies three discourse nodal points: fear of ageing, a moral aversion to looking “old”, and the scientification of skincare discourse. The use of the AI aged filter reinforces a postfeminist, neoliberal narrative that positions youth as a laborious ideal achieved through diligent self-care and anti-ageing products. By framing ageing as a problem, the filter aligns with traditional cosmetics marketing techniques, advancing commodified “solutions” to an increasingly technologised representation of age, strengthening the underlying mediated technomyth of youth. This study highlights how these dynamics make ageism pervasive in contemporary online media content, reinforcing societal pressures that compel individuals, particularly women, to engage in relentless self-surveillance and corrective practices to “age successfully”.

Key words:

AI Aged Filter. Cosmetics. Discourse Analysis. Influencers. Skincare. TikTok.

1 Introduction

“A new TikTok filter has 20-year-olds reaching for the retinol,” writes Alexandra Pauly (n.d., para. 1) for the Highsnobiety website, explaining the then-new viral TikTok trend, the “aged filter”. TikTok effects, i.e. the filters named “aged” and “aged filter”, have 30.9 million and 2.3 million uses, respectively, in August 2024. The principle behind these filters is simple: they use AI to modify the user’s face and hair to show signs of ageing. Depending on the specific filter, it may be a video mapping the ageing process or a filter causing general ageing, i.e., the user looks old(er). It is also possible to use an AI filter with clear temporal indications of ageing, such as what the user’s face and hair will look like in 2073. The signs of ageing implemented here using AI are mainly the standard wrinkles around the mouth, eyes, forehead, and grey hair. These are thus clearly socioculturally recognisable signs of ageing that occur in every human being. So, why do twenty-something Gen Z TikTok users have to reach for retinol? The answer, which will be argued here based on the present analysis, is relatively brief – because of neoliberal ageism in media content.

This paper examines how the AI aged filter on TikTok perpetuates the neoliberal ageism present in the media. To this end, we first review contemporary academic literature investigating the relationship between media representations of ageism and advertising content related to skincare and cosmetics. We focus on the theoretical conceptualisation of ageism and previous research analysing this phenomenon in media content. Secondly, we present the methodological foundations of our research, which are discourse analysis and the Barthesian deconstruction of myths. In the research results section, we focus on three discourse nodes: (i) dismay and fear, (ii) looking and/or being old is “wrong” and (iii) science is here to help. Through the analysis of these discourse nodes, we deconstruct how ageism, including internalised ageism, is represented in the analysed discourse, selected TikTok videos from July 2023 to July 2024, as well as the technomyth of youth, in which technology is seen as a tool to stop or reverse ageing.

2 Skincare, Skintok, and Ageism in Marketing and Media

In the context of TikTok, the AI aged filter will be seen here as part of the so-called SkinTok, a part of the TikTok social network where users, both “amateurs”, i.e. ordinary users, as well as dermatologists or influencers and specific skincare brands, engage in skincare. This includes videos such as skincare routines explaining the steps and reasons for using each product, reviews of particular products and their recommendations, or dermatologists’ reaction videos to skincare routines of influencers or celebrities. Under the hashtag #skincare, 23.5 million videos can be found in August 2024.

Our analysis addresses the anti-ageing imperative of using AI aged filter concerning skincare products and routines. Media representation, especially the marketing of skincare products, has historically carried a moral agenda related to individual responsibility for clean and beautiful skin or overall appearance (Coupland, 2003) and a connection to wealth (Ramsbrock, 2015). These connotative networks also regulate skincare products in terms of skincare and decorative cosmetics. Wilfried Rähse (2020) maps the legal definitions of cosmetics in the European Union, Germany and partly the United States and summarises the purpose of cosmetic products as follows:

Essentially, the purpose of applying cosmetics is to increase the attractiveness of the user. This goal is achieved with many cosmetic products: unobtrusive, barely perceptible in the daily cleaning of skin and hair as well as the teeth, or eye-catching for decorative cosmetics, hair styling or coloring. To maintain the good condition, the daily use of cosmetic products on the skin and in the oral cavity is necessary; this applies with restrictions also for the hair (nose and ears are not mentioned in the regulation). The main tasks of cosmetics are cleansing, beautifying, perfuming, protecting, and maintaining a good condition of skin, nails, hair, and the teeth. (Rähse, 2020, p. 2)

While Rähse speaks of “maintaining a good condition”, Coupland (2007) traces the construction of the manifestations of ageing as a process that is “correctable” or “repairable” in advertisements for skincare products. She describes “anti-ageing” products as being “promoted as consumerised solutions to ‘the problem of ageing’” (Coupland, 2009, p. 955). Like Coupland (2003, 2007, 2009), we consider this media representation and marketisation mode gendered and a form of ageism. Ageism can be defined as a “prejudice or discrimination based on age. Ageist feelings include revulsion and disgust towards growing old, having disease, or being disabled” (DeRenzo & Malley, 1993, pp. 105-106). In other words, ageism, as a form of prejudice, is associated with a cluster of connotative prejudices that relate primarily to a certain type of infirmity and the associated, for example, lack of independence or the need to be cared for. Ageism, in this sense, can be both a way of looking at others and an internalised one, materialising primarily in fear of one’s own ageing, in “fear of powerlessness, of feeling useless and/or dying” (DeRenzo & Malley, 1993, p. 106).

In media content, ageism can manifest itself in different ways, such as a “tacit understanding that aging is a pathology, a deficiency that needs to be controlled, disguised and covered up” (Sandikci, 1996, p. 411) and this understanding is reflected at the linguistic level in the form of a specific “lexicon of ageism” (DeRenzo & Malley, 1993) including expressions such as “toothless”, “doddering” or expressions more loosely associated with ageing, such as “wrinkle” or “line” (DeRenzo & Malley, 1993). Furthermore, ageism manifests itself in an agenda-setting sense in media content that allows for a primary understanding of ageing as unfavourable. For example, media representations of older people in news coverage are usually associated with issues such as those related to declining health (Edström, 2018).

However, ageism in the media can also be traced within the seemingly positive media representation of older people, especially in the form of the discursive object of “successful

ageing”, which is strongly associated with the use of appropriate cosmetics and skincare. Fundamentally, “successful ageing“ is linked to “the idea that older people can and should be active, productive, and autonomous” (Kenalemang-Palm, 2023, p. 1), which is related not only with certain activities and products that are particularly marketed to the target group of 50 or 55 years old and above called the “grey” or “silver market” (Kenalemang-Palm, 2023), but also with a specific appearance, including covering grey hair by dyeing it, or not covering it, but only in a discursively acceptable form, i.e. it must be “respectable” and “non-old” (Cecil et al., 2022). “Successful ageing” is closely associated with neoliberal rhetoric involving high self-discipline and self-responsibility for one’s own ageing process (Ylänne, 2022), the promotion of the idea of “agelessness” in which ageing is seen not as a natural process but as a mindset that can be summarised as the idea that “ageing is all in your head” (Castro, 2022, pp. 102-103), and also with the concept of the “aesthetic entrepreneur” (Kenalemang-Palm, 2023). “Aesthetic entrepreneur” is a concept that encompasses all of the above; it means the “construction of individuals as entrepreneurs of the self” and works on the basis of “neoliberal modes of governance, wherein ageing individuals are encouraged to actively manage and ‘perfect’ the appearance of their skin through consumption, hiding visible signs of ageing” (Kenalemang-Palm, 2023, p. 2). In this sense, the concept of “aesthetic entrepreneur” functions also thanks to so-called commodity culture, which “relies on a middle ageism that signals to young people that they are ageing rapidly and therefore need to take preventative measures entailing the purchase of anti-ageing products” (Chambers 2012, p. 162). The expression “middle” in the above quote implies ageist attitudes that are not necessarily primarily aimed at stigmatising a group of older people but much more likely to promote internalised ageism directed at young(er) people and their fear of ageing in order to foster their self-discipline.

Within this ideology present in the media, two more distinct axes can be observed, especially in skincare and cosmetics marketing in the field of “anti-ageing” products: the gendering of the issue and the technologisation and scientification of the body.

In the literature on ageism and ageing in the media, Susan Sonntag is repeatedly cited as arguing that there is a “double standard” in ageing for men and women (e.g., DeRenzo & Malley, 1993; Sandikci, 1996; Muise & Desmarais, 2010). The double standard means primarily that the performativity of gender intersects with the performativity of age, with women being normatively ascribed the necessity, in this intersection of these two performativities to perform youth and agelessness. In the event of a lack of compliance with this standard, women face “double jeopardy for being viewed negatively [...] That is, women are assumed to lose their beauty, sex appeal and intellectual abilities much earlier in life than do men” (DeRenzo & Malley, 1993, p. 108). According to Calasanti et al. (2006), this intersection is also neglected by theoretical and activist feminism, which, while addressing age to some extent, ignores certain age groups: “Feminists consider age but neither old age nor age relations. They focus on young adult or middle-aged women and on girls” (Calasanti et al., 2006, p. 14). To a certain extent, this neglect is also evident in analyses of media content, where ageism is mainly related to the impact on younger generations and their coping with the idea of ageing and their consumerist behaviour concerning their internalised ageism, and to a lesser extent to older people themselves.

Concerning the double standard, Coupland (2003) discusses how, in contemporary Western discourse, the ageing female body is viewed as “unwatchable”, and women are credited with the need to actively work against ageing, particularly concerning facial ageing. At the same time, women’s skincare products are framed, according to Coupland (2007), as being marketed differently from men’s, characterised, for example, by hypermasculinity (Coupland, 2007) or by features that make it clear that the product is intended exclusively for men, such as the standard “for men” appendix, and the subsequent differences in the various forms of promotion (see, for example, Byrne & Milestone, 2023; Berkowitz, 2023). The

gendered ageist discourse in media content regarding skincare reflects a postfeminist discourse that enforces gender norms as a moral obligation fulfilled by an individual, framing femininity as something to be laboriously maintained and judged through commodified ideals and socially accepted standards (cf. Gill, 2007; Ringrow, 2014; Kolehmainen, 2012).

Last but not least, another layer of the discourse regarding anti-ageing products and ideology is the technologisation and scientification of the body and body care. Sandikci (1996) speaks in this sense about the “technomyth of youth” characterised by the use of technology, whether we are talking about electronic devices, cosmetic procedures such as micro-needling, Botox or skin care technologies such as cleansing lotions, creams, serums and oils, to “disconnect and decontextualize body parts, neutralizing the personal experience of being a human being and fragmenting the body into pathologies” (Sandikci, 1996, p. 414). The technomyth is a part of neoliberal rhetoric and consumer culture and is thus transformed from “the desire to control the process of aging” into “a decision to take control of one’s life, and hence, to increase one’s self-worth” (Sandikci, 1996, p. 414).

Technomyth is mainly traceable in media content at the level of language, as Coupland (2007), Sandikci (1996), Searing and Zeiling (2017) and Ringrow (2014) show. The technologisation of the body is closely linked to its scientification, which is manifested in the modes of expression. Coupland (2007) states the following:

Marketed products, particularly those targeting women, are largely scientized: the products are represented as pharmaceutical rather than cosmetic, with claims made about empirical verifiability, often (exclusively for the female market) making ‘precise’ claims about how much younger such products can make skin appear to be. Readers are persuaded that skin care is a serious business in which highly technologized products can, with care and conviction, make significant and capital-enhancing changes to facial appearance, similar to those associated with surgical intervention. (Coupland, 2007, p. 56)

Similarly, Searing and Zeilig (2017) talk about the “medical-sounding terms” used in advertisements for women’s skincare products, which aim “to create the possibly illusory sense that these products are the result of much research and development in scientific laboratories” (Searing & Zeilig, 2017, p. 22). Along with scientific and technological terms and lexicon, Sandikci (1996) traces medical and military metaphors, such as “fighting” or “combatting” the effects of ageing, etc. The “scientific” is also mapped by Ringrow (2014), mentioning in particular “‘scientific’ ingredients” or “‘scientific’ product names”, “scientific” sounding or looking features of the product, but also the use of statistics and numerical data as a strategy of authentication and more generally as an argumentative strategy or argumentative fallacy. Regarding “scientific product names”, Sandikci says that the scientificity of product names is the reflection of “the authoritarian voice of science” (1996, p. 415). The umbrella term for skincare products which combine cosmetics and pharmaceuticals is “cosmeceutical”, and it includes “cosmetic products with biologically active ingredients purporting to have medical or drug-like benefits” (Muisse & Desmarais, 2010, p. 2).

Concurrently, using AI filters indicates a paradox in the discourse on cosmetic products. On the one hand, the products enhance the appearance to bring out the “natural” beauty; on the other hand, this transformation is always artificial and therefore “unnatural”. As we will see later, AI filters combine both these aspects: they are artificially created applications that can simulate how we will look in the future, but the result is too “natural” and too “realistic” for the user, evoking feelings of terror.

3 Methodology

The present analysis focuses on these nodal points of skincare discourse in a sample that uses an AI aged filter. Thus, the hypothesis is that the filter in this discourse functions as a disciplining mechanism in the field of gendered labour aimed at maintaining a youthful appearance, and its operation is covered by scientific discourse.

The chosen method is a discourse analysis, which combines Foucault's (2013, 2007) approach to discourse with an emphasis on biopower. The term bio-power is used here because the focus is not only on the aspect of youth as a Barthesian myth (Barthes, 2000) connotated with beauty but also on youth connoted with the health of the person in question, including Sandikci's (1996) technomyth of youth.

The analysis was conducted on 300 TikTok videos using the "aged" and "aged filter" effects, specifically on skincare themes. Duplicates were removed from the sample. The videos, posted between July 2023 and July 2024, were examined through discourse analysis, considering both linguistic and visual elements.

4 Results of the Discourse Analysis

4.1 Dismay and Fear

"I've been gaslighting myself that there is no way this is accurate but every celebrity is SPOT ON,"¹ user Abby Baffoe (2023) writes in her video, where she has her current face and her face "aged" by the AI "aged" filter underneath her, and next to this pair of filters, she tests it on older photos of celebrities like Sarah Jessica Parker and Jennifer Aniston. The video demonstrates that the "aged" photos of celebrities, which are now the age at which the AI filter is designed to age the individual, closely resemble how these celebrities appear in their current photographs. This is an example of the first nodal point of discourse associated with the AI "aged" filter: dismay and fear.

Frightened reactions to the application of the filter are the most prominent element of the discourse concerning the AI "aged filter" effect. On a discursive level, this is a manifestation of internalised ageism, as individual users are not offended; they do not express disgust towards how other, older people are represented in the media but are terrified of how they themselves would look as old. This dismay is closely linked to the failure to achieve the discursive norm of self-discipline in the sample studied. It is interwoven with the failure of the self within the narrative of self-responsibility for the ageing process and its manifestation. This process can be traced in explicit commitments to self-improvement and a "more careful" approach to skincare that was identified in the analysed videos or specific steps users plan to take to "fix" their skin and prevent ageing in the form "caused" by the applied AI filter are depicted. Such commitments are based on the discursive norm of self-discipline with the imperative of regulating one's own manifestation of the ageing process. User Ricart Maria (2023), who adds a caption to her video simply stating "Traumatized", referring to her own reaction to the application of the filter, describes herself as a plastic surgeon and, like Abby Baffoe, says that the filter is "spot on".

Nevertheless, she grounds this assertion in her authoritative role as a medical practitioner dealing primarily with the "undesirable" aspects of the human body. In the video, she is shown before and after using the filter. She diligently applies a face roller to her face here, demonstrating her commitment to caring for her skin enough to prevent the AI filter from becoming her future reality. Given the explicit definition of her profession, this step, i.e. the demonstration of the application of a specific tool to positively influence skin ageing, can be

¹ Authors' note: The text occurs in the time frame 00:00 – 00:15.

interpreted as a challenge or recommendation from the position of medical authority. Her position in a given discourse is thus characterised by the accumulation of specific power capital derived from her medical authority; her utterances have a more pronounced illocutionary force in the terminology of speech acts (see, for example, Austin, 1975) as she has that specific authority and standing to perform the speech act of medical recommendation.

Similarly, the user *oliviasalmen* (2023), who refers to herself as an aesthetic nurse and nurse injector in the hashtag of the post, says at the beginning of her video, “Let’s talk about how realistic this filter is”² with the aspiration of describing the specific facial changes that the AI filter “causes” to users, thus depicting them in their possible older form. After establishing this goal, however, she pauses and tells viewers, “I’m unwell”, i.e., like other users, she is referring to her horrified reaction to the filter in question. In her video, she then details that the AI filter shows users with standard facial wrinkles, ageing eyelids, and the like. In the caption to the video, she again emphasises her dismay (*oliviasalmen*, 2023): “Not me getting spooked by my own aged face in the middle of the video” and complements it by declaring her commitment to taking more care of his skin by saying, “nervously lathers on more sunscreen.”³ Akin to the user *Ricart Maria*, *oliviasalmen* derives her authority from her profession, her authority and discursive standing, in the sense of terminology of speech acts, is the primary support of her arguments as to why the filter is “realistic”.

4.2 Looking and/or Being Old Is “Wrong”

The concern expressed about AI filter applications in the analysed videos appears to be based on something other than a perception of technological advancement or inadequacy. Instead, the moral imperative that ageing is “wrong” is much more evident in the videos. Users such as the aforementioned *oliviasalmen* are not only horrified but sickened by the sight of their possible older selves. Thus, the AI filter functions here not as a technology providing a more or less accurate “view of the future” but as a demonstration of something that is fundamentally viewed as inhuman not because of its technological nature but because it is socioculturally or mythologically constructed as inappropriate to the gaze, foreign, out of place, *unheimlich*.

Although this is a temporary application of the filter, users hectically try to “erase” its effect by immediately trying to correct the appearance of their skin. This is a clear discursive establishment here that ageing is a “problem,” as *Coupland* (2009) analyses, not an inevitable process. This problematisation is also written into so-called “wholesome” videos where users apply an AI filter and supplement this application with positive proclamations about looking like their mother and how they cannot wait to age. While they imagine a positive future here, these videos are so-called stitched together by other users who add their faces with the AI aged filter and express their fear or disgust over it.

The imperative of ageing, or the visible ageing of the body and skin, as morally wrong is strongly gendered within the sample analysed. This finding is limited by the sample design, however, the vast majority of the videos analysed depict women or are directed at women. The “reversal” of the effect created by the AI filter is here, in line with postfeminist rhetoric, attributed as the responsibility of individual female users who can keep themselves looking young if they try hard enough. Implicit here is thus that not trying to reverse the effects of ageing is morally wrong and inadequate for a woman. One can easily trace here the lines of normative performativity of gender, which for women requires an appearance appropriate to a lower age than the woman in question. In other words, the analysed videos include the “ageless” gendered discursive norm for women. A demonstration of this normativity is the video of user *Erim* (2023), who places her video in the caption on the “pro-age ‘I’m lucky to be alive’ side of TikTok”. Firstly, the user mentions in the video that viewers “shouldn’t be afraid of this

² Authors’ note: The text occurs in the time frame 00:00 – 00:02.

³ Authors’ note: The text occurs in the time frame 01:57 – 02:00.

filter” because it portrays a Eurocentric way of ageing, i.e. people of colour are those who “shouldn’t be afraid” as their skin ages in a different way. Thus, she reiterates the norm that “ageing like this” is wrong/ugly/undesirable and although at the end of the video she mentions that everyone ages and everyone ages in a different way, in the middle she states “this is 100% acting like we don’t have all the skin care in the world, I mean surely retinol can do better than this” as a reason why those watching the filter do not have to be concerned. She thus points to the scientification level of the discourse concerning the link between AI aged filters and skin care.

4.3 Science Is Here to Help

Several self-described dermatologists and skincare experts have responded to TikTok users who are dismayed by the AI aged filter. For example, user Dermguru (2023) stitches a video of another user frantically applying various beauty products after seeing the filter’s effect and, as a “board-certified dermatologist”, shares “3 crucial things to do to slow premature aging:” “no tanning”, “no smoking/vaping”, and a “consistent skincare routine with SPF and retinoids”. Similarly, user aavrani (2023) highlights the importance of SPF and skincare routines. Dr Whitney Bowe (2023) further underscores this link by suggesting that the AI filter was lenient with her appearance because she’s “proactive about the ageing process,” reinforcing the post-feminist ideal of actively preventing ageing, aligned with the concept of aesthetic entrepreneur. Consequently, AI aged filter discourse aligns with conventional cosmetics marketing, using scientific terms like “SPF” and “retinoids”.

In such videos, the technomyth of youth can be traced – skin ageing is discursively deconstructed into individual “problems,” such as wrinkles or pigment spots. For each individual “problem,” a specific technological solution, be it a particular product or a specific technique of usage of a product, is recommended to correct the “problem” or reverse the effect of ageing altogether. At the linguistic level, we can also observe the authoritativeness of the voice of science along the lines of Sandikci’s (1996) conceptualisation, manifested both in the explicit presentation of the professions of the users concerned, who thus borrow “scientific” authority to back up their claims in order to give them adequate standing, and at the level of the names of product groups or specific products. For example, instead of the term “sunscreen,” the term “SPF” is employed, which discursively shifts the debate into the scientific arena. Terms such as “retinoids” fall both into the technoscientific lexicon of the discourse and into the designation of specific group of products, which are so-called cosmeceuticals. Retinoids are referred to here as products that fulfil the function of, for example, a medical procedure such as the application of Botox.

However, the AI aged filter itself is also subject to scientification and is also a part of the technomyth of youth. Its accuracy is evaluated, e.g. Dr. Whitney Bowe (2023) talks about “what it got right and what it got wrong”, Erim (2023) points out its “Eurocentric aging effect”, users who are not themselves dermatologists or other doctors “scientifically” test its accuracy, like Abby Baffoe (2023) in the introduction of the analysis, by comparing photos of celebrities or, for example, comparing their “aged” version with a picture of their mother or grandmother. The AI filter thus retroactively becomes part of the scientification of the media discourse on cosmetics, as it is itself a “scientific” tool simulating the “danger” and “horror” if users do not use the right products. The filter itself supports the technomyth of youth by simulating the ageing process. In the hands of specific discursive actors, it functions as a tool for pinpointing possible “problems” that become “problematic” only because they defy youth. It is becoming part of influencer marketing by dermatologists and other influencers involved in cosmetics or skincare. It is very similar in technique to standard cosmetics ads showing broken hair, chapped lips or dry skin.

5 Discussion

The discourse surrounding TikTok's AI aged filter reveals significant sociocultural norms regarding ageing, underpinned by internalised ageism, gendered expectations, and the pervasive influence of science or, more precisely, scientifically sounding claims as a source of authority. Our findings highlight how digital tools reinforce and perpetuate specific discursive responsibilities, especially concerning norms regarding women.

Following especially academic literature concerned with ageism in media, such as DeRenzo and Malley (1993), Kenalemang-Palm (2023), Edström (2018) and Yläne (2022), we first traced the discourse node concerning anxieties or prejudices against elders. In the analysed sample, fear of their own ageing or disgust and startling was especially prevalent when the AI aged filter was applied, and users saw their aged appearance. In other words, the prejudice against older people was not directly directed at the media representation of old people, but at the idea of oneself as old; we are therefore talking about a manifestation of internalised ageism, where one is prejudiced against oneself because, for example, within the myth of "successful ageing" one was not sufficiently self-disciplined, didn't work hard enough, wasn't a successful "aesthetic entrepreneur" (Kenalemang-Palm, 2023) in the creation of their own self, to look "successfully aged". The media representation of internalised ageism may also be a media representation of ageism itself in relation to the users watching the content; it is a media reproduction of the discursive norm that the appearance of old age is undesirable. Whether such content reinforces ageist sociocultural norms in relation to recipients is, however, out of the scope of this research, which focuses exclusively on media content.

The second discourse node analysed is the moral imperative hidden in ageism, namely that looking old is morally wrong. This discursive norm is manifested in the expressions of culpability of the analysed user videos and explicit commitments to remedy. This is a perceived failure to conform to self-disciplinary norms, where agelessness, or more precisely, looking young, results from the individual's efforts. In this respect, postfeminist neoliberal rhetoric is found in the analysed sample, as most of the analysed videos feature women confessing their shortcomings and promising to make greater efforts. This is a manifestation of a gendered discursive norm concerning ageing and, following Gill (2007), we can also trace here the extent to which the performativity of women's gender is encoded in the bodily manifestations of youth.

The third discourse node analysed was the scientificity and technomyth of youth in videos linking AI aged filter and skincare products routines. Technomyth of youth is manifested here primarily in its basic meaning (Sandikci, 1996), i.e., the manifestations of ageing are discursively deconstructed into units and a technical solution is assigned to each unit. We purposely use literature here that predates the advent of social media and could easily be considered outdated at this point, being over 25 years old. The sample analysed shows that the technomyth of youth, i.e. that youth can be sustained using very narrowly focused technologies, has functioned as a stable and long-lasting Barthesian myth in media representation. The human body is here a machine that can be repaired piece by piece and kept young. The scientificity of the analysed discourse, which supports the technomyth of youth, is manifested primarily at the linguistic level, the language used is scientific-sounding, for example, terms such as "SPF" or "retinoids". This scientificity is also supported by the inclusion of scientific and medical sounding or scientific and medical user occupations such as "aesthetic nurse" or "nurse injector".

However, the AI aged filter itself functions here as a technological tool that supports the technomyth of youth. Through this filter, users can visualise the possible impacts of ageing and can compartmentalise these impacts into (seemingly) solvable problems. The discourse surrounding the use of this filter then explicitly offers them these concrete solutions. AI aged

filter thus deepens the neoliberal logic of ageism in a very personalised form – it is not a model in a TV advertisement who has pigment spots that disappear through the usage of a serum, the user sees themselves and with the visual trick of the AI aged filter the pressure on the effort that they should put into themselves is personalised, so they would, as the discourse preaches, age successfully.

6 Conclusion

In the present analysis, we aimed to examine how the AI aged filter on TikTok reproduces discursive norms regarding ageing with an emphasis on neoliberal ageist rhetoric. Through a discourse analysis of selected TikTok videos, we analysed users' reactions to the use of this filter, or their confrontation with visualisations of their own ageing, as well as videos of medical and beauty professionals recommending specific steps and products to keep the skin “young” or to “prevent” the effects of ageing. The sample consisted exclusively of videos using the AI aged filter and dealing with skincare and cosmetics. Based on the findings of the relevant academic literature on media representations of age in the context of skincare and cosmetics and the ageism present in it, we used discourse analysis to identify three discourse nodes in the analysed sample: (i) dismay and fear, (ii) looking and/or being old is “wrong”, and (iii) science is here to help.

The discourse surrounding TikTok's AI aged filter reveals how digital tools can reinforce internalised ageism, as the users are depicted as terrified of the visualisation of their aged selves. This fear is tightly connected to the ideology of “successful ageing”, as we track primarily in the analysis of the second discourse mode. The users are making promises to “try harder” in the future as if they could completely prevent ageing by their willpower and labour. This is entirely in line with the ageist neoliberal rhetoric in which individuals have the power in the form of their self-discipline, to correct the ageing process and its manifestations. The gendered nature of this rhetoric was also evident in the sample analysed, with mostly women committing to greater self-discipline or, for example, regular use of certain products.

The AI aged filter also perpetuates the technomyth of youth, where ageing is deconstructed into solvable problems that can be fixed with targeted technologies, like skincare products. Scientific language and references to medical professions lend authority to these solutions. The AI aged filter deepens neoliberal ageism as a technological tool in personalising the pressure to “age successfully”. The filter is used as a persuasive tool in the given discourse, reinforcing societal norms that youth and beauty must be actively and individually maintained.

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SOCIAL MEDIA AS THE MAIN COMMUNICATION PLATFORM OF PRIVATE SCHOOLS IN THE ERA OF AI

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Abstract:

Schools and educational institutions in a choice-based system must inevitably operate based on market mechanisms. Their goal is to convince potential applicants that they, as institutions, meet their requirements for quality education. Therefore, it is essential for these institutions to communicate about themselves and their activities. Social media has become one of the main channels for marketing communication in educational institutions, as it offers an easy and accessible alternative for effectively targeting potential students and their parents. The main aim of this study was to investigate the social media presence of private kindergartens in Slovakia, particularly their use of Instagram and Facebook, and to evaluate the impact of different social media formats on engagement metrics such as likes and comments. In our quantitative research, we analysed 228 private kindergartens and their profiles on Facebook and Instagram. Our study revealed that visual content had the highest impact on engagement, while video content and textual posts also demonstrated positive relationships with engagement. Facebook remains the dominant platform for Slovak kindergartens, which is used by 67.1% of the sample.

Key words:

Facebook. Instagram. Kindergartens. Marketing in Education. Private Education Institutions. Social Media.

1 Introduction

Recent studies have shown that the quality of education is closely linked to the support provided to educators and the resources available within the system. Without strategic investment and policy reforms, the long-term sustainability of education faces significant challenges. According to available data compiled by the European Commission: Directorate-General for Education, Youth, Sport and Culture (2023), the situation in education in Slovakia is expected to worsen in the coming years if adequate corrective measures are not taken. The most adverse factors affecting the education system are the shortage of teachers, the unattractiveness of the profession in certain regions due to limited salaries, and the overall funding of the education system. In Slovakia, according to *Act No 245/2008 on education (Zákon č. o výchove a vzdelávaní (školský zákon), 2008)*, the current system evolves around “choice-based” mechanism, which means that students (and their parents) are allowed to decide, on which school they want to apply to. Therefore, the current system creates a more marketlike arrangement – in which schools (regardless of the type) compete for a number of students in order to not only get the best students and thus improve their rankings, but to also receive funding (Greaves et al., 2023). In this manner, schools have to behave like “standard” companies trying to sell their products (education and brand in this case) to their customers. In order to do so, they must utilize marketing tools to tailor their services to the needs of their customers.

Marketing communication is particularly key in this context, as the core of this system lies in providing relevant information to consumers. Only based on informed decision-making can a parent or child choose which school to apply to. For this reason, educational institutions are increasingly utilizing marketing communication as a response to competition, aiming not only to attract the most applicants but also the best ones (Tah & Knutes-Nyqvist, 2022). In the current setup of the education system in Slovakia, the state supports the emergence and

functioning of market mechanisms directly through its interventions via legislation. However, it should be noted that this is not yet a fully integrated marketing market but rather a heavily regulated environment where the state still plays the primary role, particularly in granting licenses and, to a large extent, in shaping the curriculum. This system also, however, views education as a commodity and encourages relevant stakeholders to treat it as such (Le Feuvre et al., 2021). This duality suggests that while schools need to market themselves like businesses, the sector still operates within strict governmental boundaries.

When it comes to schools and other educational institutions themselves, they can be divided into two main categories. The majority of schools in Slovakia are public schools, where the state bears the responsibility of providing the adequate level of education, however, in recent years there has been a growing number of privately run schools and institutions that do not pose as a replacement for the public sector, but rather as an option for families that are able and willing to pay additional money in hoping to get better teaching quality, new ways of incorporating the curriculum and more (Shaikh & Kazmi, 2022). Given that private institutions rely more heavily on funding from parents and private investors, they often delve much deeper into marketing processes and operate on a more advanced level. These institutions can function more like brands, with their own strategy, unique tone of voice, and visual identity. Such a brand image can be an effective tool for attracting new students, differentiating from competitors, and building a sense of “premium” education. This branding serves as a package of everything the institution has achieved, making it easier for the audience to remember and associate it with specific qualities (Santoso et al., 2021). Additionally, these institutions often incorporate a more advanced level of corporate social responsibility to further enhance their brand status, demonstrating a commitment not only to education but to broader societal values (Tan et al., 2022). In doing so, they create a comprehensive brand image that appeals not just to parents seeking better education but also to those looking for schools with a strong ethical foundation and social impact.

Regardless of whether they are private or public educational institutions, all must communicate with their target groups in some way. In this case, communication can also be divided into internal and external. Internal communication takes place directly within the educational institution and occurs between the academic management, its staff, and current students, while external communication primarily concerns potential students and other stakeholders in the surrounding environment (Avram, 2015). In internal communication, schools today primarily use integrated internal systems that combine the pedagogical aspect (assignment of tasks, grading), informational aspect (announcements), and social aspect (communication). Additionally, internal email addresses, newsletters, websites, printed documents, and face-to-face communication are also commonly used. When it comes to face-to-face communication, parent-teacher conferences are also an option (Santos & Ventura, 2021). In external communication, the choice of channels primarily depends on the target audience the school wants to reach. The basic tool for communicating public announcements is the website. For various recruitment campaigns, schools may use local media, different advertising banners, event marketing, or organize open days. Within the school building, various notice boards are often placed in publicly accessible areas (Kołodziejczyk, 2015). However, one of the main channels that educational institutions utilize, is social media.

According to Chaffey (2024), data from April 2024 shows that 62.3% of the global population uses social media, with over 3,065 billion users on the social network Facebook alone. The social media platform YouTube has 2,504 billion users, while Instagram is used by more than 2 billion people, according to the same data. According to Čábyová and Krajčovič (2020), it was expected in 2020, that in 2023, the active users on social media per month would grow to 3.43 billion, which is not far off from the actual numbers. In the context of educational institutions, social media – particularly social networks – are essential for reaching younger

demographic cohorts. In the case of kindergartens, parents from Generation Z are beginning to join the ranks alongside millennials (Maresova et al., 2020). Nowadays, with younger generations require different approaches to social media that those before them, focusing more on entertainment, viral content and memes (Čábyová et al., 2024). In this case, it is especially Gen Z that requires further focus, since it is the first generation that actively grew up with social media and most of them cannot remember the times before them, therefore, they are most technically adept in their use (Čábyová et al., 2023). This shift highlights the importance of adapting marketing strategies to connect with these emerging demographics, ensuring that educational institutions remain relevant and appealing in a rapidly evolving digital landscape.

The primary benefit of using social media is the increased effectiveness of communication, particularly in reducing costs associated with paid advertising to specific target groups (even micro-segments) and the ability to create and share organic free content for, or even with followers. Additionally, social media can be utilized to boost and build brand awareness, foster brand associations, and enhance perceived brand quality. These platforms also help establish and maintain a track record, build trustworthiness, and provide better customer service and experiences (Malesev & Cherry, 2021). Also, social media is an effective tool for groundswell initiatives – in this particular case, when followers of social media profile organically spread information and communicate with each other based on recommendations, shared information and discuss among themselves – e.g. regarding school announcements, parent-teacher conference talks, giving opinions on post-school activities and more (Krajčovič et al., 2023). Ultimately, by leveraging social media strategically, educational institutions can create more meaningful connections with their audiences, leading to greater engagement and loyalty.

The use of new and advanced technologies in education is advancing, with the COVID-19 pandemic further accelerating these changes. In recent years, schools have begun offering various virtual experiences and even classes that take advantage of low-cost and accessible technologies, as well as web-based and mobile tools (Bopp & Stellefson, 2020). According to a study by Mostafa (2021), social media can be utilized directly in the educational process, serving to remove both physical and psychological barriers (such as social anxiety) and to promote the sharing of information. The advantages are largely attributed to their collaborative nature, which allows for collaborative learning and mutual support among students and teachers. Social media are much more than just a platform for entertainment. For educational institutions, the content can serve not only to promote themselves but also to educate their audience through relevant content and content marketing. This approach allows potential applicants to gain insights into the functioning of the educational process within the institution, tailored to the chosen communication channel and delivered in various formats (Otchie & Pedaste, 2020). For example, through a platform like Facebook, a school can share brief announcements and key information it wants to convey to the public. Instagram serves as a source for various emotionally charged and visually impactful messages (entertaining content), while YouTube can be utilized for a range of tutorials, mini-classes, and other educational content (Olowo et al., 2020). As educational institutions increasingly leverage social media for communication and engagement, so grows the possibilities of implementing Artificial Intelligence (AI) to enhance these efforts.

In recent years, there has been a rapid shift in the use of AI tools, particularly due to the accessibility of generative AI (e.g., ChatGPT), which can be implemented for free within existing systems across various sectors. Education is one of these sectors, with AI transforming how students learn, how teachers teach, and impacting areas such as personalization, data analysis, trend identification, automation, and delivering real-time feedback to improve the overall effectiveness of education (Kamalov et al., 2023). When it comes to the marketing aspect, AI based on machine learning can automate various elements of educational institutions'

campaigns. This includes analysing social media interactions to identify the best times to post, determining the optimal posting frequency, and pinpointing the most engaging content for specific audiences. Additionally, AI can handle audience segmentation and tailor campaigns for different groups, while also analysing behaviour and preferences to further refine marketing strategies (Kedi et al., 2024). Therefore, AI can help administrators in education, that do not necessarily have marketing experience make more data-driven decisions, that could benefit the effectiveness of their campaigns, and their strategies regarding marketing communications on social media, or even elsewhere (Hicham et al., 2023). To summarize, incorporating AI into the marketing efforts of schools and educational institutions not only streamlines processes but also enables these organizations to quickly adapt to shifts in student behaviours and preferences. This allows schools to better connect with prospective students, personalize their outreach, and make data-driven decisions to improve engagement and enrolment outcomes.

2 Methodology

The main aim of this study was to investigate social media presence of private kindergartens in Slovakia, particularly their use of Instagram and Facebook, and to evaluate the impact of different social media formats on engagement metrics such as likes and comments. This study also aims to identify the best practices in social media marketing for educational institutions to improve communication and attract prospective parents, which could be beneficial for AI learning in order to utilize automation and help generate more useful responses by AI models.

To achieve this goal, we decided to conduct quantitative research focused on analysing engagement on posts of various formats on social networks. Using Zoomsphere (n.d.), and its social media analysis tool, we analysed the Facebook and Instagram profiles of a total of 228 private kindergartens and collected data regarding engagement (likes, comments, shares) on different types of posts. The data collected from the profiles was ranging from March 2023 to March 2024.

To create a list of private kindergartens registered in Slovakia, we used the data from Slovak centre of scientific and technical information (Centrum vedecko-technických informácií SR, 2023). We first created a list of all the private kindergarten institutions and then gathered links to their profiles on Facebook and Instagram.

Based on the gathered data, we formulated these research questions and the following hypotheses:

RQ1: What type of content format influences the level of engagement on private kindergarten's social media profiles?

- Hypothesis H1: There is a positive relationship between the frequency of static visual content and engagement on posts.
- Hypothesis H2: There is a positive relationship between the frequency of video content and engagement on posts.
- Hypothesis H3: There is a positive relationship between the frequency of textual content with a link and engagement on posts.

RQ2: Which social media platforms do kindergartens in Slovakia utilize more?

The statistical data processing was conducted using Microsoft Excel. Descriptive statistics were calculated employing fundamental statistical methods, specifically the sum of values and arithmetic mean. The normality of data distribution was verified through histogram analysis. The relationships between variables were analysed using Pearson's correlation coefficient, selected as an appropriate tool due to the nature of the analysed variables

(a combination of nominal and cardinal variables). The interpretation of Pearson's correlation coefficient values adhered to the following scale: values between 0 – 0.1 indicate no or negligible relationship, 0.1 – 0.3 a weak relationship, 0.3 – 0.5 a moderate relationship, 0.5 – 0.7 a strong relationship, 0.7 – 0.9 a very strong relationship, and 0.9 – 1 a perfect relationship, signifying identical variables (Grønvik et al., 2016).

3 Results and Discussion

The research question (RQ1) deals with types of content on social media of educational institutions through a selected sample, more specifically identifying types of formats that most significantly influence user engagement levels. The data and frequency of content on social media by type are displayed in Table 1.

Table 1: Frequency table of social media content by type

	N - count	Sum	Minimum	Maximum	Mean	Standard deviation
Photo	102	7742	0	770	75,9	99,78
Video	95	1175	0	192	12,37	24,15
Links	91	326	0	34	3,58	5,74
Interactions	98					

Source: own processing, 2024

As displayed in Figure 1, the average values indicate that the most prevalent type of content is static visual content, which accounts for 75.9% (99.78), followed by video content at 12.37% (24.15), and text content with links at 3.58% (5.74).

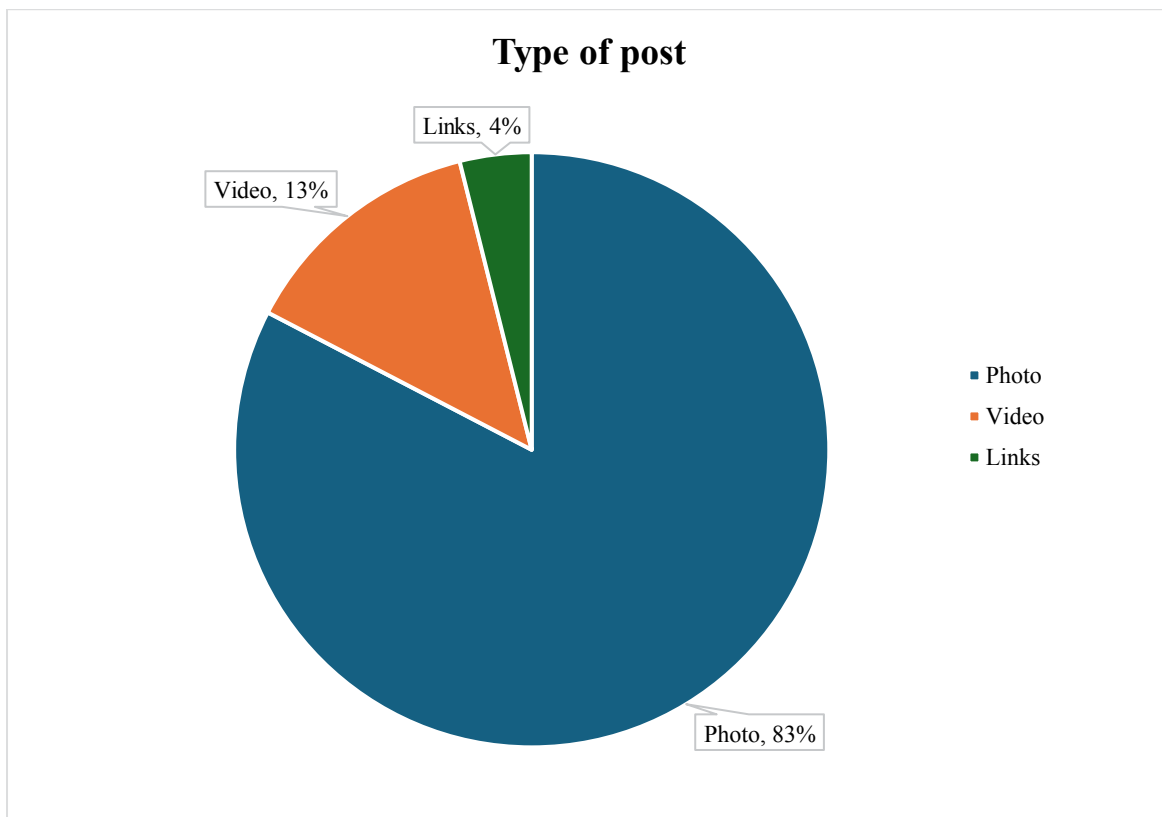


Figure 1: Relative values regarding social media post formats

Source: own processing, 2024

In testing hypothesis H1, the relationship between the frequency of static visual content occurrence and user engagement in posts was evaluated (Table 2).

Table 2: Correlation between post type – photo and total number of interactions

Correlations			
		Photo	Nr. Of interactions
Photo	Pearson correlation	1	0,598
	Significant (2-tailed)		<0,001
	N	101	98
Nr. Of interactions	Pearson correlation	0,598	1
	Significant (2-tailed)	<0,001	
	N	98	97

Source: own processing, 2024

The analysis using Pearson’s correlation between the number of “photo” posts and the total number of interactions resulted in a value of 0.598, indicating a moderately strong to strong positive relationship. The significance value ($p < 0.001$) shows that the correlation is statistically significant at a high level of reliability. Based on this, it can be stated that a higher number of posts with static visual content is likely associated with a higher number of user interactions. Based on the research results regarding the number of photo posts and interactions (where the correlation reached a value of 0.598 and the p-value was less than 0.001), the hypothesis that there is a positive relationship between the frequency of static visual content and engagement in posts was confirmed.

In testing hypothesis H2, the relationship between the frequency of dynamic visual content occurrence and user engagement in posts was analysed (Table 3).

Table 3: Correlation between post type – video and total number of interactions

Correlations			
		Video	Nr. Of interactions
Video	Pearson correlation	1	0,403
	Significant (2-tailed)		<0,001
	N	95	98
Nr. Of interactions	Pearson correlation	0,403	1
	Significant (2-tailed)	<0,001	
	N	98	93

Source: own processing, 2024

The data analysis conducted between the frequency of video content and the number of interactions yielded a value of $r = 0.403$, indicating a moderately strong positive relationship between these variables. The significance value ($p < 0.001$) shows signs that this relationship is statistically significant and unlikely to be the result of chance. The number of observations ($N = 95$ to $N = 98$) provides a sufficiently large sample size to demonstrate the reliability of these results. Hypothesis H2, stating that there is a positive relationship between the frequency of video content and engagement in posts, is confirmed.

Hypothesis H3 assumes the existence of a positive relationship between the frequency of text content enriched with hyperlinks and the level of user engagement in posts. The following figure provides data on the relationship between the variable representing the number of interactions on the Facebook and Instagram platforms and the variable indicating the number of posts with text content that also include hyperlinks (Table 4).

Table 4: Correlation between the number of textual contents with a link and engagement

Correlations			
		Links	Nr. Of interactions
Links	Pearson correlation	1	0,458
	Significant (2-tailed)		<0,001
	N	91	98
Nr. Of interactions	Pearson correlation	0,458	1
	Significant (2-tailed)	<0,001	
	N	98	89

Source: own processing, 2024

The results of the correlation analysis confirm that more frequent use of text content with hyperlinks is associated with a higher level of user engagement in posts. The correlation coefficient ($r = 0.458$) demonstrates that this relationship is moderately strong and positive. Therefore, the hypothesis is confirmed.

The aim of the research question (RQ2) is to identify which social media platforms are most used by kindergartens within the selected sample in Slovakia (Figure 2).

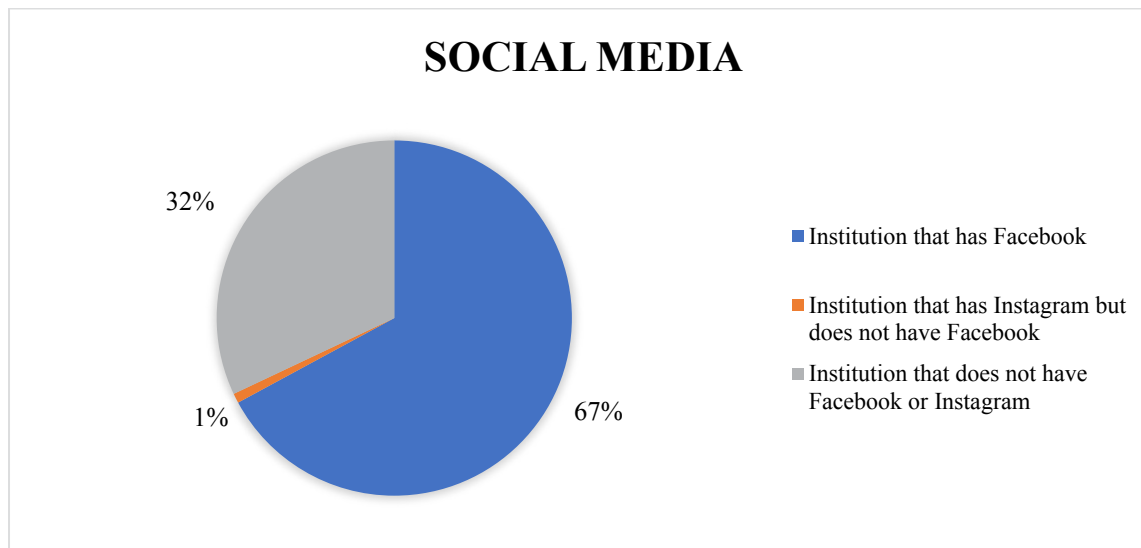


Figure 2: Comparison of the most frequent use of social media
Source: own processing, 2024

Regarding the second research question, the results indicate that kindergartens in Slovakia most frequently use the Facebook platform, while the Instagram platform is used by fewer institutions within the sample. These findings serve as evidence that Facebook is the dominant social platform among the selected sample of Slovak kindergartens. Given these circumstances, as the analysis shows that Facebook is the most widespread and frequently used tool for communication and interaction with the community, it can be concluded that the selected sample prefers this platform for sharing content and building relationships with parents and the wider public. These findings address the research question focused on identifying which social media platforms are most used by kindergartens in the selected sample in Slovakia and suggest that Facebook plays a key role in the digital communication of kindergartens within the sample chosen for this study.

The results of the study provide valuable insights into the relationship between the types of content on social media and user engagement in the case of kindergartens in Slovakia, based on the selected sample. The analysis demonstrated that there is a moderate to strong positive correlation between the frequency of static visual content and the number of interactions

($r = 0.598$; $p < 0.001$), suggesting that photographs are a key type of content to support engagement in posts. Similarly, the frequency of dynamic visual content shows a moderate positive relationship with the number of interactions ($r = 0.403$; $p < 0.001$), confirming its significance in digital communication. The data on text-based posts with hyperlinks revealed a moderate correlation ($r = 0.458$; $p < 0.001$), indicating the strong potential of such content in enhancing community engagement with posts. These findings suggest that both visual and text-based content play a significant role in building the digital presence of kindergartens. In terms of social media selection, the results indicate that, of the 228 kindergartens analysed, the majority 153 institutions (67.1%) – actively use Facebook. Instagram is used by 54 institutions (23.7%). The research also found that 101 kindergartens (44.3%) use only Facebook, while just two institutions (0.9%) use Instagram without Facebook. A total of 73 institutions (32%) do not use either platform. These findings confirm that Facebook is the dominant platform among the kindergartens in the sample, highlighting its role as a key tool for communication and interaction with the community. With the increasing use of artificial intelligence (AI) tools, kindergartens have greater opportunities to leverage these findings in practice. AI tools could assist in analysing the success of various types of content, predictive analysis of user engagement, and automated content strategy optimization. For example, AI tools could suggest the most effective content types based on historical data analysis, thereby enhancing communication effectiveness and fostering higher engagement from parents and the broader community. The analysis and findings of this research provide solutions for optimizing content and demonstrate the potential for further progress in the studied area through AI technologies.

4 Conclusion

The research on the use of social media by kindergartens in Slovakia revealed important correlations between the types of shared content and user engagement levels. The main findings were supported by correlation analysis, which confirmed that static visual content (photos) showed the strongest positive relationship with user engagement ($r = 0.598$; $p < 0.001$). Similarly, video content ($r = 0.403$; $p < 0.001$) and text posts with hyperlinks ($r = 0.458$; $p < 0.001$) also showed moderate positive correlations.

This data suggests that an effective content strategy should include a combination of different types of content, with an emphasis on visual appeal and relevant links. Regarding the most frequently used platforms in the analysed sample, Facebook emerged as the most used platform among the institutions, with 67.1% of kindergartens actively engaged on this platform. Instagram is used by a smaller proportion (23.7%), while 32% of kindergartens do not use any of the analysed platforms. These findings also highlight the fact that Facebook is the most preferred communication and interaction platform for Slovak kindergartens, based on the tested sample.

The research results show potential for the implementation of artificial intelligence (AI) tools. Through AI technology, historical data could be analysed to optimize content strategies. These tools offer the possibility of automatically selecting the most effective types of posts, which could subsequently increase user engagement from parents and the broader community. Based on the evaluation and subsequent analysis of the results, it is recommended that kindergartens optimize content by increasing the frequency of static visual content, while regularly including dynamic visual content and text formats with hyperlinks. Furthermore, it is advisable to continue using Facebook as the primary communication channel, but also to consider increasing activity on Instagram, as this could potentially reach a wider group of parents and the general public.

The use of AI tools for predicting and analysing content success may improve communication effectiveness and tailor strategies to the needs of specific target groups. The

findings from this study can serve as a basis for further research into the marketing communication of educational institutions concerning the monitoring of various types of content on platforms and their impact on building trust and loyalty within the community, as well as the use of AI tools in the broader context of the education sector.

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ETHICAL IMPLICATIONS OF AI-GENERATED POLITICAL REELS

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Abstract:

With social media now serving as one of the main platforms for political discourse, AI has become a powerful tool that enables content creators to produce engaging, emotionally charged media that may blur the lines between what is fact and fiction. This study explores the ethical implications of AI-generated political satire, specifically through the use of AI in creating political reels on Instagram. The research focuses on the profile *zltunke*, a satirical political account that leverages AI to create humorous political content. The study uses quantitative content analysis to assess the performance of AI-generated political content and its effects on follower growth and interaction. The results show that AI-generated posts accounted for 83% of the profile's content during the two-month research period, with a noticeable increase in follower growth and significant spikes in engagement linked to AI-generated content. While the results indicate the success of AI-generated satire, audience comments revealed minimal concern regarding the ethics of AI usage in political satire. This study highlights how generative AI can shape political communication, especially in terms of satire, by engaging users in a highly emotional and entertaining manner. It also raises critical ethical questions about the potential for disinformation, manipulation, and bias in AI-generated political content. While AI provides a valuable tool for content creators, the study suggests that a lack of social media literacy among users may lead to uncritical acceptance of AI-generated content, posing significant challenges for ethical standards in political communication.

Key words:

Content Marketing. Ethics in Marketing. Generative Artificial Intelligence. Instagram. Memes. Political Marketing. Social Networks.

1 Introduction

Currently, we can observe a rather long-lasting polarization in society, which is largely caused by the rise of technologies, especially social networks that guarantee people the rapid access to information, and sometimes even disinformation. Their current settings allow the creation of various opinion bubbles, which strengthen and reinforce users in forming increasingly extreme views (Rodilloso, 2024). Moreover, the algorithms of these social networks today operate on a principle aimed at maximizing interactions and the time users spend on individual platforms. Therefore, they primarily support content that evokes strong emotional reactions, often being anger or fear (Aïmeur et al., 2023). Disinformation, misinformation, and fake news are so effective on social networks because they exploit these types of strong emotions in combination with various narrative stories that users can identify with, overshadowing their rational thinking. Emotions also increase the likelihood that people will share such content with others, which then causes disinformation to spread faster. Additionally, this emotional impact can also reinforce biased opinions and create stronger resistance to facts that contradict them (Zhao et al., 2024). It is therefore the perfect combination of psychology and the functioning of technologies that makes disinformation and hoaxes such a successful weapon for shaping public opinion.

According to Vasist et al. (2024), politics is the area where disinformation and hate speech are most commonly created, with social media and online platforms playing a pivotal role in amplifying them to a larger audience. With the arrival of social media, political advertising has significantly changed. Political marketers quickly learned how to use dynamic

targeting that is essential in modern campaigns, which social networks make more accessible, than ever before. Politicians can precisely tailor messages (which may include manipulative information or context) to a specific target group, and sometimes even to a specific individual, to either confuse them, present themselves more favourably, or convince them of something that may not necessarily be based on factual truth (Křiška & Kováčik, 2024). This highly precise targeting, combined with the functioning of algorithms, helps create filter bubbles, where users with the same mindset and opinions are grouped together. Politicians aim to gradually penetrate, dominate, and expand these bubbles to the friend list of these users, who are also likely to be interested in the same content (Dahlgren, 2021). To penetrate these bubbles, politicians started to use stronger language in order to generate stronger feedback and create more powerful emotional response, all at the cost of pushing these bubbles with different ideologies and opinions further away from each other (Castanho Silva & Proksch, 2022). The result of this (among other factors) is a more divided and polarized society.

In the case of the Slovak Republic, authors today no longer speak of a polarized society but rather of a fragmented society, which is the result of long-term negative political campaigning and political, parliamentary, and party instability, as well as deep divides between different regions. These divisions are not only in terms of living standards and finances but also in access to education and a more open and free way of life (Lintner et al., 2023). In the last decade, political communication in Slovakia has, in some cases, shifted towards hate speech. This form of communication is directly used as a marketing tactic by some political entities, aiming to gain support by fostering hatred towards another opinion group (Steuer, 2024). This problem intensified during the Covid-19 pandemic, when the pandemic itself became a trigger for racist statements by politicians, as well as extremist behaviour directed towards doctors and medics who were saving lives of Slovak citizens. These behaviours reproduced by followers of certain parties and ideologies were fuelled by various internet personalities and, in some cases, even directly by politicians from certain political parties (Piatkowska & Whittington, 2024). For a long time in Slovakia, immigrants, Roma people, refugees, and, according to the European Commission, Jews and Muslims have been target groups for hate speech (Papcunová et al., 2023). With all of that in mind, this is not a problem specific to Slovakia, and even within that society, there are groups that are inclusive and tolerant of other cultures.

As a result of deep divisions, many internet creators, pages and websites find opportunities in creating content that combats these negative emotions with humour and light-heartedness. Humour is a common element in the marketing communication strategies of businesses for the same reason that fear, and anger are used in political marketing – because humour and laughter are also strongly emotionally charged. Through humour, narratives can be built more easily, allowing the subject using it to be better associated with certain traits and characteristics (Zaki et al., 2020). Researchers also describe humour as a coping mechanism for people, helping them deal more easily with difficulties and negative emotions (Lenggogeni et al., 2021; Chirig et al., 2024). In the context of this study, humour is therefore utilized in social media marketing of certain profiles to combat the divisiveness and hateful rhetoric by politicians with the main goal being making fun of these politicians, so their messages are not as impactful as they hoped to be.

One of the ways these profiles utilize humour is by creating political memes. Memes represent a diverse group of digital items that share a common characteristic in defining their content and form, created for the purpose of spreading on the internet by users. We refer to political memes when they address social interests, political actors, or political decisions. The most commonly used form of memes is typically static images accompanied by a verbal message, often recontextualizing well-known images from pop culture, everyday life, or politics into a different light (Johann, 2022). Memes are nowadays rapidly disseminated

thanks to their viral nature and have emerged as one of the most successful forms of communication in social media. They are also multimodal, which means they combine text, images or even videos and other elements (Balan et al., 2023). In recent years, a trend can be observed when creators not only create static memes, but also short videos, commonly known as reels.

Short videos have been identified as the fastest-growing content format on social media (Avlonitou & Papadaki, 2024). Short videos on Instagram (Reels) and on the social media platform TikTok are designed as engaging videos aimed at capturing and maintaining attention, with the primary mechanism being a personalized feed that prioritizes content similar to what the user has previously viewed, thereby reinforcing their bubble and existing worldview. Additionally, these short videos are easy to create, cost-effective, and addictive for users. However, these videos are also frequently used today to share political information and hate speech (Molem et al., 2024). In this context, even humour can be a double-edged blade (Haidău, 2023). Humorous content can be utilized to hide disinformation and manipulation planted by political actors in order to penetrate certain groups that are not the target voters, but rather to sow doubt and discourage the group with opposing views (Al-Rawi, 2021). The main reason why political actors that utilize divisive rhetoric do this, is to weaken humour and political satire, since it has been proven to be the most successful counterattack to hate speech in public discourse (Boukes & Hameleers, 2023). A completely new dimension is the accessibility of artificial intelligence (AI) technologies to the masses. Content creators can thus automate various processes in the creation of these videos in order to speed up the process and deliver much more content in a shorter period of time.

Generative AI is undoubtedly a major trend today, especially due to its accessibility in consumer adoption and the value it brings to companies, whether they are startups or large corporations (Weisz et al., 2024). As the name implies, generative AI is capable of producing new content based on the data it has learned through machine and deep learning (Kalota, 2024). It allows to create realistic and novel data, which can be utilized in business, entertainment, healthcare, finance, etc. Through a prompt, it is possible to generate images, text, music compositions and chatbots, to name a few (Bandi et al., 2023). In the marketing industry, one of the most common uses can be found in the content creation, especially in the ability to create advertisements with the data and parameters provided by humans, which can depict unreal, but very convincing reality (Fui-Hoon Nah et al., 2023). There are already dozens of models that allow for creation of different types of content. Regarding the topic of this article, it is important to mention, that when it comes to memes and reels, models like ChatGPT (for text generation), DALL-E 2 (for image and video generation) and VALL-E (x-to-music or speech generation) are utilized, to create completely new reels, depending on the needs of the creator (Feuerriegel et al., 2024). Therefore, it has become extremely easy to create reels and memes of politicians saying things, that they have never said in reality, or putting them in environments, that are unnatural, or even doing things, that they wouldn't normally do.

With that in mind, there are some serious ethical implications regarding the use of generative AI, especially in the context of political communication. AI is a powerful tool that allows for politicians to skew and shape information and behaviour based on actions, that they haven't committed, or words that they have never said. Also, it allows to generate completely new political content that can be divisive, and it also allows chat models to communicate with voters based on the information given by political marketers instead of the candidates themselves (Jungherr & Schroeder, 2023). Researchers have significantly focused on the ethics of using AI in the past two years (Ulnicane & Erkkilä, 2023). Peters (2022) points out that in some cases, AI has bias against certain types of political information. This can

contribute to further diminish trust in political communication, spread of misinformation and manipulation of voter behaviour. All of this then further contributes to polarization.

With artificial content being so close to reality, social media platforms started to implement AI disclosures to content, that either the creators themselves brand as artificial content, or that the social media platforms themselves suspect of being (Raj et al., 2023). This disclosure works relatively similar to advertising disclosure, where a small textual bubble appears in either the upper, or the lower part of the said content, depending on the format (Sesar et al., 2022). However, the usefulness and effectivity of these disclosures can be a subject of discussion, since one needs to have a certain level of media literacy to identify this type of content.

Media literacy can be described as anyone's ability to access, identify, analyse, evaluate and create media in various forms, it also guides individuals to critically engage with all types of media content and understand how it influences them with underlying messages and motives (Wuyckens et al., 2022). In the case of Slovakia, according to Lessenski (2022) from the Media Literacy Index measurement, Slovakia ranks 23rd, with the results showing that Slovaks are somewhat vulnerable to disinformation compared to others, being slightly below average compared to other European countries.

2 Methodology

The aim of this paper is to identify the impacts of generative AI on the content and success of a selected satirical political profile on Instagram through content analysis and measurable indicators.

As the subject of our study, we selected the profile *zltunke*, whose content consists of various posts focused on the political situation in Slovakia (*zltunke_*, n.d.). The appropriateness of this profile is also supported by a media report on the Refresher portal, in which the author of the Instagram profile was asked about the ethical aspect, with the author himself admitting that his creations truly walk the fine line of ethics (Gašper, 2024). Our chosen profile combines relevance to current political discourse in Slovakia with an engaging approach that appeals to its audience. The profile's content sparks public discourse, sometimes touching on ethical boundaries, as acknowledged by the creator, which adds depth to the analysis of how audiences perceive AI-generated satire and its ethical implications.

In our research, we chose to work with quantitative metrics related to interactions on the profile, as well as tracking follower growth over a two-month period. The timeframe was set from August 10 to October 10, aimed at capturing recent political events in Slovakia and the period when active political communication resumed after the summer break.

To explore the impacts of generative AI on both the content and success of the selected satirical political profile, we formulated the following research questions:

RQ₁: Did the profile *zltunke* experience follower growth even during periods of passive political communication? And if so, how much of the profile content was AI-generated during that period?

RQ₂: How (if at all) do Instagram users engage with and respond to AI-generated political reels compared to traditional content and to what extent does the profile's use of AI impact the ethical perceptions of followers, based on interaction data from comments?

The first question (RQ₁) investigates whether the profile maintained or increased its follower growth during periods of passive political communication, providing insight into its ability to sustain interest even when political activity slows. It also aims to determine the extent of AI generated content during this period, shedding light on AI's role in content creation. The second question (RQ₂) compares user engagement with AI-generated political

reels to traditional content, exploring any differences in audience response. It also examines the ethical perceptions of followers, analysing how the use of AI in political satire might influence the way content is perceived, particularly through interactions in the comments.

To collect and analyse data from the chosen Instagram profile, we utilized the Zoomsphere analytics tool. Zoomsphere offers a comprehensive suite of features for content scheduling, monitoring, and reporting, enabling to assess metrics such as engagement, reach, and follower growth. By providing in-depth insights into these performance indicators, Zoomsphere allows for a more informed understanding of how content is performing and how audience interactions evolve over a period of time (Zoomsphere, n.d.). This made it an ideal tool for tracking the profile’s activity and analysing its overall success.

3 Results and Discussion

During the study period, the profile zltunke posted a total of 24 posts on its Instagram profile (excluding stories), of which 23 were reels, and one was an image post. Given the set aims, we will focus more closely only on the reels.

Out of the 23 reels, 18 addressed current political events, and their content can be divided into three main categories. The first type featured reels in which a politician’s voice was synthesized using AI, where the politician spoke fictional words intended to entertain. The second type was a purposefully edited video in which the rearranged sequence of words altered the original meaning of what the politician was saying. The third type combined both approaches but served as an advertisement for the profile’s own products (clothing) with the aim of boosting sales and awareness.

A total of 20 reels on the profile during researched period were created using AI, making up as much as 83% of the total content on the profile, including other post formats as well. This proves, that AI plays a crucial role in this context as it drives the majority of the profile’s content. This reliance on AI not only shapes the content’s tone and appeal but also enhances the profile’s reach and effectiveness in engaging its audience.

During the researched period, the profile zltunke achieved a comparable growth in followers to previous months (+8.52%), indicating a steady upward trend regardless of the current political situation (or political activity). By the end of the study period, the profile had a total of 36,431 followers. This also points to effectiveness of AI content that substitutes the original content that content creators simply had to wait for to happen, rather than creating them themselves.

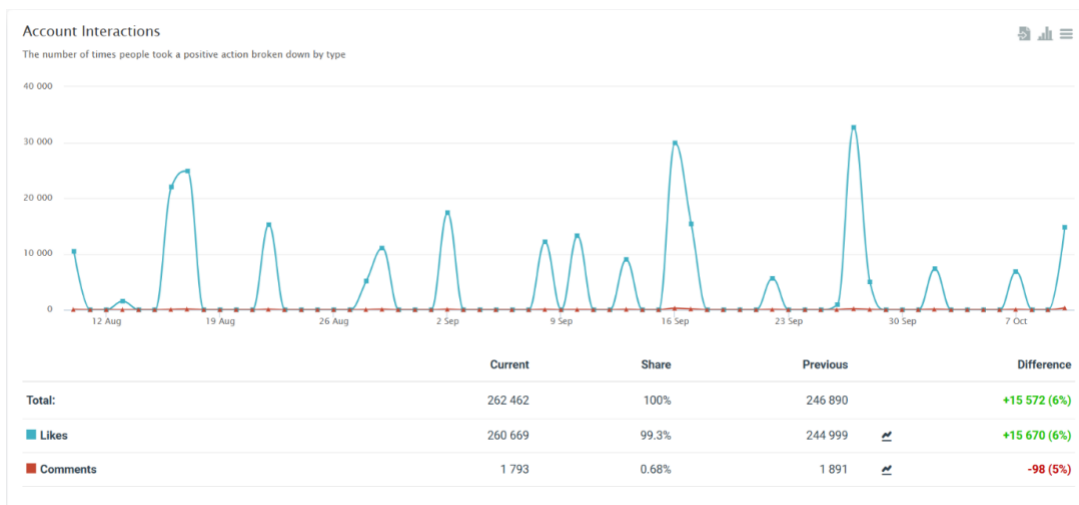


Figure 1: Account interactions
Source: Zoomsphere (2024)

During the study period, the profile saw three significant spikes in engagement, each tied to AI-generated content focused on current political events in Slovakia. The highest spike was driven by a post satirizing the ejection of a member of the Slovak National Council, where the original comments about alleged procedural violations were replaced with AI-generated dialogue and music, humorously depicting the member as playing songs at the podium (zltunke_, 2024a). The second post parodied President Peter Pellegrini, implying he only began his duties during the flood crisis (zltunke_, 2024b). The third post featured political satire on statements by MP Andrej Danko and a reaction by President Pellegrini in a political talk show, with the original dialogue once again replaced by a humorous, AI-generated exchange (zltunke_, 2024c). These spikes indicate that the profile's use of AI-generated content, particularly in the form of political satire, has a strong impact on audience engagement. This once again highlights the potential of AI to create engaging, attention-grabbing content that drives higher levels of engagement, while also demonstrating the growing appeal of satirical, politically themed content on social media. All interactions over the studied period of time are showcased in Figure 1.

As we mentioned in the previous text, the highest engagement was achieved by the AI post directly related to the interaction between two members of parliament in the chamber during a session. Out of 176 comments, none, according to our manual evaluation, were negative regarding the use of AI itself. None of the commenters expressed any negative stance on the ethics of such AI usage. On the contrary, the comments were overwhelmingly positive, with commenters primarily expressing that the post entertained them greatly and thus fulfilled its purpose (zltunke_, 2024a, 2024b, 2024c). This indicates that, in this particular case, AI can be successfully used to entertain and engage an audience without causing concerns about its ethical use. However, if the audience is not aware of the ethical implications of AI usage, they might not be able to critically evaluate whether its application is ethical or not. In this case, the positive response could reflect a lack of awareness about the potential ethical concerns surrounding AI, rather than a clear endorsement of the technology's ethical use. It's also possible that, because the content was humorous and aimed at politicians, the ethical aspects were overshadowed by the entertainment value. However, without a critical understanding of AI's ethical considerations, followers may not recognize or question the potential issues related to the use of AI.

For comparison, the most successful post that was not created using AI had 14,784 likes (a decrease of 45.2% compared to the AI post) and 324 comments (an increase of 84% compared to the AI post). This post featured a video of an influencer playing music on a mixing console, but the sound in the video was replaced with different music. It was also a satirical post, as it featured a remixed version of the national anthem and Slovak songs (zltunke_, 2024d). The success of this post in terms of engagement is more evident through comments than likes. However, it's important to note that a significant number of comments were critical of the content, as many found it disrespectful toward one of the national symbols. Based on the observations, it can be concluded that followers are much more sensitive to the desecration of national symbols than to the satire involving politicians representing the state (or legislative and executive powers).

When it comes to overall comparison, even though there are significantly more posts made with AI, if we evaluate the engagement per post, it is clear that AI posts create a lot more excitement for interaction, rather than traditional posts. This can also be explained through the nature of the content itself. These AI posts are mainly used against specific politicians, to make fun of them and what they do. Therefore, if the followers of this profile are of opposing parties, they are likely more inclined to support the creator behind this profile.

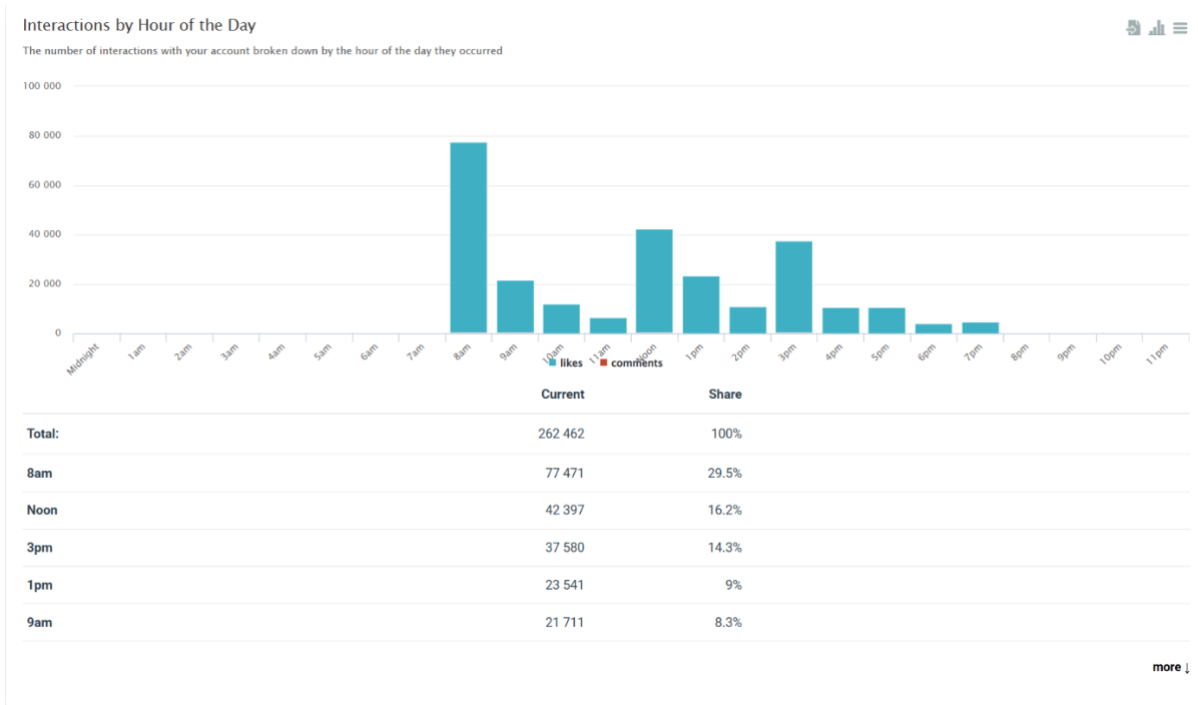


Figure 2: Interactions by hour of the day
Source: Zoomsphere (2024)

If we take a closer look at the interactions in Figure 2, it is evident that the most engagement is occurring in the morning at 8 AM, at noon and after 3 PM. These times could coincide with common daily routines and peak activity periods. At 8 AM, people are beginning their day and often check social media while preparing for work or school. Noon aligns with lunch breaks, a time when individuals have some downtime and are more likely to engage with content. After 3 PM, as people wind down from their work or school day, social media serves as a way to relax or unwind, leading to increased interaction.

The profile *zltunke*, in collaboration with the profiles *rukahore* and *merch_sk*, used AI to promote their own clothing with the aim of increasing sales. The post achieved a total of 3,228 likes and 20 comments, with 100% of the comments being positive. In this post, they used AI to modify a statement from the Minister of Finance, in which he mentioned that books are only purchased by wealthier classes. Using AI, they added the message that everyone can afford the t-shirts from this profile (*rukahore et al., 2024*). This indicates that the use of AI in content creation can effectively engage the audience while promoting a product. The overwhelmingly positive feedback suggests that AI-generated content can resonate with followers and increase their interest in the promoted items. However, using the Minister of Finance, or any active-duty politician, as a promoter for a product raises significant ethical concerns. Under law, politicians in active service are prohibited from endorsing commercial products to maintain impartiality and avoid conflicts of interest (*Zákon č. 264/2022 Z. z. o mediálních službách, 2022*). By modifying the Minister’s statement through AI to promote a product, the post blurs the line between political speech and commercial advertising, potentially misleading the audience into believing the politician endorses the product.

Nevertheless, all posts that used AI were properly labelled by the author with the designated tag. However, it is important to note that not everyone may necessarily notice the tag, and not everyone has the same ability to distinguish and recognize such content on social media.

4 Conclusion

This study underscores the growing influence of generative AI in political satire, particularly in shaping public engagement on platforms like Instagram. The analysis of the profile zltunke reveals that AI content, especially in satirical formats, boosts audience interaction and follower growth, yet it poses ethical dilemmas that merit further exploration. While AI-generated satire resonates with users and can combat divisive political rhetoric, it also blurs lines between entertainment and factual discourse, raising concerns about misinformation and manipulation.

The findings of this study show, that AI content on zltunke drove significant follower growth and high levels of engagement, indicating that AI-driven satire can captivate audiences even during periods of reduced political activity. This suggests that AI content is a valuable tool for maintaining and growing social media audiences, regardless of external political events. Also, audiences responded more actively to AI-generated satirical reels compared to traditional content. The AI-driven posts attracted more likes and comments.

However, audience comments revealed minimal concern regarding the ethical use of AI, with most responses focused on the humour and entertainment value of the content rather than on any potential ethical implications. The results of the study imply that without sufficient media literacy, audiences may be at risk of uncritically accepting AI-generated content as authentic or trustworthy.

The author of study also acknowledges certain limitations. First, it focused on a single Instagram profile, zltunke, limiting insight into how AI-generated satire might perform across other platforms or cultural contexts. Additionally, analysing only one type of audience (followers of a satire account) may not reflect broader public responses, particularly across different demographics and these results are therefore not applicable to the general public. These factors suggest the need for broader and more long-term studies that incorporate diverse audiences and media literacy levels to better understand AI-driven political satire's impact.

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AGGRESSIVE LANGUAGE AS A TOOL TO INCREASE POPULARITY ON SOCIAL MEDIA

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Abstract:

With the beginning of the third phase of the internet and its impact on the way information is disseminated and the dynamics of social media, the way politicians communicate with the public has changed. While in the past electronic media played an important role in such communication, today for some politicians are social media enough. Nowadays, social media do not only serve to bring communities together, but also to create and support opinion bubbles or to spread political messages that largely polarise society. Artificial intelligence plays a crucial role in shaping these algorithms that govern social media platforms, determining what content is shown to users and how it is prioritized. These AI-driven algorithms often amplify emotionally charged or polarizing content, as such posts tend to drive higher engagement, including likes, comments, and shares. The aim of this case study is to investigate whether the presence of aggressive language in the Facebook posts of the most popular Slovak politicians increases their reach through an increased number of interactions on specific posts.

Key words:

Aggressive Language. AI. Algorithm. Facebook. Sentiment. Social Media. Web 3.0.

1 Social Media as a Tool for Spreading Information

Over the past few years, social media has become an essential part of everyday life for ordinary people. Initially, they were a place where users spent their free time or functioned as a platform to keep in touch with family and friends. Over time, however, they have also become an information resource for a large number of users. According to a report by the Reuters Institute for the Study of Journalism, 48% of Slovaks use social media as a source of information (Chlebcová Hečková & Smith, 2024). However, this is a decrease compared to previous reports. In 2017 and 2022, 58% of Slovaks drew information from social media.

Since the Web 2.0 phase, i.e. since the beginning of social media in the online space, these platforms have changed significantly. The ability to create and publish a wide variety of content has become highly exploited by internet users. So much so that the Internet itself has entered its third phase, in which algorithms started to play a major role. The original, admittedly noble idea of helping to sort content in the extremely crowded social media had a business side. As Višňovský et al. (2022) say, Web 3.0 is related to the commercialization of various online contents and services. Not only social media, but also, for example, Internet search engines were flooded with various forms of commercial communication that had the ambition to personalize their content to make it more attractive to potential clients. While most social media sites do not require a fee to register or use, the attention of their users is a commodity that social media then sells to advertisers, along with data on user behaviour that helps to refine and better target advertising content.

Facebook continues to dominate social media in Slovakia (Chlebcová Hečková & Smith, 2024). Although the potential advertising reach is greater on YouTube, Facebook still retains a high popularity among Slovak users. This reality is not changed by the fact that the number of Slovak Facebook users decreased by 100,000 between January 2023 and January

2024 (Kemp, 2024). This may be related to the content that dominates on this platform¹, or the fact that the global pandemic has receded, and users are no longer reliant on virtual contact alone. In any case, we can conclude that political topics and politicians in general are thriving on Facebook (at least on the “Slovak” one). On the contrary, on Instagram, political topics are almost non-existent among the most popular posts (Struhárik, 2024). Abroad, political topics also thrive on platform X (formerly Twitter), as most politicians communicate their messages primarily on this social media platform. In Slovakia, the former Twitter never gained such prestige. Most Slovak politicians communicate on Facebook as a priority. Not only through text statements, promotional photos or broadcast press conferences, but also through audiovisual content, which nowadays seems to be one of the most popular forms of communication within social media in general. This mode of communication has also influenced the functioning of the electronic or online media, which obtain comments and statements of politicians on Facebook. For example, radio editor is no longer forced to travel to a press conference of a political party or an individual, as he is able to get the audio content from Facebook. On the other hand, politicians are no longer intrinsically dependent on presenting themselves in traditional media. It is enough that they are active on social media, where they have no opinionated opponent or critical voice. Other parliamentary elections in Slovakia are proof of this (Struhárik, 2024).

The third phase of the Internet, also known as Web 3.0, has brought a change in the consumption of content, particularly on social media. The algorithms evaluating the content we interact with have changed over the years. However, they still fail to eliminate the opinion bubbles that are the biggest negative for Web 3.0. According to a study by R. Levy, “social media can increase polarization and raises concern since affective polarization may decrease trust in government and the accountability of elected officials” (2021, p. 31). Social media algorithms offer users those posts which have more interactions. At the same time, posts that evoke stronger emotions in users have the potential to have more interactions and, consequently, greater reach. Misinformation and especially hoaxes on social medias operate on a similar principle (Višňovský et al., 2022). In this case, Facebook’s algorithms function similarly to tabloid media. Sensationalism and an emphasis on emotions, especially negative ones, are given priority over posts with neutral or positive sentiments.

Social media are using artificial intelligence to personalise their content as a priority, which is related to the crowded online environment, but also to better target not only regular social media posts, but also advertising content. Social networking algorithms use artificial intelligence to analyse user behaviour. Based on this, machine learning tries to predict what content will be most relevant and engaging for a given user. Social media also uses AI to recommend new connections (or, for example, friend suggestions on Facebook or videos on YouTube). Artificial intelligence also plays an important role in identifying content that violates community norms, especially in the context of social media belonging to Meta Platforms group. Priority is given to detecting hateful content.

Successful Slovak politicians on Facebook share similar ideological orientation (more conservative than liberal), communicated content and also affiliation to the current coalition. Ideologically similar content is communicated by 16 of the 20 most successful politicians. 10 of them belong to the current coalition of Smer, SNS and Hlas. The remaining 6 belong to the extra-parliamentary parties Republika (5) and ĽSNS (1). For the remaining 4 it is President Z. Čaputová, M. Šimečka (PS) and J. Naď and E. Heger (Democrats), who can be described as centrist or more liberal. Looking at the most popular politicians on Instagram, the situation changes significantly. Among the most popular politicians are centrist and more liberal politicians. These are 13 of the top 15 (Struhárik, 2024).

¹ Author’s note: The most popular posts on “Slovak Facebook” include 44% of political content (Struhárik, 2024).

2 Methodology

The present text is a case study in which we verify, through a quantitative content analysis of specific profiles of Slovak politicians, whether the presence of aggressive language increases the number of reactions and, consequently, the impact of the posts themselves, which ultimately increases the popularity of the profiles of specific politicians. The aim of the study is to determine whether the presence of aggressive language increases the popularity of Facebook posts. The sub-objectives also include identifying the impact of sentiment and intensity of aggressive language on the popularity of these contents.

For this case study, we select two profiles of the most successful Slovak politicians on Facebook. These are the profiles of R. Fico, the chairman of the Smer party, and M. Uhrík, the chairman of the Republika party. These politicians achieved the most interactions among Slovak politicians on Facebook in 2023. R. Fico reached 6,931,000 interactions, M. Uhrík 3,645,000 interactions (Struhárik, 2024).

In the analysis itself, we note all Facebook posts for the month of October 2024² and we investigate whether the increased presence of aggressive and emotional expressions increases the popularity of posts, where we measure the popularity rate by the number of interactions per post. We obtain the total number of interactions of a post by summing the number of reactions, comments, and shares of posts on Facebook. After obtaining data from all posts published in a given month, we calculate the average value of interactions per post (median), so that we can then identify posts that can be labeled as more successful. We analyze all posts to identify sentiment and then verify the presence of aggressive language and its intensity in the content in question. We perform the actual analysis on the texts, omitting audiovisual contents from the analysis due to their length (some of them are as long as 30 minutes).

In sentiment analysis we work with three categories:

- Negative sentiment – includes emotional expression in the form of anger, frustration, sadness or disappointment. Posts contain criticism, sarcasm, irony or blame. Include strong words, capitalization or exclamation points. In terms of content, they are preferably focused on disagreement with topics or persons.
- Neutral sentiment – this is objective reporting. Posts avoid emotionally charged words, provide descriptions of events, announcements, etc.
- Positive Sentiment – posts have an optimistic tone, expressing gratitude, joy, contentment or support. They use words with a positive charge, include encouragement, compliments or celebration of achievements.

In the analysis, we also identify the presence of aggressive language and its intensity. This can take the following forms:

- **High** – posts have a strong negative emotional charge, expressing anger, contempt or hostility. They contain direct insults, name-calling or calls for aggression. They use exaggeration, capital letters, exclamation marks. They target specific persons, groups or institutions to discredit them.
- **Medium** – they use criticism, but without extreme insults or name-calling. Language is harsh but respects basic ethics of communication. Focused on the issue or disagreement.
- **Low** – posts and the emotions they arouse are more subtle, not a direct attack. They use phrases that don't arouse discontent but are not extremely offensive. Language can be mildly ironic, does not cross the boundaries of hurtful language.

² Author's note: We omit reshared content to which users have not added any textual or other content (e.g., in the form of a comment).

To refine the results and to better define the objectives of this study, we formulate research questions that will help us to interpret the data appropriately:

RQ1: Is there a correlation between posts with negative sentiment and an increase in the number of interactions on Facebook?

RQ2: Does the presence of aggressive language in Facebook contents affect their popularity in terms of higher number of interactions?

RQ3: Does the intensity of aggressive language affect the popularity of Facebook content?

Following the research questions, we also formulate hypotheses that predict research outcomes based on theoretical assumptions:

H1: We hypothesize that content with positive or neutral sentiment will exhibit lower interaction rates than content with negative sentiment.

H2: We hypothesize that contents with aggressive language show higher interaction rates than contents without aggressive language.

H3: We suggest that contents in which aggressive language is present in high intensity are more successful than contents in which aggressive language is present in low or medium intensity.

3 Results

In the present study, we analyse all posts for the month of October 2024 from the above-mentioned Slovak politicians on the social media Facebook. In the case of R. Fico there are 23 posts and in the case of M. Uhrík there are 42 posts. We label successful and popular posts based on the value we calculate as the median of all reactions to all analyzed posts of a particular profile under study. In the case of R. Fico, we consider as successful those that received more than 10,957 interactions. For the analysis of M. Uhrík’s posts, we consider as successful those that received more than 1,909 interactions. In Table 1 we present the obtained data.

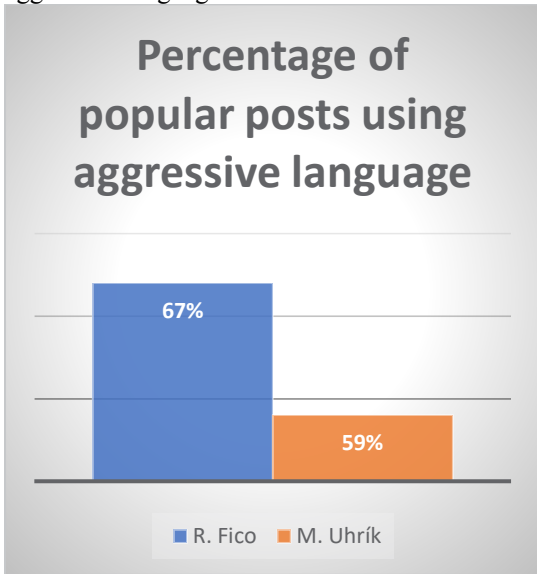
Table 1: Research results

	R. Fico	M. Uhrík
All posts	23	42
Positive sentiment	9	6
Neutral sentiment	5	1
Negative sentiment	8	20
Aggressive language	9	27
High intensity	2	6
Medium intensity	4	15
Low intensity	3	6

Source: own processing, 2024

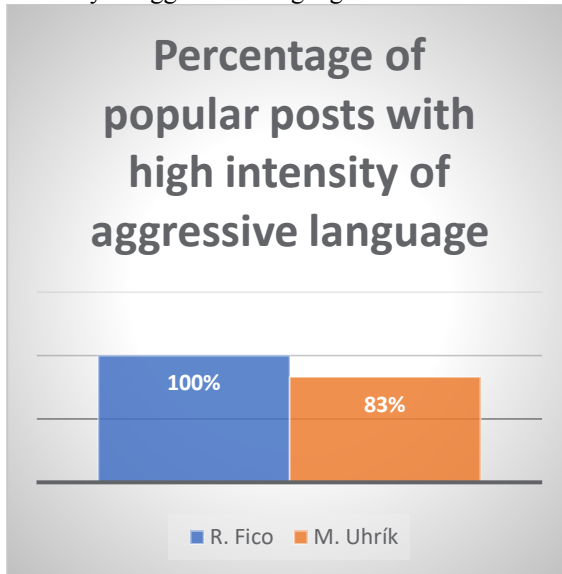
We first divide the contributions by sentiment into positive, neutral, and negative, and the use of sentiment differs across the two profiles examined. We then indicate the number of posts in which aggressive language occurs. We also divide these posts, according to their intensity, into high, medium and low. In both cases, medium intensity dominates the use of aggressive language in the examined posts.

Table 2: Percentage of popular posts using aggressive language



Source: own processing, 2024

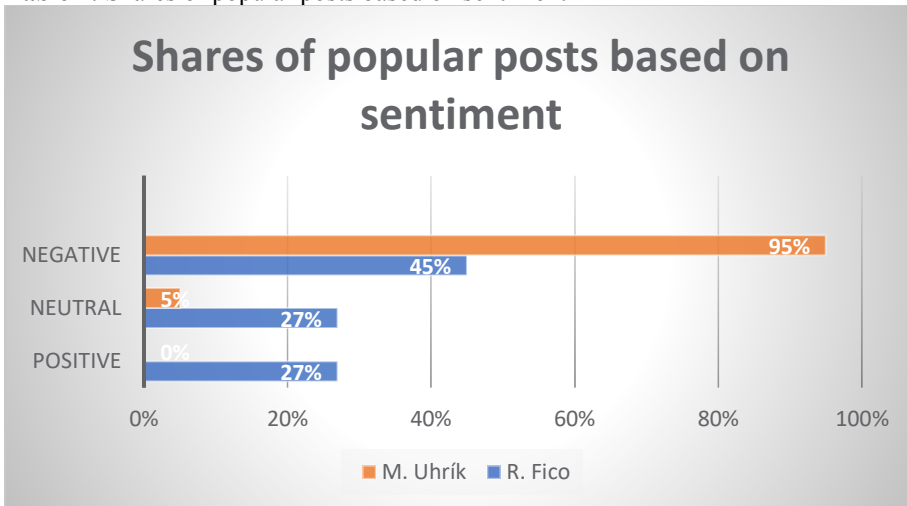
Table 3: Percentage of popular posts with high intensity of aggressive language



Source: own processing, 2024

When we analyze the popular posts in both samples studied, we find that those in which we identified the presence of aggressive language in any intensity (low, medium or high) dominate. On R. Fico’s profile, this is 67% of the most popular posts where aggressive language is present. In the case of M. Uhrík, the popularity of posts where we identified aggressive language is 59%. When selecting posts with high intensity of aggressive language, we found that these are the most popular type of posts. In both cases, practically every such post is among the most successful content examined (with the exception of 1 post by M. Uhrík³). Additionally, posts with aggressive language in high intensity show to be among the most popular of all the examined posts in the analysis.

Table 4: Shares of popular posts based on sentiment



Source: own processing, 2024

³ Author’s note: There is high intensity aggressive language present in this post, but it is re-shared content from another author. We identified all the re-shared posts as less popular during the analysis. We suggest that the failure of this post was due to the type of content – reshared.

In terms of the use of sentiment, the popular posts analysed are dominated by those that use negative sentiment. In the case of M. Uhrík, we identify 95% of the popular posts as having negative sentiment. On the same profile, we also identify 5% of posts with neutral sentiment and no posts with positive sentiment. Conversely, posts with positive sentiment on this profile show the lowest interaction counts.

Among the most popular posts by R. Fico, we identify 45% of content with negative sentiment and 27% of content with neutral or positive sentiment.

The first 5 most popular contents we analyze on R. Fico's profile are exclusively textual in nature, in one case this post is accompanied by a photo. On the other hand, on M. Uhrík's profile, the 5 most popular contents for the period under study are audiovisual. This type is the most used on both profiles under study. Of all the published content, audiovisual content accounts for 65% (R. Fico) and 66% (M. Uhrík) of the posts.

4 Discussion

In the present study, we analyze a total of 65 posts on the social media site Facebook. These were published by two users whom we identified as the most popular Slovak politicians on Facebook based on their interactions over the past year. In this section of the text, we answer the above research questions and evaluate the previously formulated hypotheses.

RQ1: Is there a correlation between posts with negative sentiment and an increase in the number of interactions on the Facebook platform?

Absolutely yes. Based on the analysis, it was found that the most popular posts we examined were dominated by those with negative sentiment. In the case of M. Uhrík, it was 95% of such posts, in the case of R. Fico it was 45% of content with a negative sentiment.

H1: We predict that contents with positive or neutral sentiment show lower interaction rates than contents with negative sentiment.

We confirm this hypothesis. Among popular posts, contents with positive or neutral sentiment appeared at a reduced rate. In the case of M. Uhrík, none of the content with positive sentiment appeared among the popular posts, and 5% of the content with neutral sentiment appeared among the popular posts. On R. Fico's profile, we identified 27% with positive and 27% with neutral sentiment among the most popular posts.

RQ2: Does the presence of aggressive language in Facebook content affect its popularity in terms of more interactions?

Yes, it does. The presence of aggressive language increases the likelihood that a given post will be successful. The data above showed that 67% of the most popular posts by R. Fico were content showing the presence of aggressive language. For M. Uhrík we observed such contents in 59%.

H2: We hypothesize that contents in which aggressive language is present show higher interaction rates than contents without aggressive language.

We also confirm the second hypothesis. The presence of aggressive language increases the likelihood of success for a given post. The intensity of aggressive language also matters.

RQ3: Does the intensity of aggressive language affect the popularity of Facebook content?

Yes, it does, and in a directly proportional way. As the intensity of aggressive language increases, the likelihood of success of that content increases.

H3: We believe that content that contains high intensity aggressive language is more successful than content that contains low or medium intensity aggressive language.

We also confirm the last hypothesis. All posts by R. Fico in which aggressive language is present in high intensity were among the most popular contents during the month under study. M. Uhrík had such posts in 83%, in one case it was content that was taken from another Facebook profile, which might have caused the lower interaction rate.

5 Conclusion

We consider the main limitations of the present study to be the limited possibilities of audiovisual content analysis. These were omitted from the analysis itself (some of the video contents were 30-minute press talks). Although the average Facebook user is unlikely to view all such content, at least the introductory part may influence the willingness to interact with such content. Various other factors, such as co-authorship or collaboration in the creation of social media content or sharing of other users' content, may also influence the data obtained. We also emphasize that this is a case study and for better results and to be able to generalize the obtained data, it is necessary to study this issue regularly and repeatedly, possibly with a higher amount of research material. Within the sentiment analysis, it is also possible to investigate other contents, for example the reactions of the receivers of these messages through sentiment analysis of the comments.

The present paper is about social media algorithms and how AI through these algorithms promotes opinion bubbles, or aggressive expression and negative sentiment promotes the popularity of political content on social media.

We also note that the current algorithm setup on Facebook directly supports the intentional use of negative sentiment and aggressive language (especially in high intensity) to increase popularity and organic reach within the social media under study.

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ADAPTING EDUCATION FOR DIGITAL NATIVES: UNDERSTANDING THE NEEDS OF STUDENTS OF HUMANITIES AND TECHNICAL DISCIPLINES

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Abstract:

Amid the accelerating advancements in information technology, robotics, and artificial intelligence, educators are exploring ways to integrate these advancements into their teaching methods. The new generation of students, often referred to as digital natives, arrives at universities expecting education to be more in tune with the latest digital trends. Previous studies focused on technology adoption among university students have shown that Generation Z favors a hybrid teaching approach that blends traditional and digital methods. This paper aims to explore the differing needs of university students whose specializations are in the fields of humanities and those who specialize in technical fields when it comes to balancing these teaching methods. Data for this research was collected through an online questionnaire completed by undergraduate students from universities with differing orientations. The findings revealed similarities as well as differences in responses of the two groups of students. Based on these the authors offer changes to teaching strategies that can be adapted to better meet the needs of these Gen Z students.

Key words:

Digital. Education. Generation Z. Humanities. Hybridization. STEM. Teaching Methods.

1 Introduction

In recent years, the rapid digitalization of our society has significantly influenced the methodology of learning and teaching in all sections of education. Blended learning is the attempt to bridge the gap between the traditional and the tech-savvy, between face-to-face classroom methods and digital learning activities. With goals of maximizing the benefits of personal interaction, collaboration and engagement in the physical classroom, blended learning enables the integration of e-learning in existing strategies or in the promotion of new ones, thereby tailoring the needs of the individual student (Condie & Livingston, 2007). The combination of digital technology, electronic content and instructional strategies is used to enhance teaching and learning activities (Nalini et al., 2019). These technologies can include computer-based learning, web-based learning, virtual classrooms and digital collaboration (Keengwe & Kidd, 2010). The potential advantages of digital learning are obvious in the ability to individualize learning content to produce dynamic study materials for the further betterment of learning retention (Gaur et al., 2015). The future of education is therefore entangled in the development of digital learning. However, the shift to digital learning does not need to be dogmatically applied to curricula any more than its treatment as a novelty in the educational arena.

Our recent study focused on STEM students, specifically students of Faculty of Electrical Engineering and Information Technology of Slovak University of Technology in Bratislava (FEI). The result of the research revealed that the students consider both traditional and digital learning and teaching methods effective. This means that there is a demand for a highly hybrid approach to learning. The results also showed that the students of the technical disciplines appreciate visual input such as pictures, graphs and videos being employed in the education process. This group of students also values discussion and the teacher's explanation (Karasova & Uherkova, 2023).

However, these conclusions were drawn from a study centered on a particular group of STEM students whose preferences might differ from the preferences of humanities students. This brings us to question if this highly blended and visually oriented approach could be appropriate when teaching students of humanities. Especially considering these specializations have different objectives and methodologies. Our aim is to broaden our understanding of these recommendations, especially the one for blended learning and visual input utilization can be optimized for different study specializations. In an effort to answer these questions, we conducted a comparative analysis of STEM and humanities students' preferences regarding teaching and learning materials, methods and input.

2 Methodology

The aim of the study is to better understand the needs of university students regarding traditional and digital approaches in education. A quantitative analysis was conducted based on data gathered via Google Forms online questionnaire filled in by 87 first-year students of the Faculty of Mass Media Education of the University of Ss. Cyril and Methodius in Trnava, Slovakia (FMK). Their responses were compared to the responses of 282 first-year students of FEI who filled in an identical questionnaire as part of our previous research in November 2023 (Karasova & Uherkova, 2023).

The results from the questionnaires were subsequently analyzed statistically using the R programming language. The analysis aimed to evaluate the relationship between two categorical variables: the school attended (i.e., FEI, FMK) and the responses to a specific survey question. Contingency tables, chi-squared tests, and effect size measures are used to assess independence and association between these variables.

The chi-squared test of independence was conducted to examine the relationship between the variables *school* and *response to questions*. The null hypothesis (H_0) is that these two variables are independent. The alternative hypothesis (H_1) is that the variables are dependent. The significance level of all tests was $\alpha = 0.05$. Cramér's V was calculated as a measure of association between two variables. An additional *association test* was performed using the LSR package.

The main goal of our analysis was to identify similarities and differences among students of those two different specializations in their preferences of teaching and learning methods and to propose relevant adjustments of current teaching approaches applicable either for both specializations or specific for a particular one.

3 Results

The aim of this chapter is to present, analyze and interpret the results of the students' answers to the questionnaire on the effectiveness of teaching and learning methods. A detailed description of the results is provided using figures and tables as well. Subsequently, the results of the questionnaires from the two universities were compared. The first question the students were asked to answer was related to their preferred forms of classes, in particular, lectures, seminars, lab work and practical classes and independent study. The following graph shows the percentage of each class form received from the students of electrical engineering and information technology.

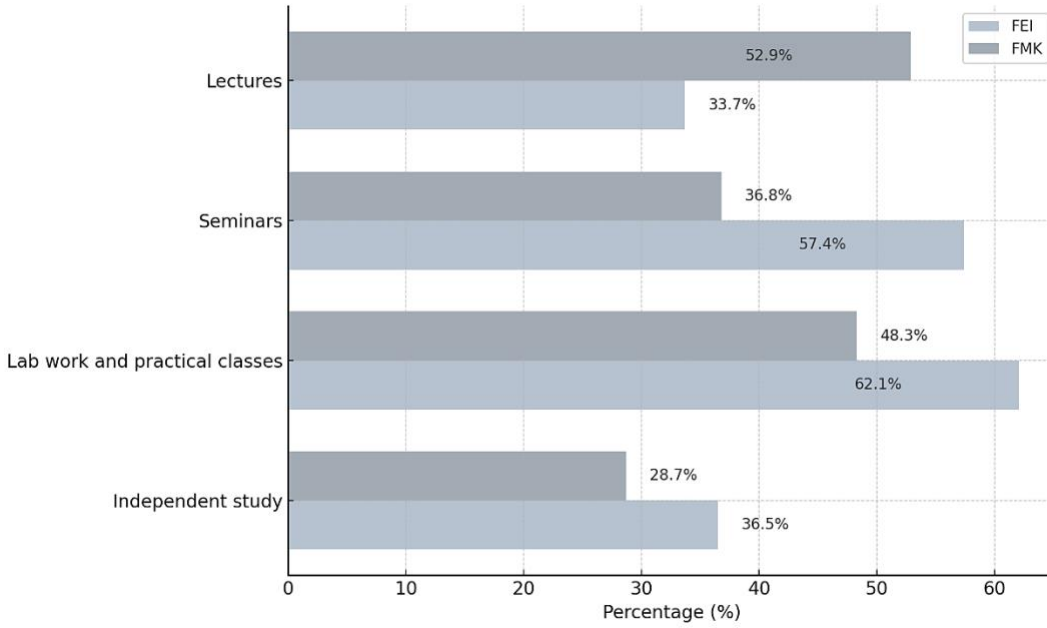


Figure 1: Graph showing forms of classes preferred by FEI and FMK students
 Source: own processing, 2024

More than half of the FEI students consider lab work and practical classes and seminars effective forms of classes. Independent study and lectures are thought to be effective only by a third of the respondents. The survey showed that little over half of the students of FMK, also consider lectures effective, while practical classes are valued as such by 48.3% of the students. Seminars and independent study are thought of as effective only by 36.8 and 28.7 of the students, respectively. Overall, students of the technical specialization prefer lab work and practical classes (62.1%) and seminars (57.4%) over lectures (33.7%) and independent study (36.5%). Students with the humanities specialization prefer lectures and lab work and practical classes to seminars and independent study.

In the second question, types of activities preferred in the classroom were examined, namely individual tasks, pair work and group work.

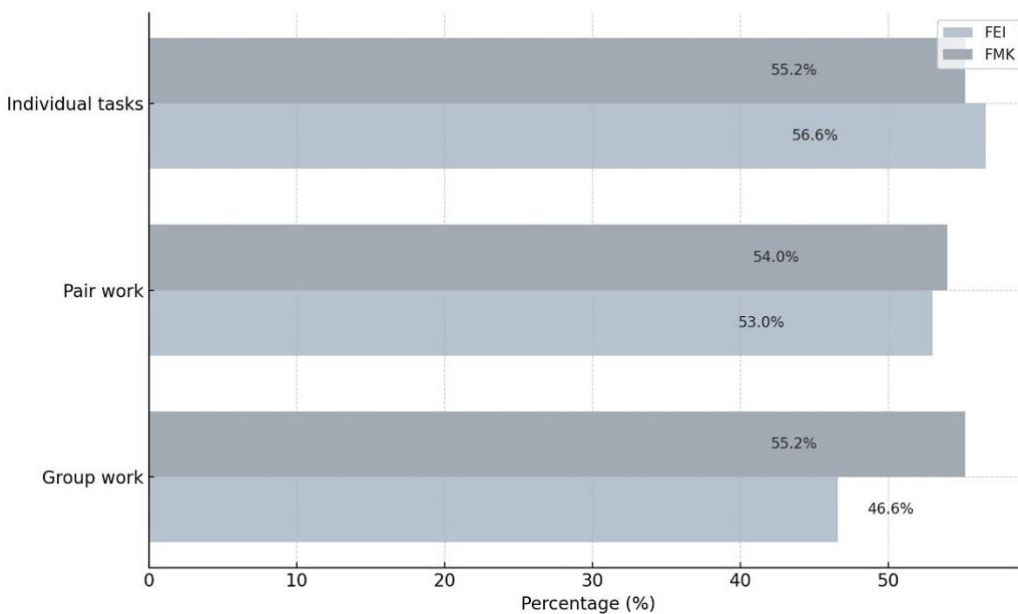


Figure 2: Graph showing preferred types of classroom activities FEI and FMK students
 Source: own processing, 2024

The graph shows that students of mass media communication value all the above-mentioned classroom activities more or less equally. Students of the technical disciplines and students of mass media communication have similar preferences in classroom activities as individual tasks, pair work and group work are considered effective by around 50% of all students of both specializations.

The next question was related to students' preference related to the types of material used in classes. They were choosing from three options:

1. Using only textbooks and printed material
2. Using only digital media
3. Using both digital media and textbooks / printed material

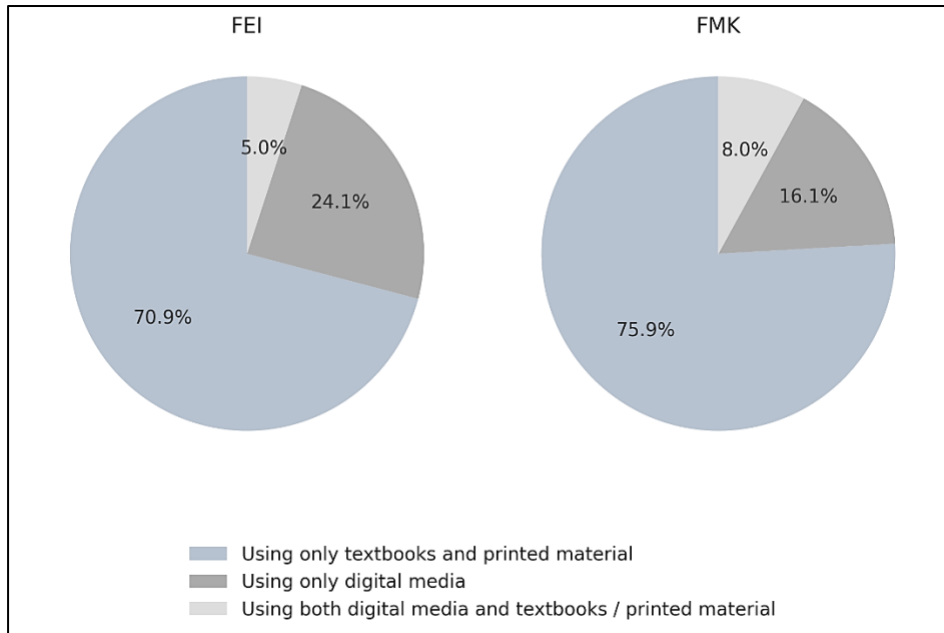


Figure 3: Charts showing preferences of digital and printed material by FEI and FMK students
Source: own processing, 2024

Students of both different specializations prefer using both digital media and textbooks or printed material to using only one of these options. While using mixed materials is considered effective by more than 70% of all the respondents, using only textbooks is the least preferred. Statistically, there is no significant difference between the two types of students and their preferences.

The next question was related to the use of digital platforms in the classroom. Students were asked if they like it when digital platforms such as Microsoft Teams, Google Classroom are used in the classes. There were three options to choose from: yes, no and sometimes. The results can be seen in the graph below.

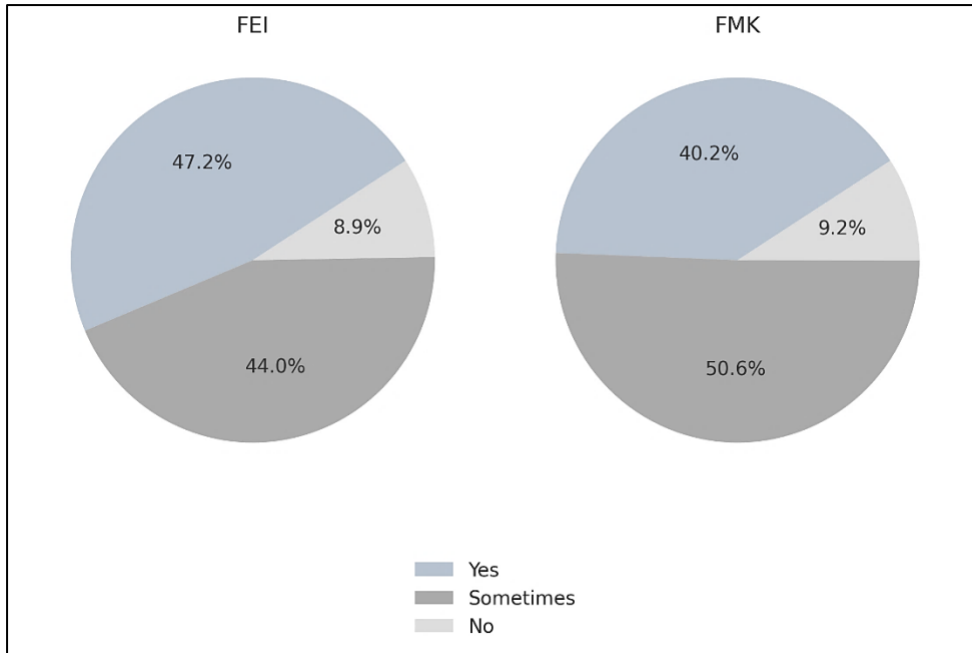


Figure 4: Charts showing preferences of FEI and FMK students in using digital platforms
 Source: own processing, 2024

Less than half of all FEI students (44%) prefer constant use of digital platforms, while a similar number of students, 47.2%, prefer only occasional use of such platforms, and 8,9% of students do not prefer the use of digital platforms at all. The humanities students answered similarly, and no statistically significant differences were found.

In the next section of the questionnaire, students were asked how effective they considered particular classroom tools, methods and activities. They had three options to select from: effective, a little effective and not effective at all. Students were giving their opinion on the effectiveness of the following:

1. Listening to an explanation by a teacher
2. Reading texts from textbooks, printed material
3. Looking up information relevant to a particular exercise online.
4. Explanation based on visual input (pictures, graphs, etc.)
5. Listening to an online audio explanation (podcast, radio broadcast, etc.)
6. Watching a video related to relevant topics linked to a course
7. Completing exercises from textbooks, printed material
8. Discussion
9. Game and competition-based activities
10. Tasks requiring creativity
11. Completing online exercises with the use of phones, tablets, laptops
12. Using AI tools such as ChatGPT in classes

The order of the questions was strategically chosen as to not imply any relationship, especially that of juxtaposition, between them. In the following table, the percentage of students' answers for each item is displayed as per how effective it is seen by them.

Table 1: Preference of methods, input and material among students of FEI and FMK

Method or input	FEI			FMK		
	Effective	A little effective	Not effective at all	Effective	A little effective	Not effective at all
Pictures	79.1%	18.1%	2.8%	73.6%	25.3%	1.1%
Videos	75.5%	22%	2.5%	73.3%	24.4%	2.3%
Discussion	71.9%	22.4%	5.7%	73.6%	24.1%	2.3%
Teacher	65.2%	33.7%	1.1%	51.7%	42.5%	5.7%
Internet	62.4%	33%	4.6%	49.4%	37.9%	12.6%
Games	56.6%	31.9%	11.5%	58.6%	33.3%	8%
Textbook exercises	54.6%	40.1%	5.3%	36%	53.5%	10.6%
Online exercises	52.5%	41.1%	6.4%	50.6%	44.8%	4.6%
Creative tasks	49.3%	42.2%	8.5%	65.5%	26.4%	8%
AI tools	47%	36.7%	16.4%	50 %	29.1%	20.9%
Reading	37.9%	53.5%	8.5%	39.1%	55.2%	5.7%
Listening	31.2%	49.6%	19.1%	47.1%	47.1%	5.7%

Source: own processing, 2024

As it is evident from the presented data, students of both FEI and FMK value most highly three types of methods/input and that is visual input such as pictures and graphs, videos and discussion. All three items are considered effective by more than 70% percent of all students. Games and online exercises are viewed as effective across the board, more than half of each group of students are in favor of their usage in learning. Also notably, AI tools are seen very similarly by both the students of FEI and FMK, when around half of both groups of students consider it effective, while quite a few of them rated them as not effective at all (16.4% and 20.9%, respectively). Students of both specializations consider reading as the second least effective as only around a third of the polled students see it as an effective method of learning. While the students at the technical school appreciate teacher’s explanation as the next most effective after the three items on top, for the students of communication it is creativity-based tasks. The least effective input used in learning is according to FEI students listening to podcasts, radio broadcasting and other solely audio input. For the students of FMK, it is exercises to be completed in a textbook. As the data suggest there are similarities as well as differences between the preferences of the humanities and STEM students. The following table shows these in detail, after statistical analysis revealed statistically significant differences.

Table 2: Similarities and differences in the preferences of FEI and FMK students

Similarities	Differences
Individual, pair and group work	Lectures
Using digital media and textbooks	Listening to an explanation by a teacher
Digital education platforms	Looking up information on the internet
Reading texts from textbooks, printed material	Audio explanation (podcast, radio broadcast, etc.)
Visual input (pictures, graphs, etc.)	Completing exercises in textbooks
Videos	Creative tasks
Discussion	
Games	
Completing exercises in digital format	
AI tools	

Source: own processing, 2024

As part of the statistical analysis, a chi-square test of association was performed to examine the relationship between the variables: school and a particular question. When the null hypothesis was not rejected, the variables were deemed independent of each other. This means there was no statistically significant difference between FEI and FMK students’ responses. These were filed under similarities in the table above. The other column titled *Differences* includes methods and inputs preferences of which revealed statistically significant differences between the schools. Students’ preferences in lectures proved to be statistically significant as there is a 19 percent difference between these two groups of students’ preferences. Responses to the question about the teacher’s explanation were found to be dependent on the student’s school as well, as the null hypothesis was rejected. The p-value was 0.006287 and the estimated effect size, Cramer’s V, was 0.166. Similarly, results for looking up information on the internet, also proved statistically significant as the null hypothesis was rejected, the p-value was 0.01131 and the measure of association between two variables, Cramer’s V, was 0.156. Students’ answers about audio explanations also revealed differences between the preferences at the two schools. The null hypothesis was rejected, and the p-value was 0.002055 and Cramer’s V was 0.183. Different preference was found in completing textbook exercises as well, as the p-value was 0.006946 and Cramer’s V was 0.163. The last statistically significant difference was revealed in responses related to creativity-based tasks, where the p-value was 0.02231 and the Cramer’s V was 0.144.

4 Discussion

The responses to the questions revealed more similarities than differences between FEI and FMK students, and these seem to stem from the fact that the polled students from both schools belong to the same cohort. The overall findings of the similarities in the preferences of STEM and humanities students are well aligned with past studies of Generation Z. When we look at previously known Gen Z attitudes towards individual, pair and group work, for example, the data makes similar claims. For 71% of Gen Zs, it is preferable to attempt to figure a problem out on their own or with a friend than it is to ask a teacher for help (*Beyond Millennials: The Next Generation of Learners*, 2018). Nevertheless, this individualist approach is not synonymous with individual studies. 78% of digital natives consider the teacher to be very important for learning and another 57% favor in-person activities with classmates (*Beyond Millennials: The Next Generation of Learners*, 2018). We can contrast this with Gen Z’s dislike for taking online classes and self-directed learning, with only 26% and 22% preferring these styles respectively (*Beyond Millennials: The Next Generation of Learners*, 2018). Paradoxically, Gen Zs were seen to choose to work independently even in a team setting

whereby they communicate with classmates, mid-class, through Google Docs (Nicholas, 2020). This seeming mismatch in preference to working alone but with others can be explained by the generational characteristic concurring in our study that disfavors independent studies but almost equally values independent tasks and pair work, regardless of academic discipline.

The inclusion of discussion in Generation Z also rates highly in other studies. In a survey of over 1,300 American Gen Z students, Barnes & Noble College (2016) found that 64% thought class discussion a helpful tool for learning, the highest-rated of any tool on the survey. Likewise, class discussion ranked in the top three of both surveyed faculties.

A common shift this generation in learning styles has to do with audio-visual. Indeed, Generation Z prefers audio-visual materials and deems them more effective (Szabo et al., 2021). According to one study, YouTube videos are preferred by 59% of Gen Zs, comprising the number one spot for Gen Z learning methods in that study, and 55% claim that YouTube has contributed to their education, learning and/or personal development (*Beyond Millennials: The Next Generation of Learners*, 2018). Our data clearly shows the continuation of this trend in students in Slovakia with their high ratings of pictures and videos.

Similarly, games have proven to be popular with Generation Z. Research has corroborated the commonly held belief that students prefer learning through simulation games (Ding et al., 2017). A clear majority (76.5% of students) reported such games to be appealing and 64.7% said they preferred these games over traditional learning methods. Results on quantitative tests to explore game effectiveness in learning, however, were shown to be statistically insignificant (Ding et al., 2017). Regardless of effectiveness, games are an engaging form of education that is greatly appreciated by Gen Z.

The differences between the two groups of students seem to be related to the nature of the two fields. Lectures being less preferred class form among STEM students is not a surprising result as previous research indicates the same (Freeman et al., 2014). According to Freeman et al. (2014), their research raised questions about continued use of traditional lecturing and suggested preferring active learning instead. The results of their research showed that students' performances were better under active learning. The higher preference for lectures among FMK students might be because lecturers in humanities have the possibility to employ different techniques due to the different character of the specialization. For example, a humanities lecturer can use storytelling and various narrative techniques, however, this does not apply to subjects like math and physics (Herlina et al., 2024).

Interestingly, explanation by a teacher is viewed more favorably by the students of technology than the humanities students. Again, we assume that this might be because of the different characteristics of the specializations. In STEM, the explanation typically includes description of physical phenomena and measurable quantities and thus might be perceived as more objective. On the other hand, lectures in humanities subjects might be more abstract and thus perceived as disconnected from immediate practical concerns. Moreover, humanities and social sciences' research outcomes can be more qualitative and rely on interpretations which might be perceived as more subjective and less rigorous (Herlina et al., 2024).

Looking up information on the internet is considered more effective by the students of the technical school. In our opinion, this is also related to the inherent differences of the two specializations. Due to the complexities of humanities and social sciences and their reliance on interpretation and subjective analysis, finding definite answers online might be difficult for students. On the other hand, communication studies often involve more subjective analysis, interpretation, and critical thinking, which can vary greatly depending on the context and perspective. While finding clear and definite answers on the internet to questions related to STEM subjects might be easier as they are based on quantitative data and precise answers, and they deal with more standardized problems and solutions.

It comes as no surprise that audio input such as podcasts and radio broadcasts are preferred more by the students of mass media communication for whom the ability to analyze auditory delivery is crucial to their field of study. These formats not only align with their career aspirations but also help them develop critical listening skills, understand audience engagement, and explore techniques for effective audio production, which are essential components of their curriculum. Despite the fact that this input is digital, and students can listen to it at the time of their choosing, it is the least preferable learning method for the students of technology. As the focus in their first year of study is math and physics, listening to purely auditory resources cannot be effective here. STEM subjects typically rely heavily on visual representations such as graphs, equations, and diagrams. These cannot be presented through using only audio which makes visual resources like textbooks, videos, or slide presentations more suitable.

The fact that the students of FEI consider completion of textbook exercises more effective than do their counterparts from more humanities-oriented school. This can be again explained by the nature of the two different specializations. STEM subjects typically include calculations, application of formulas and algorithms with the goal of getting one correct solution. Textbook exercises align with this structured way of learning very well. On the other hand, humanities and social sciences focus more on critical thinking, interpretation and subjective analysis. As tasks related to these do not necessarily have a definite solution, the textbook exercises are less relevant as a learning and teaching method for the students.

Tasks requiring creativity are considered more effective by the students of mass media communication than they are by the students of technology. STEM disciplines often focus on clear and definite answers reached by structured and objective solutions to problems. That is why these types of exercises might be seen less relevant to students who are accustomed to precision and verifiability. On the other hand, humanities students are used to open and subjective solutions to problems and that is why they are more comfortable with these tasks. Moreover, they are quite important for them when their learning involves creating and analyzing content, art and literature.

5 Conclusion

When we look at the results of the survey, we see that there are many similarities between the FEI and FMK students and their preferences in learning. They can be mostly explained by the fact that these are first-year students who belong to the same demographic cohort, Generation Z. However, the research also showed differences between the preferences of technology students and humanities students. These seem to be arising from the different nature of the two specializations. Nevertheless, the recommendations on how to adapt methodology for better effectiveness can mostly apply to both schools, albeit to various degrees.

The first recommendation is to fully embrace blended learning and continue enhancing it. Not all educators feel comfortable adopting digital tools, as they might view the usage of information and communication technologies as integrally linked with a student-centered view of teaching and learning. However, teachers are an integral part of digital learning adoption in schools (Wohlfart & Wagner, 2022). Support from the school management in the form of workshops and technical assistance can be invaluable in developing teachers' digital literacy. Hybridization of content is also very important when teaching Gen Z. This cohort thrives on visual input as well as multimedia and interactive content (Nicholas, 2020). Blending online learning with traditional approaches will thus continue to be an important aspect of adjusting schools' methodologies to the digital natives. That is why schools should provide their teachers

the opportunity to fully explore the possibilities of digital teaching methods (Condie & Livingston, 2007).

Another aspect that seems to be important for Generation Z learning process is a variety of tasks, material and class forms in general. Many of the tasks and methods in our questionnaires were ranked similarly by the students. The students of this generation should be provided with different types of tasks or input during the course of a seminar or a lecture. The reason is their well-documented short attention spans (Nicholas, 2020), and a variety of tasks keeps them engaged by breaking up the monotony and maintaining their attention better. Again, universities should strive for continuous professional development of teachers in terms of didactics to gain improvements in this area.

A further area that needs improvement according to the students polled is the lecture, especially at the technically inclined school. Lectures are not considered the most effective class form in STEM subjects as opposed to active learning methods. However, due to financial and staff constraints, universities cannot simply abandon using this class form. What can be done is to incorporate changes to make the lecture more engaging and memorable. As was mentioned earlier, using narrative techniques, storytelling in STEM lectures is definitely more challenging than in humanities and social sciences, however, not impossible (Herlina, 2024). According to Herlina et al. (2024), storytelling in STEM classes can improve the students' engagement and new information retention. To make lectures a more effective class form, lecturers are advised to employ a more interactive approach (Freeman et al., 2014) and avoid monotonous and uninterrupted monologue, let alone reading from their notes, textbook or slides. There are many ways to make a lecture more engaging for Gen Z (Terrell, 2024). However, lecturers might at the very least make use of simple techniques such as eliciting answers or asking rhetorical questions. Based on the results of our survey, utilizing more visual aids and discussion during lectures can make a difference. Furthermore, lecturers are oftentimes representatives of previous generations where presentation and skills were not formally taught, university management should provide such workshops and seminars and not leave it up to individual teachers to educate themselves without any formal assistance.

Based on the results of our research, the role of the teacher continues to be an important element in educating Gen Z students, especially at the school of technology. However, the percentage of students viewing it as effective could be higher at both schools. With the advances in AI technology, experts expect it to have a profound impact on education systems (Tuomi, 2018). As a consequence, the role of the teacher will inevitably change. The new generation of students will expect teachers to be more guides, consultants or even curators of learning rather than knowledge authorities on knowledge, as Gen Z are looking for more autonomous learning experience (Alamäki & Marttinen, 2021). Such personalization of the education process will put further strain on educators who will again require assistance, and it will possibly lead to changes in curriculum. These students also require new types of guidance, supervision, instruction and learning environment (Cilliers, 2017, in Alamäki & Marttinen, 2021). Higher education institutions should be already preparing for the shift. Some of the aspects of the teacher's role will be more difficult to replace, however. Among those is the teacher's enthusiasm for the subject they are teaching which is vital for the learning process (Svinicki & McKeachie, 2011, in Felix, 2020) Then there are the teacher's broader roles such as the social, mentorship, coaching, and relational aspects that are integral to teaching that as of now are not possible to replace and should be explored more (Elliott, 2024).

For future research we suggest conducting similar research where the students polled will be from graduate study to investigate if the differences between the two specializations deepen with the time they spent studying at their respective universities. Future research on the topic should be done to address the matter of differentiating effective learning methods from popular learning methods for Gen Z students. Just as Ding et al. (2017) found in their paper

about games as learning tools, the popularity of an activity does not always equate to more effective learning. We should investigate further into the effectiveness of lectures, videos, listening, discussions and digital learning tools for learning retention. Nevertheless, engagement through the comforts of such tools is indeed its own reward.

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SOCIAL MEDIA AND AI IN THE MARKETING OF BOOKS: DOES THEIR POWER EQUAL THE PRINCIPLE OF WORD OF MOUTH?

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Abstract:

This study explores the role of social networks and influencers in book marketing, highlighting the shift from traditional media to digital platforms. It examines how influencers, particularly bookstagrammers and niche influencers, impact readers' perceptions and book recommendations. The research also delves into the ethical considerations and authenticity challenges posed by AI-generated content in book promotion. By analyzing the effectiveness of word-of-mouth (WoM) and electronic word-of-mouth (e-WoM) marketing, the study aims to understand the evolving landscape of book marketing and its implications for publishers, authors, and readers. Our study addresses the question of how to view book marketing from the perspectives of the publisher, author, and reader, and how contemporary book production is related to the electronic environment and forms of book promotion and marketing today. The popularity of social networks is now complemented by the possibility of creating easy book ratings with the help of artificial intelligence tools as a generator of evaluation texts, which are not easily distinguishable from the texts of reviews on social networks for the lay reader.

Key words

Artificial Intelligence. Electronic Word of Mouth (e-WoM). Marketing Books. Social Media. Word of Mouth (WoM).

1 Introduction

Observing the community of readers and publishers, the process appears straightforward: the author writes a book, the publisher prepares it for publication, and thanks to social media, it becomes widely known to the public. The communication of book content on social networks has even received its own special marketing terms such as Bookstagram (books on Instagram) or BookTok (books on TikTok). Book reviews can also be found on other social networks or in comments on bookstore websites. Books have gained their own book influencers, who often do not have a literary academic education, are not literary critics, but correspond more to the label of book lover. For many introverted readers, social media is the perfect way to talk about books.

But what is the real power of such book promotion from a marketing perspective? Does it make sense to invest time, review copies, or even money in Instagram marketing?

Books are a special type of commodity. A book can be defined as a non-periodical publication containing text and, depending on the type, also pictorial content (Unesco, 2024). It can be printed on paper or formatted as an electronic book usable in electronic reading devices and the digital environment. In its physical form, it is bound by standard bookbinding methods (paperback, glued, sewn, etc.) and printed using common printing methods (offset, digital printing). Its content can include artistic literature (fiction, poetry, essays, picture books), non-fiction (biographies, interviews, travelogues, popular-educational or reportage literature), professional and scientific literature, children's books, religious literature, textbooks, and various other books.

Digital technologies have enabled changes in the publishing process. The emergence of e-books, self-publishing, and digital distribution has necessitated a redefinition of what

constitutes a book today. These problems were very well summarized by a study by M. Kovač et al. “What Is a Book”:

Through an iterative process, this paper has identified four attributes of the book: length, textual content, boundaries to its form, and book information architecture (e.g. linear structure and key textual elements). The application of these attributes to particular species of the book, from the printed book to the coloring book, has produced a hierarchy of the book. The species of the book genus differ some have more and some have fewer of the full set of attributes of the printed book. The purest definition of the book demands the presence of all four identified attributes. (Kovač et al., 2019, pp. 13-14)

We do not buy books “the same”; it is not a type of product that we buy repeatedly in an identical form (such as a brand of yogurt), nor is it a type of product that is short-lived, although we often ‘consume’ it quickly. However, the quality of the product book does not change by using (reading) it. But how do we choose a book? Does advertising work here as with other goods? What is the difference between them?

The system of recommending good books has been inherent in book culture from the beginning. Parents recommend the first books to their children; teachers recommend literature to pupils and students. We mutually recommend the books we have read. The term *word of mouth* is “one of the most effective forms of communication in marketing by spontaneously disseminating a marketing message based on word of mouth without the need for paid promotion by the company”¹ (Hanuláková et al., 2021, p. 360). It is also one of the most elusive and least influenced forms of communication.

In the world of books, readers’ recommendations have been operating practically since the beginning of book production. And readers’ recommendations still exist today in the form of book reviews in online stores, in virtual reading communities such as Goodreads, or on social networks that use the power of friend recommendations.

2 Methods

In our study, we focus on the importance of social networks for disseminating information about books. When researching and further developing the topic, it would be appropriate to address other issues and problematic moments. Is book marketing on social networks meaningful in our country? For whom, and when promoting which titles? Can every title be offered on social networks?

The study is currently based on market observation and analysis of current thinking about practices that could affect the book market and book sales in the near future. The question of how WoM marketing and its digital version in the form of e-WoM marketing works is not easily answerable and measurable (Ismagilova et al., 2020). The reputation of a book and the recommendations of acquaintances are not measurable by standard methods, so we can move more at the level of speculative analysis based on experience, observation, or qualitative research.

Simply put, you can’t command the market and customers to recommend this or that. A message spread by word of mouth is mostly spread horizontally from several random points, its dissemination taken care of without influence by locally influential people in the field (we can also refer to them as decision makers), i.e., people who influence other people’s tastes. The digital environment is also trying to do a similar thing.

¹ Author’s note: Text is translated from Slovak original text: “z najefektívnejších foriem komunikácie v marketingu samovoľným šírením marketingovej správy na základe ústneho podania bez potreby platenej propagácie zo strany firmy” (Hanuláková et al., 2021, p. 360).

In the book environment, a recommendation to read from a friend can have far-reaching consequences on the book market – it can produce a popular book, or it can take the author from the limelight to gradual oblivion. The well-known wisdom “tell me what you read, and I’ll tell you who you are” may not have a well-known author (or rather, it is attributed to several authors), but the essence of this idea is also curiosity: what can shape the reader, what keeps their head busy, what they are willing to devote their time to. We probably don’t often come across answers like – I’ve been reading a boring, terrible book for the last month. We do not recommend a bad book, but we boast about our experience of good reading.

To further enrich our theoretical framework, we will incorporate a speculative analysis approach, combining insights from qualitative research techniques. This will allow us to capture a more comprehensive understanding of the impact of social networks on book marketing. Qualitative data will be gathered through interviews and focus groups with key stakeholders, including authors, publishers, and readers, to gain deeper insights into their experiences and perceptions of social media marketing.

We will also explore the role of influencers and micro-influencers in the promotion of books on social media. Influencers have become a powerful force in digital marketing, and their endorsements can significantly boost the visibility and credibility of a book. Our study will analyze the strategies used by successful influencers in the book industry and assess their impact on book sales and reader engagement.

Finally, we will investigate the ethical considerations of social media marketing in the book industry. This includes examining issues such as data privacy, transparency in sponsored content, and the potential for manipulation of consumer behavior. By addressing these ethical concerns, we aim to promote responsible and sustainable marketing practices that benefit both the book industry and its audience. Our study is, to some extent, an analysis that is an interpretation of the readers’ market observation and at the same time a preparation for quantitative research on the readers’ choice of books before the purchase decision, which will take place in 2025 and 2026.

3 Research

Books – since they behave strangely as goods also because we borrow them – have their strength within Word of Mouth in that they often circulate among readers, selflessly lending to each other. Such a cycle of books naturally creates an affection for a certain type of literary creation, and since reading is in a way a never-ending activity and we want to repeat the experience, we subsequently look for similar books. And if someone with richer book experience recommends books to us and we have had a good experience with their recommendations, we also take other books with a certain mental preparation for a positive experience.

According to the research agency Nielsen and their 2021 research, up to 88% of consumers trust the recommendations they receive from people they know (Nielsen, n.d.). It is the most trusted form of recommendation ever. Of course, it is very difficult to use commercially, because it is possible to reach thousands of people at the local level (e.g., when opening a new restaurant), but it is very difficult to reach people at the national or global level to talk about our product in a targeted way. Although companies are trying to take advantage of the credibility of word of mouth, they are trying to create brand awareness and encourage people to talk about products, but it is very difficult to estimate the level of pressure so that it feels spontaneous and not like a targeted activity. This is especially true in the book and cultural industry, where passive resistance to visible marketing activities is to some extent part of ‘good morals’.

The environment of social networks is mainly used by younger communicators to present their literary interests and preferences. The environment of social networks is very varied and practically all the “niches” of this virtual world are surprisingly occupied by book lovers. From fan groups and genre websites to individual performances by bookfluencers and literary decision makers on social media to trying to showcase your fledgling works, you’ll encounter literary communities in virtually any form. The advantage of this communicative environment is that it connects the private and public worlds, and it is specific for its more relaxed language, which is not tied to the tradition of academic science, literary criticism, and review. On the other hand, this privacy is also manifested in a large degree of subjectivity, enthusiasm/rejection of some titles without a deeper objectifying evaluation, i.e., a popularizing or even pop-cultural approach to literature. In this case, however, in terms of genre, it is not literary criticism and review, but rather the fan joy of reading presented extrovertly to the outside.

Influencer marketing is one of the ways to implement online marketing and try to combine the power of word of mouth, personality, and technology in one package. An influencer is a publicly known person today, and by public in this case, we mean mainly users of the Internet and especially social networks. An influencer is someone who is not afraid to present themselves in this public space, often in a controversial way. The influencer usually started in the social media environment as an enthusiast who was interested in the possibilities of self-presentation.

3.1 The Authenticity and Freedom of Influencers

The authenticity and freedom of influencers have meant higher credibility for consumers, with no limits to creative ideas. Initially, the requirements for an influencer were to offer their personality in connection with the brand, presenting it as they “feel”. Offering freedom within the framework of cooperation ensures the authenticity of the influencer. Gradually, however, several requirements for ethical behavior in the social media environment and in the international context have emerged. These have resulted not only in non-binding recommendations in our country (the Code of Influencer Marketing was created in Slovakia in 2022 and prepared by IAB Slovakia, the Association of Digital Marketing Agencies, the Slovak Association for Branded Products, and the Advertising Council), but also in legislative adjustments under the *Media Services Act 264/2022 (Zákon č. 264/2022 Z. z. o mediálnych službách, 2022)*, which defined the framework of entrepreneurs’ services in the field of new media services in the digital environment.

The aim of similar codes of ethics and legislative amendments is to standardize the environment and introduce true and ethical labeling of advertising collaborations. This is important from the point of view of consumers, who should know that they are consuming paid advertising content. The problem still lies in the gray area of what an influencer does when they add not only paid posts to their profiles and admit cooperation, but also their private posts, in which they use products (clothes, cosmetics, bicycles, phones) as regular users. Sometimes it may not be completely clear what advertising is and what is no longer paid advertising cooperation.

In the case of books, the use of influential personalities is not a communication strategy; recommendations for good reading through them have been and are perceived as part of a cultural outlook. Questions such as “your favorite movie”, “which book would you take to a deserted island” appeared long before the age of the Internet. Reading and recommending books was not and is not perceived as some kind of marketing, but as a manifestation of the cultured outlook of a person who talks about themselves and their hobbies in public. With social networks, only the new fashion name influencer has received this recommendation.

What are the options for promoting books on social networks for publishers and booksellers? Here, too, targeted advertising is clearly a way that works. Recommending experimental literature to fans of a teenage influencer idol probably won't work, just as an influencer who recommends cyberpunk sci-fi will probably not succeed among poetry fans. In influencer marketing, the marketer must therefore look for personalities who can influence potential customers of a specific product – again, we are on the topic of target groups. In this sense, the size of the group of followers of an Instagram celebrity is not even important. Here, too, it can be assumed that the larger the audience an influencer has, the more superficial and easier their communication campaign must be. Even among the hundreds of thousands of followers of a pop icon, there are people who, for example, like to take a slightly erotic female romance on vacation, so if such a book is recommended by an Instagram celebrity, it will have its impact.

3.2 Specialized Communities and Niche Influencers

On the other hand, there are narrowly specialized communities with their opinion-makers. Niche influencers are not categorized by the number of followers, but by the group they have influence on. They mostly focus on one area and have a very specific and narrow circle of followers. Although these influencers do not have large numbers of followers, their value is not less. Of course, the world of book opinion-makers does not catch up with the numbers of the most popular ones, who are also present in standard (and especially tabloid) media. Most book communication takes place at the level of so-called micro-influencers, whose numbers of followers are in the hundreds to thousands. Among book influencers, we can find authoritative influencers who are often professionally associated with the book market and use their communication on social networks to confirm and expand their position in the literary world, or to expand their brand of “connoisseur”. These key opinion leaders have good information, a more refined speech, experience, and expertise.

The second active group in the field of book production in our country consists of professionals who work in the book world and use social networks as a tool to promote the brand of their bookstore or publishing house. Whether it is publishing accounts, activities on the occasion of events such as autograph signings, book launches, festivals, etc., or accounts of bookstores, e-shops, antique bookshops – they usually act as activities aimed at promoting a specific product or service. They are not pure influencers, but direct marketing tools of the information producer, which are very convenient to use.

The third group that grew up spontaneously on social networks are people who have also acquired the informal nickname “bookstagrammer”, a portmanteau of the English words book and Instagram or Instagram user. Such bookstagrammers, book enthusiasts, are also active on other social networks (Facebook, TikTok, YouTube), but various forms of short presentations of their reading experiences have become the primary space of their communication (Warren, 2023). Often they are simply young book lovers who want to share the experience of the story in a book and recommend it to their friends. Not every book lover is a direct asset to publishers; some bookstagrammer accounts are really just amateur fan pages of readers who admit to their hobby. After all, reflecting on the book environment requires a certain type of insight, reading experience, knowledge of the market, and undoubtedly, the ability to stylize and skillfully comment.

Today's Instagram is full of ordinary users who share their lives with their friends and save nice memories in it, but also influencers who, through sharing their lives, focus on creating and shaping a certain segment of the market – from fitness, fashion, cosmetics, to cultural content, design, or books. The uniqueness of this social network is the ability to connect video content, photos, and texts in such a way that this content is not primarily intended for discussion and opinion debates or commenting on what is happening around us

(as is often the case on another social network, Facebook), but for self-promotion, introducing positive posts, recommendations, instructions, and tips. Through keywords and hashtags, Instagram is more effective at connecting people with similar interests who follow each other and grow their community. And it is the community recommendations in various forms and options that Instagram recommends that also allows good marketing communication for titles intended for such readers. However, the publishing house should work with such communication groups not as the main marketing group, but rather with those who help “make noise” in the social media environment.

3.3 The Importance of Stylistically Appealing Texts

This makes it even more important to offer texts that are stylistically appealing and meet the reader’s emotional statement in terms of content. Since today’s artificial intelligence tools directly use text editing, the question will certainly arise in the near future as to what extent we read the message of the influencer and when artificial intelligence as a text generator takes over the promotion of the book. With books, photo posts are still the most popular, acting as a reading diary. They can contain possible quotes, humorously placed books, and arrangements associated with evaluation. However, imagination and creativity can be exhausted when describing “another amazing story”, and less skilled text creators may reach for AI tools.

Many Instagram creators start with their own books, shaping their virtual world to their own taste. After a certain amount of time and a certain number of followers, publishers become famous, but the cooperation between the publisher, Instagram, and bookstagrammer is not automatic. Especially because book publishers have their own habitual paths, their own microworlds on social networks, and because cooperation with the Instagram environment does not bring a visible effect. An interesting observation on the topic is presented by the web portal kniznenovinky.sk:

An ordinary bookstagrammer can hardly achieve sales power and certainly not sell out the warehouse at all. However, they can be valuable co-author of awareness of the book, its presence, or its content and theme. They can inspire in an immeasurable way. All the more so if they present the book in a slightly different way than others try.² (Tom, 2022, "Bookstagramer, ktorý zvládne o štipku viac" section, para. 1)

However, review copies are often the only reward for someone who has a few hundred or better a few thousand followers; there is practically no question of paid cooperation simply because it is an uninteresting process in terms of investment.

A special group consists of self-publishers who believe that bookfluencers will help them start selling their title. But as with standard publishing houses, even with self-publishing books, a mention on a social network will hardly trigger a sharp flight to bookstores or e-shops so that people buy a new book

3.4 AI and Book Recommendation

Artificial Intelligence (AI) has the potential to revolutionize the way we recommend fiction to readers. By leveraging advanced algorithms and data analysis, AI can provide highly personalized book recommendations, enhancing the reading experience for individuals. „In book recommender systems, AI algorithms have the task of suggesting books that buyers

² Author’s note: Text is translated from Slovak original text: “Bežný bookstagramer len ťažko dosiahne predajnú silu a už vôbec nevypredá sklad. Môže byť však cenným spoluautorom povedomia o knihe, o jej prítomnosti, či obsahu a téme. Môže inšpirovať nemerateľným spôsobom. O to viac, ak prezentuje knihu o štipku iným spôsobom, ako sa to snažia iní” (Tom, 2022, "Bookstagramer, ktorý zvládne o štipku viac" section, para. 1)

are potentially interested in and that have not been read by them“ (Tegetmeier et al., 2024, p. 1706)

One of the primary ways AI can assist in recommending fiction is through personalized recommendations. AI can analyze individual reading preferences and history to suggest books that align with a reader’s tastes. Machine learning algorithms can identify patterns in reading habits and recommend books that are likely to be of interest. This personalized approach ensures that readers receive suggestions tailored to their unique preferences.

Additionally, AI can perform sentiment analysis on reviews and comments from readers on social media and book platforms. By understanding the emotions and opinions associated with specific books, AI can recommend titles that evoke positive reactions and are popular among readers. This analysis helps in identifying books that are well-received and likely to be enjoyed by others.

AI also has the capability to predict reading trends. By monitoring current trends and analyzing data from various sources, such as sales figures, social media, and reviews, AI can forecast which books might become popular in the future. This predictive ability allows AI to recommend potential bestsellers to readers, keeping them ahead of the curve.

Automated recommendation systems powered by AI can be integrated into book platforms and online bookstores. These systems can automatically generate recommendations for users based on their interactions with the platform. Continuous updates and adaptations based on new data and user feedback ensure that the recommendations remain relevant and accurate.

Furthermore, AI can support authors and publishers by identifying target audiences for their books and suggesting marketing strategies based on data analysis. This assistance can lead to more effective dissemination of fiction and increased book sales.

4 Conclusion

Social networks have their followers who perceive books not through traditional media, but as a “complement” to their lives. A view of internet influencers as part of literary “chatter” is also brought by literary scholar M. Stanková:

The existence of literary critical activities on the Internet is not primarily conditioned by the desire of readers to discover the aesthetic values of a book, but to get to know the reading experience of a person close to themselves, one with whom they can identify.³ (Stanková, 2021, p. 158)

Social networks are a place of personal confessions, emotions, and showing off. When thinking about books, it is primarily about emotional, not rational communication.

Observation of the environment of book fans confirms the hypothesis that the book has acquired its electronic version of the verbal recommendation. The question remains to what extent it is as trustworthy as WoM in its traditional form. This may be the subject of further research. Additionally, the role of influencers in shaping reading habits and preferences cannot be underestimated. Their ability to connect with followers on a personal level and share genuine reading experiences adds a layer of authenticity that traditional advertising often lacks.

³ Author’s note: Text is translated from Slovak original text: “existencia literárnokritických aktivít na internete nie je primárne podmienená túžbou čitateľov odhaliť estetické hodnoty knihy, ale spoznať čitateľský zážitok človeka blízkeho im samotným, takého, s ktorým sa môžu stotožniť” (Stanková, 2021, p. 158).

It can also be interesting how artificial intelligence can be used in creating texts that evaluate the reading experience, as reading is an intimate emotional act, which is also reflected in subjective evaluation. AI tools have the potential to generate reviews and recommendations that mimic human emotions and preferences, but the challenge lies in maintaining the authenticity and personal touch that readers value. Future research could explore the balance between AI-generated content and human influence in book marketing.

Furthermore, the integration of AI in book marketing raises ethical considerations. As AI becomes more sophisticated, distinguishing between human and AI-generated content may become increasingly difficult. This could impact the trustworthiness of recommendations and the overall reading experience. Ensuring transparency and ethical use of AI in this context will be crucial.

In conclusion, the intersection of social networks, influencer marketing, and AI presents both opportunities and challenges for the book industry. Embracing these technologies while maintaining the core values of authenticity and emotional connection will be key to successful book promotion in the digital age. The evolving landscape of book marketing calls for continuous adaptation and innovation, ensuring that the joy of reading remains a shared and cherished experience.

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DESIGN “MADE BY HUMAN” IN THE WORLD OF AI: AN ANALYSIS OF THE IMPACT OF ARTIFICIAL INTELLIGENCE ON GRAPHIC DESIGN AND THE ROLE OF HUMANS IN THE CREATIVE PROCESS

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Abstract:

This study examines the transformative influence of artificial intelligence (AI) on graphic design, spotlighting tools such as ChatGPT, Midjourney, Adobe Firefly, Photoshop, and Illustrator. By analyzing their integration into creative workflows, the paper highlights the expanding opportunities for designers while addressing challenges to originality and authenticity. It argues for the critical importance of preserving the “human touch” in the era of advanced automation. Despite the efficiency gains AI offers, human intuition, creativity, and strategic oversight remain irreplaceable in ensuring designs resonate emotionally and culturally. The discussion extends to ethical concerns, such as authorship and copyright in AI-generated works, and explores the evolving role of designers as curators and collaborators. Ultimately, the paper calls for a balanced approach, viewing AI as a complement to human creativity rather than a substitute, underscoring the enduring relevance of the “made by human” ethos in design. This collaboration has the potential to redefine visual communication while maintaining its core human-centric values.

Key words:

AI. Artificial Intelligence. Creative Process. Graphic Design. Human.

1 Introduction

Artificial Intelligence (AI) is gradually penetrating all areas of digital as well as physical life, and graphic design is no exception. The advent of AI-based tools such as Adobe Firefly, Adobe Photoshop with its use of generative AI, Adobe Illustrator with its machine learning-based features, Midjourney and Freepik with their huge databases of AI-generated images are bringing quite revolutionary changes to the design world. These changes were most profound in 2023, when OpenAI launched its first prototype, ChatGPT-3, into commercial operation. And in the same year, Adobe, the world’s most widely used tech software company, integrated AI tools into its already fairly conservative robust graphics creation tools (Photoshop, Illustrator, InDesign, Acrobat). It is the integration of AI into these most popular graphics programs, which are used by most of the planet to get work done, that has brought AI to the attention of real designers, not just tech geeks.

Designers used to be limited by their manual skills and available tools, but today AI allows them to generate entirely new design elements, automatically edit images, create design variations, and even design entire visual concepts. Tools like Adobe Firefly already offer a very intuitive interface that allows even less experienced users to create professional design outputs (Adobe, n.d.a). Photoshop and Illustrator use AI to automate repetitive tasks and provide designs based on analysis of existing images (Adobe, n.d.b). Midjourney and Freepik, in turn, allow for the generation of unique visual concepts based on textual descriptions, called prompts (Midjourney, n.d.; Freepik, n.d.).

This thesis focuses on an overview of how these tools are changing the workflow of graphic designers and what new possibilities they bring. We will explore the advantages and disadvantages of using AI in design, as well as the impact of AI on the creativity, originality

and quality of the resulting designs. We will also look at what new skills are needed for designers working with AI and what the future holds for human-machine collaboration in graphic design. And last but not least, we will clarify the term “made by human”, which focuses on the role of the human element in this whole process, i.e. the designer – the human who, despite advanced AI tools, still plays a key role in the final shaping of the visual output.

2 Automate and Streamline Work Processes with AI

One of the most significant impacts of AI on graphic design is the automation of repetitive, routine tasks. AI-based tools such as Adobe FireFly, Photoshop, Illustrator, Canva, Midjourney and DALL-E 2 can automatically perform tasks such as:

- **Generate design variations:** AI algorithms can generate many variations of an existing design, saving time and allowing designers to experiment with different options more quickly. For example, if we have a logo design, AI can automatically generate dozens of variations of it with different colors, shapes, and typography.
- **Image editing:** in Adobe Photoshop, AI can automatically remove imperfections from photos, change colour schemes or resize images without losing quality (Adobe, n.d.b). This is particularly useful when preparing large numbers of visuals for marketing campaigns.
- **Creating vector graphics:** tools such as Adobe Illustrator use AI to automatically create vector graphics from raster images or based on simple sketches (Adobe, n.d.b). This significantly reduces the time needed to prepare such vector illustrations.

Automation brings a number of benefits such as increased productivity, reduced costs and overall design consistency. Designers can focus on the more creative aspects of their work and experiment with new ideas, as AI can already help with routine tasks almost single-handedly.

Still, it’s also good to remember some of the concerns that working with AI can cause. Excessive automation can lead to a loss of originality and creativity as algorithms can generate similar results. Dependence on technology can weaken traditional design skills. Moreover, we are in 2024 and ethical issues around copyright and the potential misuse of AI for e.g. misinformation still require some societal debate.

It is therefore quite important to strike a balance between automation and human creativity. AI should be seen as a tool that supports and complements the work of the designer, but not as a substitute for it. A term that describes the work of a regular human designer with AI quite accurately is “the new virtual colleague”.

3 The Role of Man in the Creative Process

3.1 The Designer as Strategist and Visionary: From Routine Tasks to Deeper Creation

As artificial intelligence takes over more and more routine tasks in graphic design, it opens up space for designers to think more deeply and strategically. Although AI can generate a multitude of visual variations, it is the designer, a human with experience of the ‘offline world’, who gives meaning to these possibilities and transforms them into story and emotion. This shift allows designers to focus on aspects that have a deeper impact on the outcome of their work (Figoli et al., 2022).

Freed from routine work, the designer can spend more time on an in-depth understanding of the brand, exploring its history, values and target audience to define a unique identity that will resonate with the target audience. He or she also has the opportunity to create stronger narratives – compelling and inspiring stories behind the brand, using visual language to build an emotional connection with the customer (Meron, 2022).

In marketing practice, AI can support not only the effective visual processing of content, but also the creation of strategies targeting specific groups of consumers. Nagyová & Klementis (2023), in their publication on Graphic design for marketing practice, emphasize that the designer's role is to link visual elements to a well-defined communication goal. This ability is even more important when working with AI, which can generate a vast array of design possibilities. AI thus supports the designer to focus on creative and strategic decisions, with the resulting design bearing the stamp of "made by human".

Thanks to the many variations generated by AI, it can experiment with unconventional solutions, explore new styles, materials or technologies, and thus push the boundaries of design. This process becomes a strategic "partnership" between designer and AI, where human creativity and intuition complement the factual and machine power of AI. The result is a synergistic relationship that expands the possibilities of design and improves its outcomes. What's more, when the designer takes on a more strategic role, the value of his or her work goes up as well. Thus, design is transformed from a purely aesthetic element to a key strategic tool for achieving business goals (Tang et al., 2024).

Such an approach shows that the combination of artificial intelligence and human intuition can greatly enrich not only the creative process itself, but also the overall impact of graphic design on brands and their audiences (Figoli et al., 2022; Meron, 2022).

3.2 Human-machine Collaboration: The Dance between Creativity and Technology

The collaboration between designer and AI represents a new, rather exciting model of creation. We can also look at it in a somewhat poetic way, namely that whereas in the past the designer was a lone creator, today he or she becomes a conductor orchestrating a collaboration with a powerful instrument – artificial intelligence. This collaboration, however, is not a simple handing over of tasks to the machine. Rather, it is a dance that combines human creativity with the rational power of algorithms.

The designer is no longer just a creator of visuals, but becomes a strategist who defines the goals and direction of the project. AI assists him in this by generating a large number of visual possibilities that a human would probably struggle to create on his own. The designer evaluates, selects and refines these possibilities, giving them soul and meaning. He becomes the curator of the content. And it is the human factor that ensures that the resulting design is not only functional, but also emotionally compelling (Figoli et al., 2022).

Therefore, the ability to communicate effectively with this artificial intelligence becomes a key skill for the designer in this new paradigm. Through precise and detailed assignments – so-called prompts – the designer "guides" the AI to produce the desired results. It's like teaching a computer program to speak our visual language. This takes the designer from the role of a pure practitioner of graphic craft to that of a mentor/consultant of design, and this can be not only naturally helpful to humans, but also humanly very enjoyable.

However, human-machine collaboration is not just about entering prompts. It's an ongoing dialogue where the designer refines his requirements based on the results generated by the AI, and the AI in turn learns and adapts. This iterative process enables the creation of designs that are not only innovative, but also precisely focused on the needs of the target audience and therefore the project brief.

While AI brings new possibilities and efficiencies to design, human creativity remains indispensable. It is humans who can interpret the results of AI, uncover the hidden potentials in them and make them into a coherent and aesthetically appealing whole. The collaboration between designer and AI is therefore not about replacing, but about complementing each other and pushing the boundaries of what is possible in design.

This approach is supported by research that highlights the importance of human intuition and creativity in the process of collaborating with AI. The study "Understanding

Nonlinear Collaboration between Human and AI Agents: A Co-design Framework for Creative Design” shows precisely how effective collaboration between humans and AI leads to innovative and emotionally resonant designs (Zhou et al., 2024).

3.3 New Skills for Designers: Critical Thinking in the Era of AI

The advent of artificial intelligence in the world of design brings with it a fundamental change. Designers are no longer mere creators, but rather curators and collaborators of AI. It provides them with unprecedented new possibilities, generating a wealth of creative ideas and solutions. However, to be able to harness the full potential of AI, while still retaining their uniqueness, designers need to develop new skills. One of the most important of these is critical thinking.

In fact, critical thinking is more essential than ever in the era of AI. It enables designers to evaluate AI-generated outputs, separate the wheat from the chaff and select only those solutions that are relevant and of high quality. The designer must be able to evaluate whether the designs generated by AI are in line with the overall project concept, whether they meet the specified requirements and whether they are aesthetically appealing (Meron, 2022).

Another important skill is the ability to identify errors and inaccuracies in AI results. Even as algorithms become more sophisticated, there is always a risk that they may make mistakes or generate inconsistent results. A designer must be able to detect these errors and correct them. A common example, especially in the early days of AI in 2023, was just iconic hands with 6-7 fingers, two left feet, 3 people hugging hands, and so on.

In addition, the designer must be able to combine logic with intuition. While AI provides a rational and data-driven view of design, human intuition is essential for creating original and emotionally compelling solutions. A designer must be able to combine these two elements to create a design that is not only functional but also aesthetically appealing.

When working with AI, it's important to avoid a few pitfalls. One of them is an over-reliance on AI. While AI is a powerful tool, it should not replace human creativity and judgment. Another risk is the loss of originality. If a designer focuses too much on optimizing AI results, it can lead to designs lacking originality and uniqueness. Thus, the “made by human” brand will be around for a long time to come (Meron, 2022).

In order to work effectively with AI, a designer must be able to look for context and context in AI-generated text. Often, AI will generate text that is grammatically correct but semantically empty. The designer must be able to read between the lines and understand the true meaning of the text and words.

In conclusion, in the era of AI, the role of the designer is changing. The creator becomes a curator who guides and directs the AI. Critical thinking is key in this process. It allows designers to harness the potential of AI while maintaining their own creativity and ensuring that the resulting design is high quality, original and relevant.

4 Discussion – Questions for the Future

The discussion of AI is still in its infancy, with its use and proper understanding representing a relatively large unknown for the development of creative industries (Meron, 2022). This chapter opens up a number of fundamental areas for reflection that need to be discussed at a societal level. Ethical issues are mainly related to copyright: who is the real author of a work created using AI – the designer who has given the instructions, or the AI itself? At a time when the lines between human and machine creativity are blurring, it is necessary to consider how to protect copyright. At the same time, it is important to prevent the misuse of technology to create misinformation, deepfake content or other malicious material, and to think about the role of designers in combating these threats. The social

implications of the widespread use of AI may include significant changes in the design labour market, where some professions will disappear and new ones will emerge, requiring a comprehensive analysis of these dynamics. When it comes to the future of design, AI can open the door to creating truly personalised, unique designs that accurately reflect the needs and preferences of individual customers. For example, newsletters not just offering merchandise as they can today, but also unique designs for each user based on their past shopping behavior preferences. At the same time, new forms of collaboration between designer and AI could emerge, and optimizing these processes will be key to improving efficiency and quality of results. The role of design in society will thus become even more important once again, as technology will be increasingly integrated into our daily lives and will be able to help us significantly with our routine work.

Technical challenges include the development of AI algorithms in design, which can bring new possibilities and push the boundaries of the creative industry even further. Human-AI interaction will also be an important issue, where new interfaces and tools need to be developed to enable better communication and collaboration. The security of the data used to train AI is another critical issue that requires measures to protect data from misuse. Discussion should also address the relationship between artificial and human art and questions about how to define art in an era when it is co-created by AI (Tang et al., 2024).

The social implications of the widespread use of AI may include significant changes not only in the labour market, but also in the perception of brands themselves and their communication. A study by Murár et al. (2024) highlights that the integration of AI into the management of brand voice on social media brings new opportunities for personalization, but also challenges related to authenticity and credibility of communication. These findings raise the question of how designers can use AI to align visual and textual brand communication while maintaining consistency and human presence.

5 Summary – the Future of Design in the Era of AI

The conclusion of the chapter highlights the essential role of the human designer in a world of increasingly sophisticated AI tools. Despite the capabilities of AI, which can automate repetitive tasks and generate creative variations of designs, the key element of originality and value remains in human creativity and decision-making. The term “made by human” symbolizes the uniqueness of the human contribution, which is particularly evident in the ability to adapt AI results to emotional and cultural contexts, ensuring their authenticity and meaningfulness.

The work highlights the need for harmonious collaboration between designer and AI, where AI serves as a tool to foster creativity and productivity. The main challenge remains to find a balance between technological capabilities and the human touch, so that the final output does not lose originality and aesthetic value. The future perspective shows that technology, if used properly, can expand the possibilities of design without stifling human creativity.

In this context, the paper appeals to the social responsibility of designers in using AI to ensure that the resulting works represent not only technological advances, but also the values and visions of designers, thus retaining the stamp of “made by human”.

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THE INTEGRATION OF THE DESIGN THINKING METHOD IN THE EDUCATIONAL MODELS OF THE MARKETING COMMUNICATION: HUMAN INNOVATION IN THE AGE OF ARTIFICIAL INTELLIGENCE

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Abstract:

With the advancement of artificial intelligence and its applications in various marketing fields, it is essential to adapt educational models to reflect current innovations and technological advances. One such innovation is the Design Thinking method, which is increasingly being applied in various fields, including education, due to its potential to foster creativity, critical thinking and problem solving. This paper explores the integration of Design Thinking into educational models for marketing communication. It examines the theoretical underpinnings of Design Thinking, emphasising its user-centred approach and problem-solving processes. The paper also examines educational models in marketing communication, focusing on how pedagogical approaches can be adapted to effectively bridge theory and practice. Furthermore, the study includes the results of an empirical survey that explores the integration of Design Thinking courses into university programmes. The findings highlight the challenges, opportunities and best practices associated with incorporating this innovative methodology into higher education curricula, with the aim of enhancing the quality of teaching and preparing students for the dynamic marketing industry.

Key words:

Artificial Intelligence. Design Thinking. Educational Models. Innovative Methods. Marketing Communication.

1 Introduction

Today, when education is undergoing significant changes due to technological innovations, the integration of modern approaches such as Design Thinking (DT) into educational models is essential to effectively equip students with the necessary skills. With the rapid development of artificial intelligence (AI) and its application in all areas of life, teaching practices are gradually adapting to the new demands of the labour market, which require not only technical, but also creative and analytical skills. In the field of marketing communications, which combines knowledge of technology, media and consumer behaviour, Design Thinking is a valuable tool for developing the skills needed for creative and innovative problem solving.

The Design Thinking method is based on iterative, user-centred problem solving, incorporating elements of empathy, ideation, prototyping and testing. It originated in the context of design, but because of its versatility and adaptability, it has also found application in education. Educational institutions are increasingly using the DT method to develop students' ability to solve complex problems effectively and to promote interdisciplinary thinking. Several older and more recent studies (e.g., Brown, 2009; Lockwood, 2010; Henriksen et al., 2017) show that this approach enhances students' creativity, adaptability and collaborative skills, which are key factors for success in the dynamic environment of marketing and communication.

The development of these skills is particularly important in the context of the increasing use of artificial intelligence (Montenegro-Rueda et al., 2023; Cingillioglu et al., 2024). As Tülübaş et al. (2023) and Ouyang and Jiao (2021) point out, although AI can

perform various activities efficiently, its frequent use, especially in school settings, can lead to the elimination of students' ability to work creatively and independently.

In the field of marketing and marketing communication, these skills are essential, and perhaps the integration of DT into marketing communication educational models can be considered particularly beneficial. In addition, the DT method allows students to identify user needs, design original communication strategies and reflect market dynamics through practical exercises and real-life scenarios in line with current digitalisation trends.

The importance of using the DT method in marketing communication also lies in deepening empathy with customers and developing the ability to think innovatively. DT enables academic knowledge to be linked to real market situations, allowing students to gain practical experience and the ability to apply theoretical knowledge in practice. This is particularly important at a time when artificial intelligence is disrupting traditional processes and the skills required for marketing are constantly evolving. Integrating DT into marketing communications education models is therefore a step towards modern and flexible teaching that prepares students for successful professional practice in the age of digital innovation.

2 Defining Design Thinking in the Context of Education

Design Thinking (DT) is a method that promotes a creative approach to problem solving, empathy and collaborative learning. It was originally developed for innovation processes in design and business. However, as Brown (2009) and Meinel et al. (2011) point out, its principles have been promoted in education over the last decade.

DT involves a series of steps that promote empathic understanding of needs, identification of key issues, idea generation, prototyping and testing of solutions in practice. According to Meinel et al. (2011), it is these steps that can serve as an effective tool to improve student engagement and motivation, especially at a time when education is facing difficult technological challenges.

Several studies (e.g., Razzouk & Shute, 2012; Koh et al., 2015; Henriksen et al., 2017) show that this method can contribute to the development of students' creative and critical thinking and has a wide application in different educational contexts. Henriksen et al. (2017) state that DT leads to the creation of a richer and more interactive curriculum, where students are supported in solving real-world problems. Koh et al. (2015), on the other hand, emphasise that DT enables educators to tailor content to students' individual needs and interests, thereby increasing the effectiveness of instruction.

Design thinking is often used in education as a tool to help students develop the skills needed to solve real-world problems. Henriksen et al. (2017) emphasise that the DT method in an educational context means adopting a methodology that is not just about learning a specific skill or concept, but about an overall approach to learning as a creative and interactive process. Thanks to its user-centred (in this case, learner-centred) approach, DT allows for the creation of learning models that respect individual needs and different learning styles.

Carroll et al. (2010) point out that one of the main benefits of DT in education is that it encourages students to actively solve real-world problems and contributes to greater student engagement. In this context, design thinking not only helps to overcome static models of learning, but also promotes the ability to adapt to changing environments, which is particularly important in an age of rapid technological advancement.

The results of studies (Estrada and Goldman, 2016) show that students who learn using the DT method demonstrate improved skills in problem solving, teamwork and critical thinking. In turn, research by Razzouk and Shute (2012) showed that students were more motivated and engaged when they engaged in active learning and creative challenges.

Henriksen et al. (2017) also report that DT helps students make a deeper connection to the topics they are learning, which enables them to better master practical challenges.

According to Henriksen et al. (2017), DT enables the creation of a curriculum that is dynamic, learner-centred and promotes student engagement in the learning process. This approach also develops flexibility and the ability to adapt to change, which are essential skills for life in the digital age. Razzouk and Shute (2012) emphasise that DT is an effective tool for promoting critical and analytical thinking, which is important for preparing students to solve complex problems in the future.

However, the implementation of the DT method in education requires systematic preparation and specific training for teachers who implement this methodology in their pedagogical approach. Koh et al. (2015) found that DT can be used through a so-called five-step model, which starts with creating empathy and ends with testing the solutions created. This model has been shown to be effective not only in higher education contexts, but also in primary and secondary schools, where it promotes not only creative thinking but also collaborative skills in students.

Guha, McNally and Fails (2016) add that the DT process itself has been shown to be effective for students in developing critical skills such as analysis, synthesis and evaluation of information. These skills are particularly important in the context of courses with a strong emphasis on practical applications, such as those in science or engineering. However, as Razzouk and Shute (2012) add, DT can also benefit the humanities and social sciences, where it develops students' ability to understand problems from multiple perspectives and consider broader contexts.

The introduction of DT into educational models can face various challenges and limitations. Koh et al. (2015) suggest that DT requires sufficient time to work with prototypes and testing, which is often problematic in school schedules. Carroll et al. (2010) emphasise that effective implementation of DT requires specialised training for teachers to master new approaches to teaching. Henriksen et al. (2017) suggest that some school environments are concerned about redefining traditional methods, especially when measurable benefits are not clearly defined.

2 Methodology and Research Questions

The aim of the study is to find out the current experiences of teachers working at the Faculty of Mass Media Communication at the UCM in Trnava (FMK UCM) with the integration of DT methods into the teaching process. In order to achieve this goal, we conducted our own empirical research with the following research questions

RQ1: What are the teachers' experiences with the Design Thinking method in education?

RQ2: How have teachers acquired knowledge about the DT methodology?

RQ3: What are the perceived benefits of the Design Thinking method on student outcomes such as creativity, engagement and critical thinking, and how can these benefits be systematically measured?

RQ4: What strategies can be put in place to bridge the gap in practical application and experiential learning opportunities for educators familiar with Design Thinking?

The basic ensemble consisted of teachers working at the FMK UCM in Trnava. In total, excluding doctoral students and lecturers, there are 72 teachers working in different positions. 67 lecturers participated in the survey, which represents a sample coverage of 93.1%. The data was collected by means of an electronic questionnaire.

In order to verify the sample size, we used Cochran’s formula, which specifies the minimum sample size.

$$n_0 = \frac{z^2 \cdot p \cdot (1 - p)}{e^2}$$

Where:

$z = 1.96$ for 95% confidence.

$p = 0.5$ (worst case).

$e = 0.05$ (5% margin of error).

Calculation:

$$n_0 = \frac{1,96^2 \cdot 0,5 \cdot (1 - 0,5)}{0,05^2} = \frac{3,8416 \cdot 0,25}{0,0025} = 384$$

As there are only 72 respondents in the base set, we made a correction:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}} = \frac{384}{1 + \frac{383}{72}} = \frac{384}{6,3194} \approx 60,7$$

The minimum sample size for a relevant survey is around 61 respondents.

The structure of the respondents is shown in Table 1.

Table 1: Structure of respondents by gender, age, educational level and length of teaching experience

Gender		
Female	39	58.21%
Male	27	40.30%
Age		
25-34 y	30	44.78%
35-44 y	18	26.87%
45-54 y	10	14.93%
55-64 y	4	5.97%
65+ y	5	7.46%
Level of education		
Master	17	25.37%
Doctoral	33	49.25%
Assistant professor / lecturer	10	14.93%
Professor	7	10.45%
Length of experience		
1-10 y	36	53.73%
10-15 y	9	13.43%
15+ y	22	32.84%

Source: own processing, 2024

3 Integration of Design Thinking in Educational Models at FMK UCM in Trnava

Over the past few years, the DT method has been gradually introduced into the educational and teaching process at the Faculty of Mass Media Communication. The aim is to encourage students to solve complex problems efficiently and at the same time to promote creativity and cooperation.

Several interesting findings emerged from the survey results. Almost half of the respondents are actively familiar with Design Thinking, suggesting that it has made significant inroads into the respondent group. There is still a significant gap (37%) in awareness or in-depth understanding, suggesting opportunities for further education or training initiatives. The high proportion of those with personal experience underlines its growing acceptance as a practical methodology in relevant fields. However, the group with indirect or no experience highlights areas for improvement in terms of accessibility and practical exposure. More detailed results are shown in Figure 1.

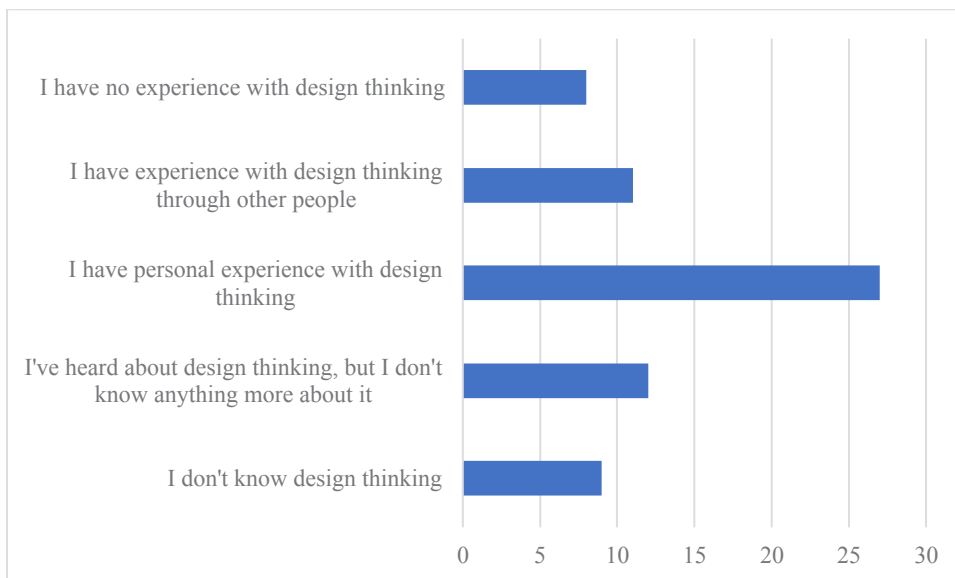


Figure 1: Experiences with design thinking method in education
Source: own processing, 2024

In the next section we looked at how teachers acquired knowledge of DT methodology. Almost 56% of respondents acquired their knowledge through courses and seminars in educational institutions. This suggests that formalised training at universities, colleges or similar organisations is the most common and accessible way to learn Design Thinking.

Self-study and online resources were used by 23% of respondents. This reflects the growing availability and appeal of independent and flexible learning through online platforms or materials.

Only 1 respondent gained knowledge by participating in actual design projects. This suggests a potential gap in experiential learning, which is critical to fully understanding and applying the principles of design thinking.

17% of respondents reported “other” sources of learning. This category could include mentoring, informal workshops or industry-specific training, but requires further clarification for effective analysis.

Figure 2 shows the results in more detail.

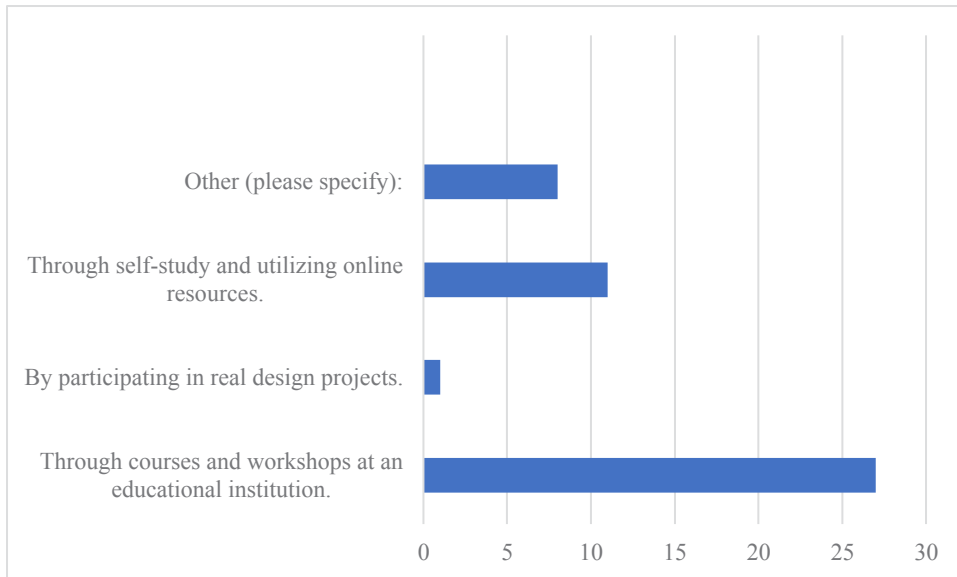


Figure 2: Way how teachers acquired their knowledge of DT methodology
Source: own processing, 2024

Finally, we focused on teachers’ experiences of using innovative methods (including design thinking) in the teaching process. The aim was to find out whether this method helps to improve students’ performance; whether students are more engaged in the teaching process; whether they acquire better knowledge and skills in each subject; whether they are more creative, more skilled in critical thinking, better prepared for working life; whether they are more involved in the teaching process during the lesson; whether these methods are able to improve interaction with students; whether they achieve better learning outcomes and promote and develop pedagogical skills. The results are presented in Table 2.

Table 2: Statements based on your previous experience in using innovative methods in teaching process

Students are more involved in the learning process	Strongly agree:	16	23.88%
	Agree:	42	62.69%
	I don’t know:	1	1.49%
	Disagree:	2	2.99%
	Strongly disagree:	0	0.00%
Students better acquire knowledge and skills of particular classes	Strongly agree:	26	38.81%
	Agree:	31	46.27%
	I don’t know:	7	10.45%
	Disagree:	1	1.49%
	Strongly disagree:	0	0.00%
Students are more creative	Strongly agree:	32	47.76%
	Agree:	27	40.30%
	I don’t know:	2	2.99%
	Disagree:	2	2.99%
	Strongly disagree:	1	1.49%
Students are better in critical thinking	Strongly agree:	15	22.39%
	Agree:	34	50.75%
	I don’t know:	12	17.91%
	Disagree:	5	7.46%
	Strongly disagree:	0	0.00%

Students are better prepared for the working life	Strongly agree:	18	26.87%
	Agree:	33	49.25%
	I don't know:	11	16.42%
	Disagree:	4	5.97%
	Strongly disagree:	0	0.00%
Students are more involved in teaching process during the class	Strongly agree:	34	50.75%
	Agree:	26	38.81%
	I don't know:	4	5.97%
	Disagree:	3	4.48%
	Strongly disagree:	0	0.00%
Improving interaction with students	Strongly agree:	39	58.21%
	Agree:	21	31.34%
	I don't know:	0	0.00%
	Disagree:	2	2.99%
	Strongly disagree:	1	1.49%
Students achieve better study results	Strongly agree:	10	14.93%
	Agree:	26	38.81%
	I don't know:	19	28.36%
	Disagree:	5	7.46%
	Strongly disagree:	0	0.00%
It supports and develop pedagogical skills	Strongly agree:	32	47.76%
	Agree:	26	38.81%
	I don't know:	5	7.46%
	Disagree:	0	0.00%
	Strongly disagree:	1	1.49%

Source: own processing, 2024

Almost all respondents believe that innovative methods engage students more effectively in the learning process, emphasising the interactive and participatory nature of such methods. The majority believe that innovative methods improve the retention of knowledge and the acquisition of skills. However, the “don't know” responses suggest that some respondents may lack clear evidence or experience to confirm this.

Creativity appears to be an important benefit, with most respondents observing that it is enhanced by innovative methods. While three quarters agree that critical thinking is improved, a significant proportion (26%) are unsure or disagree, suggesting that critical thinking outcomes may depend on specific methods or contexts.

Most agree that innovative methods align education with workplace skills, but over a fifth of respondents are sceptical, possibly due to a lack of direct workplace feedback. There is a strong perception among respondents that these methods promote student engagement in the classroom and encourage active participation.

Improving interaction with students is one of the strongest areas of impact, showing that innovative methods encourage greater teacher-student interaction. In terms of learning outcomes, the majority agree with improved outcomes, although almost 28% of respondents answered “don't know”, suggesting uncertainty about measurable academic outcomes.

Finally, respondents overwhelmingly agree that innovative methods improve teaching skills, reflecting benefits for both teachers and students.

4 Conclusion

Design Thinking is a key tool for developing creativity, solving complex problems and fostering teamwork. In the context of the ongoing development of artificial intelligence, which is significantly changing the nature of both education and work, DT is becoming even more important. This method promotes human skills such as empathy, creative thinking and problem solving, which cannot be fully replaced by artificial intelligence.

A survey conducted at the Faculty of Mass Media Communication at the UCM in Trnava showed that DT is increasingly being used in educational processes. A growing number of educators have adopted this method, especially in formal education at universities and workshops. These educators report that DT improves students' engagement, develops their creativity, and promotes interaction in the classroom. However, despite these positive findings, research has highlighted several areas for improvement.

One of these is the development of practical experience. Although a large proportion of educators have been introduced to ICT through formal training, only a very small proportion have gained experience through real projects. This points to the need to increase opportunities for practical applications of ICT, for example through simulations, collaboration with companies or student projects.

Another area is the promotion of independent study and online learning and the deepening of critical thinking and adaptation to practice. Critical thinking and work readiness were perceived positively, but still with some scepticism. Targeted programmes involving problem-based learning and cooperation with employers could strengthen these aspects. Finally, the evaluation of innovative methods needs to be improved. A number of educators are uncertain about the concrete impact of innovative methods on learning outcomes. Systematic evaluation and comparative studies could provide evidence of the benefits of these methods.

Finally, the survey results also indicated the existence of non-standard approaches to learning the DT method, which merit further investigation.

In order to strengthen the integration of the DT method into the teaching process, in the light of the findings we recommend strengthening the integration of DT into practice through project-based learning, creating online libraries of self-study materials and resources for teachers, and focusing on the development of specific skills needed in the labour market, such as teamwork and complex problem solving. It will also be essential to

Structured evaluation of the impact of innovative methods on learning outcomes and implementation of good practice in the curriculum.

5 Study Limitations

This study provides valuable insights into the perceptions of university teachers regarding the integration of Design Thinking (DT) into teaching practice, but several limitations should be considered when interpreting the results.

Although 67 teachers participated in the survey, representing approximately 93% of the target population, the sample size remains relatively small. Such a limited number of participants may not fully capture the diversity of perspectives within the wider teaching community, potentially biasing the results.

In addition, the sample was drawn from a single institution, which may limit the generalisability of the results to other universities, disciplines or education systems.

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THE IMPORTANCE OF ARTIFICIAL INTELLIGENCE IN THE E-COMMERCE PROCESS

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Abstract:

Artificial intelligence technology is now playing an increasingly important role in many fields. The aim of this paper was to provide a comprehensive view of the importance of artificial intelligence technology in the field of e-commerce. Based on previous research, an overview of the theoretical underpinnings of e-commerce and artificial intelligence issues was provided. At the same time, the current status of e-commerce issues in the world and in Slovakia was described, as well as the current trends of artificial intelligence in the context of e-commerce. From the previous research and the developed comprehensive view of the issue, it was concluded that artificial intelligence is nowadays a key element in the process of e-commerce. It can increase the efficiency of e-commerce, boost sales and revenue growth, and at the same time, reduce costs by effectively managing inventory, predicting customer demand, and analysing actual customer needs. Artificial intelligence technology is used in the online shopping process to improve the customer experience and, consequently, increase customer satisfaction and loyalty. These findings can help e-commerce entities in planning and decision-making to implement artificial intelligence technology in the enterprise in order to gain a competitive advantage.

Key words:

Artificial Intelligence. E-commerce. Electronic Commerce. Online Consumer. Online Purchasing.

1 The Nature and Importance of E-commerce

The development of new technologies in the early 1990s transformed the Internet into a commercial medium that transformed businesses around the world. As part of the process of adapting to advanced technologies, they gradually began to implement e-commerce. It is the application of digital technologies to business processes within a company. E-commerce refers to any form of commerce using information and communication technologies, with the main actors being businesses, consumers, and government (Ferrera & Kessedjian 2019). Laudon and Traver (2021) list eight unique characteristics of e-commerce that influence how businesses operate, challenge traditional business thinking, and help explain why interest in e-commerce is growing. These are interactivity, personalisation and customisation, social technologies, universal standards, global reach, richness and complexity, ubiquity and information density. These unique characteristics of e-commerce suggest many new possibilities for marketing and sales – a powerful set of interactive and personalised information is available that can be delivered to segmented target audiences.

The essence of e-commerce is the buying and selling of products or services over the Internet. This form of shopping brings with it a number of benefits for both customers and sellers. For consumers, it is a more convenient and faster way of shopping than shopping in a brick-and-mortar store. The customer does not have to physically visit a brick-and-mortar store, thus saving time. They also have a wide range of products, services, and brands to choose from, and they can compare products, prices, and reviews through comparison websites. Online stores offer customers discounts that are not available in a brick-and-mortar store. A consumer can make a purchase anytime and anywhere as the availability of online shopping is not limited by time or space and access is 24/7 (Visser et al., 2018; William, 2024). On the other hand, for businesses, e-commerce is a source of competitive advantage over businesses with traditional ways of doing business. It allows all businesses in the world to access a global online

marketplace where they generally have an equal chance to compete with each other. Online retailers can use a variety of online tools to identify customer needs and requirements, which can ultimately lead to easier acquisition of new customers. E-commerce provides a wide reach, thus achieving more customers served and more orders, easier feedback and subsequent adaptation and modification of the products and services offered based on changing customer requirements and preferences. Sellers are better able to provide information about products or services and can operate an online store at lower operating costs than a brick-and-mortar store, lower costs for staff, transportation, or materials (Nisar & Prabhakar, 2017; Chaffey et al., 2019).

E-commerce is the result of economic, scientific, technological and cultural development. The development of e-commerce is changing the way enterprises conduct business and people's consumption behaviour and is making a significant contribution to the progress of the global economy. Nowadays, as the importance of the Internet is increasing, online trading is becoming a source of competitive advantage for sellers. It is necessary to monitor trends in online shopping and changes in the purchasing behaviour and preferences of online shoppers in the rapidly evolving Internet environment. On this basis, online retailers can adapt their product and service offerings to consumers' shopping habits and meet their needs. The adoption of e-commerce in an enterprise requires a fundamental modification of current business models and enterprise activities, as well as the implementation and use of sophisticated digital technologies (Kim et al., 2017; Song et al., 2019).

2 The Nature and Importance of Artificial Intelligence Technology

Innovation and more efficient use of technology have led to the creation of intelligent systems that can manage and monitor business models with reduced human involvement. The development of artificial intelligence has brought tremendous economic benefits to mankind, brought benefits in all aspects of life, and greatly promoted social development, bringing it into a new era (Duan et al., 2019). Artificial intelligence is regarded as a new interdisciplinary technological science that develops theoretical methods, technologies, and applications to simulate and augment human intelligence. The application of artificial intelligence has been explored in industries such as healthcare, business, education, manufacturing, marketing, and financial management (Ying et al., 2018; Lu & Xu, 2019; Európsky parlament, 2023).

Artificial intelligence can realise the automatic operation of mental work by simulating and augmenting human intelligence. Artificial intelligence systems can work autonomously and adapt their behaviour to some extent based on the analysis of previous actions (Song et al., 2019; Európsky parlament, 2023). The key capabilities generated by AI include forecasting, planning, and learning. More importantly, however, AI capabilities are not independent - they interact and collaborate with human capabilities to create business value in terms of efficiency and effectiveness. Artificial intelligence has the potential to surpass the intellectual and physical capabilities of humans, offering opportunities for increasing productivity and performance. For artificial intelligence to perform at its best in the enterprise, it needs to be effectively integrated with existing business processes. Artificial intelligence can reliably perform computational tasks and automate repetitive learning. It is also able to analyse large amounts of data more accurately and deeply and make the most of it (Swathi et al., 2019; Dwivedi et al., 2021).

AI systems should have capabilities such as information processing for natural language communication, the ability to store and present information, automatic reasoning - using stored information to answer questions and draw new conclusions, and machine learning to adapt to new circumstances and to detect new patterns of behaviour. At the heart of AI is intelligent technology, which is used to develop intelligent tools similar to human mental work. These tools can react instantly upon receiving control commands (Huang & Rust, 2018; Song et al., 2019). Other means of artificial intelligence include expert systems, decision support systems

or machine learning (Zhang & Yang 2021). One of the means used by artificial intelligence is fuzzy logic. It is a tool that can computationally represent human actions, processes and interpret information and knowledge as if it were performed by a human. Proper use of fuzzy logic in conjunction with artificial intelligence enables better planning, objective expert evaluation and risk assessment, rational decision-making and management. It can also help eliminate errors associated with human error (Kelemen et al., 2019; Polishchuk et al., 2019).

Human intelligence often seems to be limited when performing certain tasks in e-commerce. This is particularly the case for predicting demand and supply chain mechanisms. It is in these cases, which are challenging for businesses, that artificial intelligence appears to be a suitable tool (Soni et al., 2019). Shankar (2018) states that artificial intelligence helps to increase the profitability of e-commerce through all available tools, helping to improve personalised recommendations and payments. It also improves customer relationship management, logistics management and inventory optimisation. The rapid development of AI in terms of its ability to make decisions under complex and unpredictable circumstances in manufacturing environments in recent years is primarily due to increased investment in innovative technologies and the availability of large amounts of data (Bughin et al., 2018; Cusumano et al., 2024). Studies estimate that by 2030, it is likely that 70% of businesses will be using some form of AI technology within their business processes and activities. The adaptation and deployment of AI in enterprises in integration with advanced technologies will become increasingly popular (Soni, 2020).

3 Current State of E-commerce in the World and in Slovakia

Easier access to computers, the modernisation of countries around the world and the increased use of smartphones have given consumers the opportunity to use the Internet more often and more conveniently. However, the growth in internet use is often also linked to the current state of development of information and communication technologies and networks. Out of a total population of almost 7.7 billion people, there were approximately 5.3 billion registered Internet users as of 31 January 2024. In 2023, 2.64 billion customers used online shopping. Global retail e-commerce sales for 2023 were US\$5.8 trillion. In 2026, turnover is projected to be US\$7.5 trillion (Chevalier, 2024).

As of 1 January 2023, there were approximately 1.05 billion Internet users in China, 692 million in India, and 311.3 million Internet users in the United States, with the largest group of Internet users being those aged 25-34, and English being the most widely used language on the Internet. China is the world's leading online market, followed by India and the United States. Overall, East Asia is the region with the highest number of internet users in the world, while Northern Europe is the region with the highest global internet penetration rate. Compared to countries such as Iceland or Denmark, which have internet penetration rates close to 100%, China's internet penetration rate is relatively low at 74.9%. This failure can be explained by the slow progress of digital infrastructures in remote regions, which can still be observed in many other parts of the world. As the Internet has become an indispensable tool for information, communication and entertainment, the average daily time spent on the Internet per capita is increasing every year. In 2023, users spent an estimated average of 397 minutes per day on the Internet (Petrosyan, 2024).

Over the past decades, the Internet has also changed the way products and services are bought and sold around the world. Figure 1 shows the evolution of the number of internet users and online shoppers in the European Union (EU) over the period 2017 to 2023, expressed as a percentage. In all years, there has been an increase in both internet users and online shoppers, indicating a growing trend in the use of digital technologies also for shopping purposes.

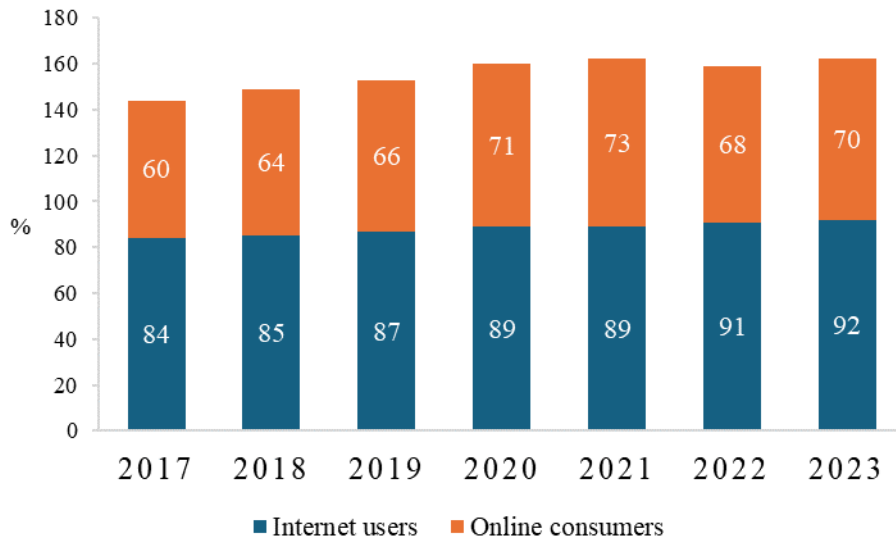


Figure 1: Share of internet users and online shoppers in the EU 2017-2023
 Source: own processing, 2024, according to Eurostat (n.d.)

As consumers increasingly shop online, global retail sales from e-commerce are growing every year. Among EU countries, Germany and France are among the top 10 countries with the highest global e-commerce retail sales in 2023. Germany ranks 7th with \$97 billion in sales, followed by France in 10th place with \$79 billion in sales (Oberlo, n.d.). The internet usage rate in Germany is 93%. Online shopping in the country is growing every year, as evidenced by the number of e-shops, which currently number more than 170,000. German shoppers prefer to pay for goods in cash and do not like to pay in advance. During the COVID-19 pandemic, online sales grew, especially in the food, drugstores, and medicine categories. The proportion of online shoppers over 60 years of age also increased. The proportion of internet users in France is at 85%. The number of e-shops is now more than 200,000. The most popular payment method is card payment, followed by online payment, and the most frequently purchased goods are clothes. During the pandemic period, French consumers have largely started to use fast e-commerce with fast delivery, especially in the food category (Retailys, 2024).

The importance of online shopping in the context of B2C e-commerce is also growing in the Visegrad Four (V4) countries. The Slovak Republic can compete with many large European countries in terms of e-commerce growth. There are more than 15 630 e-shops registered in Slovakia. Of the 94% of Slovak internet users aged 16 to 76, 66% used online shopping in 2023. The top-selling online product categories in Slovakia were clothing, furniture, medicines and food supplements. Within services, consumers mostly used online food delivery and grocery services. Among payment methods, cash on delivery is the most common payment method for Slovak consumers, followed by online payment by card. When delivering orders, they prefer home delivery by courier companies or by Slovak Post (Eurostat, n.d.).

The Czech Republic is the fastest-growing e-commerce market in Europe. There are currently more than 50,980 e-shops operating in the Czech Republic. In 2023, 95% of Czechs aged 16+ used the Internet, of which 69% made online purchases. Clothing was the top-selling product category purchased online in the Czech Republic, followed by cosmetics and homeware. Within services, it was delivery services, accommodation services and streaming platform services. When paying, Czech consumers prefer bank transfers, followed by cash on delivery and online card payments. Among the different delivery methods, they prefer Packet (Czech E-commerce, n.d.).

In Poland, e-commerce is mainly made up of small and medium-sized enterprises. Currently, approximately 42 100 e-shops operate in the Polish market. Among the Polish population aged 16 to 76, 92% were internet users, and almost 50% of them shopped online in 2023. Clothing and homeware were the most frequently purchased categories. In terms of payments, Poles prefer to pay via their payment system Blik and pay by bank transfer. The most commonly used delivery method for orders is delivery by courier company to the customer's address (Eurostat, n.d.).

In Hungary, online shopping represents only a small part of retail activity and is growing at the slowest pace among the V4 countries. The most frequently purchased products in Hungary in 2022 were clothing, electronics and books. Cash on delivery is the predominant method of payment, which also reflects the distrust Hungarians feel towards online purchases. However, electronic payment by card is also increasingly gaining ground. Of the different delivery methods, courier delivery is preferred. In 2023, 96% of Hungarians were internet users and 59% of Hungarians aged 16-76 shopped online, a 20% increase compared to 2020 (Medve, 2024).

Increase in purchases on foreign markets. Online retailing is currently the fastest-growing retail sales channel, with the fastest-growing customer base and an ever-expanding range of goods (Chaffey et al., 2019). An increasing number of consumers are also choosing to shop online with foreign online retailers, largely due to the geographical limitlessness of the shopping experience. Consumers living in EU Member States are increasingly using online shopping outside their home market. The share of online purchases from other EU countries is also rising because EU consumer legislation gives them in some cases greater advantages than online retailers in their home market. In 2023, an average of 19% of consumers living in an EU Member State shopped online for products from other EU Member States' markets. This is a 7% increase compared to 2013. Almost 12% of consumers shopped from other non-EU countries in 2023, an increase of 6% compared to 2013 (Eurostat, n.d.).

M-commerce is on the rise. M-commerce or mobile e-commerce refers to the use of mobile devices to conduct online transactions. This involves the use of a wireless network to connect a tablet or smartphone to the Internet, through which the consumer can then make online purchases of products or services, book accommodation, use various financial services and access online content. Factors currently driving the growth of m-commerce include the increased amount of time consumers are spending using their smartphones, larger smartphone screens, superior responsive design, payment security, and better mobile search. Today, 5.44 billion people use a mobile phone, representing 68% of the world's total population, and the average daily time spent on the Internet via smartphone per user is 5 hours 1 minute. In 2023, up to 53% of global retail e-commerce sales were generated through m-commerce, up from 40% in 2017. China, the United States, the United Kingdom, Japan, and South Korea are considered to be the largest mobile commerce markets. In Q4 2023, South Korea (44.3%) and Chile (37.7%) had the highest proportion of internet users who bought something online via smartphone each week, with the global average being 29.3% of users. Emerging e-commerce markets in mobile-oriented economies are a big driver of this trend. Retail m-commerce is projected to grow by more than 20% annually over the next period, and the number of consumers making online purchases via mobile devices is expected to grow as well (Laudon & Traver, 2021; Kemp, 2023).

The growing trend of local e-commerce. Local e-commerce is a form of e-commerce that focuses on engaging consumers based on their current geographic location. It is most commonly defined as the use of any online or mobile tool, service or technology by local merchants and customers. Local retailers use a wide range of online marketing tools to encourage consumers to visit their brick-and-mortar store or to place an order from their online store. A customer can order a product from a retailer who will deliver the goods to the customer

from the nearest location. This significantly reduces the time and cost of logistics for the retailer, while creating a degree of trust between the two parties. This is primarily due to the fact that the consumer is buying from a nearby or local retailer or store. One of the advantages that many customers appreciate about local retailers and shops is the possibility of same-day delivery. Even next-day delivery after an order is a welcome improvement over previous experiences where customers had to wait several days for the products they ordered to arrive at their door (Laudon & Traver 2021).

The popularity of social networks. Nowadays, s-commerce is also gaining popularity. This is a subset of e-commerce, encompassing social media and online media that encourage social interaction with users to aid in online buying and selling. Brand interactions on social media are important for retailers as active social media users can reinforce the brand, increase brand awareness, engage in peer-to-peer communication, and thus stimulate online purchase intent. In the past, the purpose of social platforms for retailers was to connect with customers and inspire them to buy. Nowadays, customers can use social platforms to make the actual purchase (Lam et al., 2019; Loureiro et al., 2019). The number of social media users reached 4.67 billion at the beginning of January 2023, which is currently equivalent to 59.4% of the world's total population. The average daily time spent using social media increased by 3.5% year-on-year to 2 hours and 31 minutes. Men are more represented among social platform users (53.7%). 49.5% of users in 2023 browsed news from their favourite brands on social platforms, 27.3% of users were looking for inspiration to buy and 25.9% searched for specific products or services with the intention to buy them. Users visited an average of 7 social platforms per month, with Facebook, YouTube, Whatsapp and Instagram being the most used social platforms. Within the V4 countries, Facebook dominates as the most popular social platform (Kemp, 2023). A survey by the Digital Marketing Institute (2024) showed that 82% of people trust information on social networks when making purchasing decisions, 86% of women use social networks to get buying advice from influencers, 41% of Twitter users have planned their purchase based on a tweet, and 60% of consumers have been influenced by social networks or a blog when making a purchase.

4 Current AI Trends in the E-commerce Process

Digital commerce has evolved over the years, and as customer demand and requirements constantly change, artificial intelligence systems are now required. Artificial intelligence technology is one of the driving forces behind innovation in e-commerce. By introducing AI, online stores can not only streamline the shopping process itself, making it easier for customers and avoiding complaints or returns, but also save on the cost of running an e-shop (TouchIT, 2024).

Use of virtual assistants - Chatbots. The online shop website is available to customers around the clock, day and night, with 24-hour customer support supported by virtual assistants or chatbots. The chatbot's primary function is to automatically answer customer questions, respond to simple voice commands, and provide product recommendations using a natural language processing system. A chatbot can also be defined as a type of software application that uses artificial intelligence to carry out an online conversation via text or voice medium with consumers who visit a given website or application. Chatbots are able to respond to customer questions and requests, they can help consumers find suitable products and services, check the status of an order, compare different products or services and help consumers to pay. In case of complaints or queries, they direct customers to customer service support staff who will further attend to them (Song et al., 2019). A study by Maynard (2019) reports that demand using AI is forecast to increase between 2019 and 2024, and that chatbot interactions will reach 22 billion in the same period, up from 2.6 billion.

Virtual and augmented reality. This is an interactive experience of a real-world environment where objects found in the real world are enhanced by a computer. In virtual reality, the real product is displayed in a digital environment or world. Vendors can show consumers the product in virtual reality to get a better idea of how the product looks and functions. A common example is 360° videos. In the case of augmented reality, it is about connecting the real world with the digital world. Online retailers are implementing the ability to virtually try out a product on their websites. Consumers can try on a product of their choice, for example, clothes ‘right on them’ or furniture ‘right in their room’. Brands are gradually using this technology to improve both the consumer experience and the decision-making process and to increase sales. For online retailers, virtual and augmented reality presents a suitable opportunity to eliminate the disadvantage of not being able to try a product when selling online, which in turn can attract customers and improve relationships with them (Visser et al., 2018; Charlesworth, 2018).

Application of the recommendation tool. Using artificial intelligence algorithm, it is possible to implement statistical programming, forecasting and analysis of consumer behaviour, large data sets and predict which products have the potential to attract customers. The algorithm is able to record key information related to the product being searched for based on recent searches by potential customers. The recommendation tool will then generate relevant suggestions for the browser and display them to the consumer in question, which will ultimately help customers quickly find the product they are looking for (Kumar & Trakru, 2019; Pallathadka et al., 2023).

The popularity of visual and voice search. With the help of artificial intelligence, it is possible to implement visual and audio search on websites, which is based on image and audio processing algorithms. Customers can search for a product using an image or voice, and there is no need for them to enter keywords in the search (Charlesworth, 2018; Pallathadka et al., 2023). In a visual search, a potential customer uses an image or photograph as input instead of a conventional text search. Either they directly take a picture of an object or text, or they upload an image, which is then recognised by the search engine and displayed in the search results. Voice search, on the other hand, allows the customer to use spoken words as input and find results through the system’s transcription of a given audio track. Voice search works on the basis of intelligent natural speech recognition and processing technologies. In the search results, the user is then provided with either a spoken answer or relevant text or image results (Melumad, 2023). AI-based innovations, such as Visual Search or Virtual Mirror, are tailored to improve customer interaction and eliminate the gap between the physical and virtual shopping experience (Maynard, 2019). Globally, voice search was used by an average of 21.7% of internet users per week in H1 2023, while image search tools were used by an average of 28.4% of internet users per week (Kemp, 2023).

Digital technologies continue to transform the way manufacturers, suppliers and consumers around the world connect, communicate and do business with each other. As a result, e-commerce trends are also constantly changing. Consumers are spending more and more time using both technology and shopping online, so it is important that retailers pay sufficient attention to this, researching their wants and needs, but also the factors that influence their buying behaviour.

5 Conclusion

The aim of the paper was to provide a comprehensive view of the importance of AI technology in the e-commerce process. Drawing on previous research, the nature and significance of e-commerce and artificial intelligence technology were identified. Subsequently, the current trends of e-commerce in the world and in Slovakia as well as the

current trends in the use of artificial intelligence technology in the process of e-commerce were described.

The study highlights the importance of AI technology and points to its use in the e-commerce process. Artificial intelligence plays a key role in the modern e-commerce process as it increases efficiency and improves customer experience. With AI, online retailers can offer personalised product recommendations based on customer preferences, leading to increased sales. Artificial intelligence also helps optimise logistics and warehouse management by analysing data and predicting demand, thereby reducing costs. Customer service is available 24/7 thanks to chatbots, increasing customer satisfaction. In conclusion, when combined with user behaviour analysis and process automation, AI technology can bring significant competitive advantage to e-commerce players.

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POLITICAL COMMUNICATION AND ARTIFICIAL INTELLIGENCE: ANTICIPATED PROBLEMS AND UNEXPECTED SOLUTION

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Abstract:

The paper summarizes and comments on the basic topics related to using artificial intelligence in political communication and journalism. Initially it presents the areas of risk and conflict, as they were identified by journalists in newsrooms and the professional public and authors looking into the ethics of journalism and, in particular, communications. It then goes on to give an overview of the first normative and regulatory initiatives, that being at both the international level and within the news organizations of states. It provides a case study of those Czech media houses (both public and private) that have already reflected the risks of AI in their ethical codes, the issues and problems that were focussed on and how detailed this reflection was (as of September 2024). The second part looks at (potentially) positive areas where AI can improve the quality of journalistic practice and outputs or even the quality of the public sphere overall. It concludes by opening the question of using artificial intelligence to analyse objectivity and balance in political coverage and journalism, as required by the Czech Republic's legislation concerning radio and television broadcasting.

Key words:

Artificial Intelligence. Code of Ethics. Communication Ethics. Czech Republic. Media Regulation. Political Journalism.

1 Introduction

Although the automation of search and research activities in newsrooms is not a particularly recent question, the pervasive infiltration of artificial intelligence in journalism¹ is increasingly being seen as a technological revolution (Tejedor et al., 2020; Tejedor & Vila, 2021). In the news reporting ecosystem, its impacts can be found in three areas: firstly, in newsgathering, which includes searching for topics, events and obtaining information. Secondly, in production, which includes creating texts, images, sounds, or videos, and thirdly, distribution, which includes news delivery processes, strategies for interacting with the public, personalising content, or techniques for attracting subscribers (Diakopoulos, 2019). It is primarily the second area, concerning the new dynamics brought about by the rise of generative AI, that is of concern. So, while journalists are forced to adapt to the inevitable AI future (Kulik, 2024), awareness of the possible risks raises public concerns and piques the interest of academic authors, especially those in the field of communication ethics.

2 The Main Risks

In academic journalistic production, it is possible to observe a literal flood of texts, from which several main areas of ethical concerns and challenges can be summarized and categorized.

Evidently, the most common issues discussed most often are the **transparency and veracity** of published texts and other media content. E.g. CalvoRubio & Rojas-Torrijos (2024)

¹ Author's note: Although I use the general term "journalism" in the text, I mainly have in mind political news and journalism, as indicated by the article's title.

and Codina et al. (2024) emphasize that the use of AI for analysing and creating news often means the content's origin is unclear giving rise to doubts about its authentic human **authorship**. Secondly, questions arise about how authentic or factually correct the information presented actually is (see the documented tendency of AI to “hallucinate” if there is deficient source data), which, when taken together, can undermine trust in the media and journalism in general (Ioscote et al., 2024, Noain-Sánchez, 2022).

Another broad problem is **data and algorithmic bias**. The authors warn that AI models often reflect prejudices and biases that are hidden in the training data. AI necessarily starts from a sum of those that already exist, which contain culturally conditioned patterns, and so it has a tendency to unintentionally replicate these patterns in ostensibly new results. As a result, this can lead, for example, to unequal access to information and public communication in general, and secondly, to the strengthening of stereotypes, intergroup antagonisms and discrimination against minorities (Gutiérrez-Caneda et al., 2023; Noain-Sánchez, 2022; Waddell, 2019). For that matter, the use of AI technology to gather, store, and share large data sets raises ethical concerns regarding governance, quality, security, standards, privacy, and **data ownership** (Zandi et al., 2019).

The “a priori” necessity to have human checks over AI in both of the above-mentioned areas raises concerns about **insufficient human supervision** and control (or even their loss). If the media relies exclusively on AI for content creation and data collection, it can lead to a situation where AI spreads false or biased information with no ethical filter whatsoever. Human supervision is seen as necessary to ensure that content meets ethical standards and is carefully verified. There is a concern that AI, which can generate content quickly, may become a tool for the creation and uncontrolled spread of disinformation (Calvo-Rubio & Rojas-Torrijos, 2024).

Leaving aside the newly created positions of “AI editors/reviewers” in newsrooms, AI quite obviously **threatens employment** in the media, especially when it comes to routine tasks.

Many authors go on to postulate and warn that using AI to automate journalistic work can also weaken creativity, which is an integral part of quality journalism. These authors argue that although AI can process data and generate text, it lacks the ability to understand the nuances and context that bring human depth and empathy to news stories, ultimately contributing to **creative degradation** (Ali & Hassoun, 2019).

To summarize, it can be stated that academic reflection on using AI in journalism calls for AI to be deployed with respect to the core values of journalism, such as truth, independence and impartiality. If not guided by ethical principles, AI can easily erode and undermine these values. Most likely every text presenting the authors' interpretations in a broader social framework and the public sphere, mention the need to create **ethical frameworks and standards** to regulate AI in the media and ensure that AI contributes to developing quality journalism rather than degrading it. This ethical framework should include rules on the transparent use of AI, protecting privacy and data management (Codina et al., 2024).

3 Regulatory Efforts

The transnational nature of AI's technological systems logically brings an impetus to considerations about regulation at the supranational level.

The Paris Charter on Artificial Intelligence and Journalism, compiled at the initiative of Reporters Without Borders (Reporters sans frontières, 2023), attempted to set up ethical principles for incorporating artificial intelligence (AI) into journalistic practice. The document, the first of its kind, defines ten key principles for media and journalists to follow when using AI: (1) Human Leadership (Decision-making processes in newsrooms must remain under human control, not machine-driven), (2) Ethical Use of Technology (Media organizations should select and use technologies in compliance with journalistic ethics), (3) Content

Distinction (It is essential to clearly differentiate between authentic content and content created artificially), (4) Responsibility for Published Content (Media outlets hold full responsibility for all content published, regardless of AI involvement in its creation). (5) Independent Evaluation of AI Systems (AI systems used should undergo regular independent assessments to ensure their reliability and ethical use), (6) Global AI Governance (Media organizations should actively contribute to the global governance and regulation of AI technologies), (7) Protection of Media and Journalists' Interests (Agreements with AI technology providers should protect the long-term interests of media outlets and journalists), (8) Transparency (Media should be transparent about how and when AI is used in their work), (9) Source and Data Protection (Safeguards must be in place to protect information sources and data from misuse by AI technologies, and finally (10) Education and Training (Journalists should receive regular training on AI to understand both its potential and risks).

At national levels, implementation is far from rapid. In their article “The Ethical Revolution: Challenges and Reflections in the Face of the Integration of Artificial Intelligence in Digital Journalism” (Forja-Pena et al., 2024), the authors focused on the question of how the current ethical codes for national journalistic associations have adapted to integrate AI into journalism. The authors analysed 99 ethical codes from various countries and found that only four countries' codes² specifically mention guidelines or rules for the use of AI.

The situation is more vital among publishing houses or the general media, which see the need to amend their codes through the lens of day-to-day practice (including threats to readers' trust and the consequent economic impacts) and are thus far more active in incorporating ethical considerations over AI into their codes (Al-Zoubi et al., 2024).

4 Self-Regulation in the Czech Media Landscape

Apart from a few exceptions (Lányiová, 2014) in Czech academic production, so far, only a few student theses have provided a more comprehensive overview of the adoption and implementation of principles for using artificial intelligence (Jahn, 2019; Kupka, 2021; Kubín, 2020). However, these studies arose before the recent, very dynamic development of generative AI, which has profoundly widened the discussion about ethics and responsibility in journalistic practice.

Therefore, I have decided to attempt to fill this gap in case studies and, as part of preparing for this conference paper, I researched the current state of self-regulatory measures in Czech newsrooms.

As of the end of September 2024, it would seem that five major media houses in the Czech Republic (CR) had taken specific steps to reflect the ethical challenges associated with using AI in journalism. These organizations have either developed completely new guidelines focused on the rules for using AI, or have at least incorporated some rules into their existing editorial codes.

The **Česká tisková kancelář** (Czech News Agency) (ČTK) has the longest tradition of any news agency in the CR for integrating automation technologies into its practice³. Due to its public status, this is also reflected in its regulatory framework. Being a public institution, the

² Author's note: Belgium, Germany, Lithuania and Costa Rica

³ Author's note: “It has been using elements of automation in its news service for 30 years. Currently the ČTK Infobank has 3,500 generated news texts [...] ‘Regarding the generation of news texts, 2018 was key, when, by the way, ČTK celebrated its centenary and we first used generated texts for reporting election results. Now we are approaching the next stage – we are looking for ways to use AI tools, such as ChatGPT’ said ČTK Editor-in-Chief Radka Matesová Marková. Apart from elections, ČTK uses AI generated news reports, marked with the editorial abbreviation ‘rur’, for example, for fuel prices or traffic accident statistics, and it is preparing the automation of unemployment statistics” (Česká tisková kancelář, 2023, para. 1-2).

ČTK was established by the ČTK Act (517/1992 Coll.) (*Act on the Czech press agency*, 1992) and as such its work is bound by the “ČTK Code and the Principles for Creating News” (Česká tisková kancelář, 2024). Most recently, they were supplemented by the Principles for the Use of AI Tools at ČTK News, which have 10 points and can be roughly summarized thus: (1) Human responsibility (the responsibility for content is always borne by a human – the editorial team, not AI), (2) Support, not replacement (AI can help with speed and stylistics, but the facts must be checked), (3) Unreliability in research (AI is not a reliable source for research; it is necessary to verify all data), (4) Testing and education (editors have AI tools to research and share their experiences), (5) Routine tasks (AI can simplify routine work, discovering appropriate uses is welcome), (6) Data protection (entering sensitive corporate or personal data into AI is forbidden), (7) Transparency (if AI has influenced an article’s content, this must be stated and the details added), (8) Generating image content is forbidden (AI must not be used for images in news). (9) Compliance with the codes (all content must adhere to the ČTK Code and the principles of news production), (10) Regular updates: with the rapid development of AI, ČTK will regularly update its principles.

Of all Czech media, **Český rozhlas** (Czech Radio), another public medium, has the most comprehensive and elaborate ethical manual for using AI: “Rules for the Use of Artificial Intelligence” in Český rozhlas (S/2024/001/DG//0), issued by the Directive of the Director General of Český rozhlas on 12 January 2024, valid from 15 January 2024. They contain 8 articles (Preamble, Subject and objective of the directive, Interpretation of terms for the purposes of the AI directive, Main principles of using AI, Main risks (7 types), The process of risk assessment and approving the use of generative AI, Binding rules for specific uses in Český rozhlas (further broken down into 3 annexes) and Concluding provisions). The annexes to these rules are 1. rules for using AI to synthesise speech, 2. rules for using AI to create visual content, and 3. rules for using AI to generate source codes for programs and applications.

For the needs of this paper, the most important principles can be identified and summarized thus: (1) Human responsibility (responsibility for content is always borne by a human, not AI), (2) Support for improving content (AI serves to improve the quality and preparation of content, however, it must not be used as the main information source), (3) Transparency (Český rozhlas informs listeners if the content is created with the aid of AI), (4) Protection of privacy (AI tools must not contain sensitive data and their use must comply with personal data protection legislation), (5) Support for authentic human work (Human creativity and creators’ rights have priority over AI outputs), (6) Upholding the values of Český rozhlas (AI must be in agreement with the ethical values and rules of Český rozhlas as a public service), (7) Security and risk minimization (AI technology must not disrupt cyber and information security), (8) Ethical use (AI must not be used to generate biased or distorted information), (9) Minimizing social risks (Český rozhlas uses AI to protect the public interest and minimize the negative social impacts, including job losses or increased social inequality), (10) Special protection for children (AI must not be used in a manner that could inappropriately affect child audiences or expose them to manipulative content).

According to the published information, Český rozhlas has likewise set up a risk assessment process during systematic AI use, especially generative AI. This process should assess potential risks and the impacts on the activities of Český rozhlas and then stimulate proposals for measures to minimize them.

Of the Czech private media, the most extensive and comprehensive rules are available to the editors of **Seznam Zprávy**, which published them as a separate code (incl. preamble) on 11 April 2023, thus supplementing the original general Editorial ethical code of Seznam Zprávy. The document, entitled “Editorial principles when working with AI tools”, has 7 articles, 30 points of which can be summarized for the purposes of this article: (1) Accountability and transparency (A person – author or editor – is always responsible for the content. AI cannot be

used as the only information source, and its involvement must be transparent if relevant to the reader), (2) AI is used to boost quality, not as a main source (AI serves to improve stylistics, structure, and work efficiency, not to fact-check or as a tool for acquiring new information). (3) The generation of texts and photos for direct use is prohibited (AI generated texts and images are not published as authentic news. If generated content is published, it must be clearly indicated), (4) Copyright protection (Editors take care to respect copyright when using images and photographs), (5) Increasing productivity (Editors can use AI to transcribe interviews, translate, structure content, create subtitles and stylize audiovisual content, whilst always checking the results), (6) Security and education (The editorial staff is constantly learning so it can recognize AI-generated disinformation and manipulation).

The two remaining media outlets did not introduce new rules, but at least supplemented the existing ethical codes. The publishing house **Vltava Labe Media** has supplemented its Ethical code with “Article 10. Use of Artificial Intelligence” (Vltava Labe Media, 2024). Its main points are (1) AI’s supporting role (AI serves as a support tool, not as a substitute for human creativity and decision-making). (2) Possibilities of use (AI can be used when searching for information, translating, creating subtitles, stylising texts, monitoring social media, following trends and working with multimedia), (3) Human responsibility (The responsibility for content created using AI is always borne by the specific employee and the editorial team’s management), (4) Checking and editing (All AI outputs must be checked and edited prior to publication), (5) Staff training (Employees using AI must receive training on correct use, the risks and ethical issues), (6) Transparency (Readers will be informed about the use of AI tools and their role in content creation), (7) Ethical and legal standards (AI-generated content must respect the VLM Ethical code, human rights and the legal standards of the EU and the CR), (8) Prohibition of manipulation (AI must not be used to create manipulative or unethical content). This updated Ethical code was approved on 23 April 2024.

The most concise reckoning of the task in hand was put forward by the management of the **Economia** media house when it added Article 12 to its Ethical code (Economia, 2024), with just 3 points: (1) Primacy of human responsibility (The editors create original content and the journalist is always responsible for the published content, not AI; AI can be used for partial tasks that increase productivity, such as transcribing audio recordings, reviewing code or assisting when analysing data), (2) A ban on misleading visuals (Newsrooms do not use AI to create image content that could be mistakenly seen as authentic news material, such as reportage photography), (3) Transparency (AI-generated illustrations and content must be clearly labelled). The amended rules were adopted on 1 September 2024.

A summary of the content of these initial Czech self-regulatory attempts can further be illustrated by the public debate Quality Journalism in the Age of Artificial Intelligence, attended by representatives of the direct actors mentioned above⁴. Currently, the emphasis is on the desirable analytical and research role of AI, the generative function is approached with distrust, and the need for human editing and checks is constantly mentioned. Still somewhat on the sidelines are the issues of source data, from their encumbrance with various types of bias, through privacy issues, to their ownership and security. The guidelines are formulated in a more general and declaratory manner, while at the same time the debate strongly reflects the awareness of the rapid development of AI technology and the resulting need for constant reflection on the rules and updating them, as well as ongoing education for journalists on various aspects of using AI in their work.

⁴ Author’s note: Lenka Kabrhelová from Seznam Zprávy, science journalist Petr Koubský from *Deník N*, Editor-in-Chief of ČTK Radka Matesová Marková, moderator Michael Rozsypal (Člověk v tísni, 2023).

5 The Positives (Albeit Sometimes Only Potential)

The emergence of AI as a journalistic aid, or direct considerations of replacing a human with a machine, often results in moments and areas where there are mixed fears and hopes (Gonçalves et al., 2024).

The arise of “mere” analytical AI in the field of journalism, and especially in the area of distributing journalistic products, has opened up questions about **personalization**, which often display ambiguities in its understanding and assessment. On the one hand, AI can create “information bubbles”, where readers only receive information that corresponds to their opinions and interests. Codina et al. (2024) and Noain-Sánchez (2022) warn that this approach restricts access to diverse perspectives and contributes to polarizing public opinion. Information bubbles can lead to a one-sided view of the world and limit access to objective news. On the other hand, however, the personalization of content for readers (algorithmization) can be viewed positively, as AI allows personalized news to be created, so that it is tailored to each reader’s preferences and interests. In this way, media increases public engagement and, ultimately, under favourable conditions, leads to greater civic engagement (Ioscote et al., 2024, Gutiérrez-Caneda et al., 2023).

The expansion of generative AI inevitably opens up the issue of creating (and subsequently cyclically distributing) disinformation – nevertheless, at the same time it also brings possibilities for **detecting and neutralizing disinformation**: the bad one robot does, can be detected by another robot (something we know about from the world of viruses and antivirus programs). Lopezosa et al. (2024) discuss the possibility that in the future AI may evolve towards a better ability to distinguish between true and false information, which could result in contributing to both improving the quality of journalism and greater critical awareness among the public (and citizens) due to embracing prudence, greater criticism and checking sources more intensively.

Similarly, concerning the issue of **employment** and the degradation of creativity, some authors stress the unwelcome theme of replacing humans by machines (Gonçalves et al., 2024), while other authors hope that AI will rather **stimulate the potential of creative journalism**, i.e. interpreting facts, and putting them into context – something machines cannot yet do because they do not have a “nose for news” (Thurman et al., 2017, well-summed up for the Czech environment by Zelenka⁵). Automation is thus understood as being a liberation from routine and time-consuming tasks, such as basic research, finding suitable sources or transcribing interviews. This automation should save journalists time, allowing them to focus on more demanding and analytical tasks (Calvo-Rubio & Rojas-Torrijos, 2024; Noain-Sánchez, 2022). For approaches that thus primarily understand AI as a journalist’s helper and ally (see, for example, Beckett, 2019; Marconi, 2020), **increased productivity and reduced error rates** are mentioned: Thanks to analysing big data, AI can process and reveal relevant information, which helps eliminate errors and speeds up work processes. This allows the media to use resources more efficiently and increases productivity (Ioscote et al., 2024; Calvo-Rubio & Rojas-Torrijos, 2024). From simple considerations about easier fact-checking (Beckett & Yaseen, 2023; Newman et al., 2023; Cardoso et al., 2021; Lindén, 2017), it is then possible to come to inferences that welcome the ability of AI to process huge amounts of data – thus AI

⁵ Author’s note: How to use new technology, which, for instance, can analyse documents in an incomparably shorter time than humans, so it works more thoroughly with sources. This is a path that the reader would ultimately appreciate. Because what kind of text can AI write? It is still masterfully mediocre, the article does not offend, but nor does it captivate, and the result is just more information ballast, because, in principle, it cannot be original news. We are not yet in a state where artificial intelligence could leave the newsroom and discover something in the field or from sources, which is still the main role of journalists. Yet more resorting, rewriting or monitoring of news that has already been written is the last thing society needs from the media (Zelenka, 2023).

can be beneficial in **investigative journalism**. It helps to analyse documents faster, identify important hidden information, relationships and frameworks in multifaceted data structures, which in turn allows for in-depth analysis of complex topics and their final interpretation into stories (Noain-Sánchez, 2022).

Last but not least, AI's potential in **journalism education** is discussed – a number of studies also focus on the issue of how the new generation of journalists should be educated in the use of AI, with an emphasis on ethical principles and critical thinking.

6 In Contrast: A Machine Controlling a Human?

The research paragraphs of this text pointed out a number of areas where AI is perceived as a risk to journalism – both in practice and in its irreplaceable social function. Subsequently, in clear contrast, approaches that accentuate at least the potentially beneficial function of AI as an editorial assistant and support for the irreplaceable social function of journalism were presented.

Now, to conclude, I put forward the proposal where a robot that will control a human – a journalist – may also be beneficial.

It is not a unique opinion that AI can help maintain high journalistic standards by checking articles do not have potential bias and ensuring that reporting is balanced and diverse. Authors such as Hamborg et al. (2019) show how AI-based tools can analyse content, identify underrepresented voices or opinions, and suggest areas for improvement.

In essence, we worked on a grant project that had a similar intention. It was entitled “Balance in Radio and Television Broadcasting”⁶ – and its aim was to create a methodology for quantitative content analysis, which should help assess the balance and objectivity of radio and television broadcasting for the needs of regulatory authorities, as required by the current legislation. In the very title of the preparatory study, we stated that the entirety of a broadcast and social relevance: two current problems of applied research in media science (Křeček, 2018), by which we directly refer to the two most problematic (ambiguously understandable) points of Article 3 of the Act 231/2001 Coll., on Radio and Television Broadcasting Operation (2001).

The broadcaster shall ensure that the principles of objectivity and balance are observed in news and political-current affairs programmes and, in particular, that no political party or movement, or their opinions or the opinions of individual groups of the public, are unilaterally favoured in **the entirety of the broadcast programme, taking into account their real position** in political and social life. (*Act on radio and television broadcasting operation, 2001, § 31(3)*)

The two points are: (1) **The entirety of the broadcast**: This problem arises from the question of how broadly and comprehensively the broadcast should be assessed. Normally, according to the requirements of regulatory authorities, analyses focus only on certain programmes or parts of broadcasting, which can lead to an incomplete picture of the overall approach of the media to individual actors and topics. Choosing specific programmes rather than the whole can distort the view of media balance and impartiality, and (2) **Social relevance**: This concept reflects the importance and impact of different political actors in a broadcast according to their actual weight in society. Determining such relevance is difficult because it requires hard non-media data – for example, election results, current preferences, but also other factors that point to the influence of parties in political and social life – and their mutual relationship is always arbitrary.

⁶ Author's note: The Technologická agentura České republiky (TAČR) TL02000119 project was carried out in cooperation with Charles University and Newton Media as part of the ÉTA programme and ran from 2019 to 2021.

With regards to the above, it is perhaps obvious that AI could offer a more or less complete solution to the first problem and alternative bases for solving the second problem.

7 Conclusion

This paper started by summarizing the main risks that the rapid development of artificial intelligence has brought to the field of political journalism. This was tied in to an overview of the regulatory efforts to date, and, although they may not be the fastest at national levels, they are balanced by vigorous efforts at self-regulation by the media houses and the journalists themselves. A case study showed the state of this self-regulation in the Czech media landscape as of September 2024. This overview would not be complete without an inclusion of some of the positive aspects that the use of AI in journalism may bring.

A minor point of this talk should be the situation where the roles are reversed, and the robot controls the human – and it probably doesn't matter whether this potential of AI will be used primarily during journalistic production or in its (self-)regulation. In both domains, its implementation looks so promising that it seems, to me, to be just a matter of time.

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POSSIBILITIES OF TOOLS FOR MEASURING ADVERTISING LITERACY THROUGH AI AND HUMAN JUDGEMENT

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Abstract:

The study explores possible methods of assessing the level of advertising literacy by examining it in juxtaposition with artificial intelligence (AI) and human judgement. The ability to understand advertisements is an important part of being able to correctly interpret information in the media, which helps people recognize techniques in advertising and make decisions based on recognition. Traditional approaches to testing advertising literacy, such as surveys, tests, and qualitative techniques, are important, but have limited scope and granularity of analysis. New technologies that incorporate artificial intelligence allow for deeper exploration of behavior and emotion using hybrid models that combine the accuracy of artificial intelligence with human understanding. The present exploration assesses the possibilities and includes attributes such as effectiveness, benefits and barriers of AI-driven tools and combined technologies. The results suggest the necessity to develop tools for specific target groups and propose methods for combining technological advances with human aspects in order to improve the assessment of advertising literacy. The study highlights the potential of using flexible and easily scalable methods to cope with the increasing complexity of advertising in the current digital age.

Key words:

Advertising Analysis. Artificial Intelligence. Advertising Literacy. Diagnostic Tools. Hybrid Models.

1 Introduction

As advertising becomes more complex and integrated with digital platforms, there is a growing demand for better tools to assess advertising literacy. Advertising literacy assessment tools evaluate people's skills in recognizing, interpreting, and evaluating advertising messages (Arbaiza et al., 2023). The advent of Artificial Intelligence (AI) has brought new approaches to assessing different skills, but human judgment is still necessary to consider context and ethics. This section explores tools for assessing advertising literacy, highlighting the interaction between AI-driven technology and human assessors. The implementation of AI in diagnostic processes brings new opportunities, but human assessment is still essential in interpreting contextual and ethical considerations (Rasekh et al., 2021). The ability to individually recognize advertising techniques, understand their purpose, and critically assess their impact on attitudes and behavior is part of media literacy, which includes, according to the authors, advertising literacy (Wang et al., 2023). Moreover, Römer et al. (2023) argue that media literacy is essential for active participation in modern society, with advertising literacy being a key component. The ability to critically evaluate advertising enables people to make informed decisions and protect themselves from potentially manipulative tactics. The following section covers traditional methods for assessing the level of advertising literacy according to authors who have reviewed tools for measuring advertising literacy.

Table 1: Traditional procedures for assessing the level of advertising literacy

Questionnaires and surveys	Questionnaires and surveys are used to find out information about respondents' knowledge, attitudes and beliefs about advertising (Thakur, 2023).
Knowledge tests	They are aimed at assessing the ability to understand specific advertising techniques and strategies. For example, in 2011, tests were used to measure children's ability to recognize persuasive techniques in advertisements (Feijoo & Sádaba, 2022).
Interviews, focus groups	Qualitative research methods such as interviews and focus groups help to better understand attitudes and perceptions of advertising. According to Spasova (2022), focus groups are to explore the way children perceive advertising.

Source: own processing, 2024

Tools that use artificial intelligence to assess advertising literacy are currently in the minority, yet the integration of artificial intelligence into diagnostic tools brings new ways to measure advertising literacy (Bulut et al., 2024). Technologies using AI bring new ways of assessing the level of advertising literacy, leading to more accurate and effective diagnosis. As Darwin & Sujitha (2023) state, machine learning can be applied and data analytics allow the tracking of emotional responses through facial recognition, sentiment analysis and monitoring of interactions with advertising content, including gaze tracking or behavioural analysis, thus specifying other elements that may be unintentionally missed in other tools. Hence, tools can enable detailed data collection and analysis to view behavioural patterns and assess users' abilities when interacting with ads. One of the main benefits of AI tools is their ability to process large amounts of data in real time (Ishaq et al., 2023). For example, artificial intelligence has the potential to determine how much users are influenced by different persuasion techniques and how they interpret hidden advertising messages if this processing is juxtaposed with classical methods. There are potential barriers to the above technologies that the authors believe need to be overcome, namely high cost, technological complexity and ethical dilemmas regarding privacy and data security (Gull et al., 2024). In addition to AI solutions, there are potentially hybrid models that combine the accuracy and speed of AI with human experts' assessment for better understanding of outcomes in larger social and cultural contexts. The method can be highly advantageous in identifying manipulative tactics that require critical and subjective judgement, such as covert advertisements or advertising techniques based on emotional manipulation (Yevseiev et al., 2022). From an examination of the theoretical underpinnings, it is important to note that effective assessment of advertising literacy ideally requires a mixed approach involving technological advances and the humanities and social sciences. When developing instruments, it is important to consider not only technological and economic factors, but also ethical and cultural differences that may affect the accuracy of diagnosis and interpretation of results. Combining AI with human assessment is an extremely promising innovative direction for further research and practical application in the field of advertising literacy. Advertising literacy is an interdisciplinary concept that encompasses an individual's ability to not only identify an advertisement, but also to critically evaluate its content, purpose, and impact. According to Kendrick & Fullerton (2019), advertising literacy is considered a key element of media literacy, which is essential for active engagement in a digital society. Advertising, as a mode of communication, is now more than just a means to promote goods and services, as it often acts as a platform to shape opinions, beliefs and social behaviours. It is therefore important to be able to critically assess advertising messages and protect oneself from manipulative methods and hidden influences. According to Um (2023), the development of advertising literacy focuses on enhancing personal ability to recognize advertising strategies, understand their purpose, and reflect on

their potential influences on opinions and behaviors. This ability is particularly important in the context of a rapidly evolving digital environment where the traditional boundaries between advertising and other forms of content are increasingly blurred. Advertising is often a component of native content, social media and influencer marketing, making it difficult to distinguish, especially for vulnerable groups such as children and adolescents (Radesky et al., 2020). The use of artificial intelligence (AI) to assess advertising literacy represents an innovative approach to effectively analyze the complexity of behaviors and feelings when interacting with advertisements. Tools using AI can extract detailed data on users' responses to different advertisements, which can then be used to tailor educational strategies (Gupta & Bansal, 2023). Tools using artificial intelligence can obtain detailed information on, for example, users' reactions to various advertisements, which can be used to tailor learning platforms. Nevertheless, technological complexity, cost, and ethical issues such as privacy concerns remain major hurdles. Combining traditional methods such as questionnaires, assessments and group discussions with modern technologies such as artificial intelligence and hybrid approaches can provide balanced and effective solutions (Meylani, 2024). Methods not only allow for quantitative assessment of skills, but also more detailed qualitative analysis that takes into account contextual and cultural variations.

2 Methodology

The research combines qualitative and quantitative methods to comprehensively compare the capabilities of diagnostic tools and established examples of tools for measuring advertising literacy. The research framework was carefully designed to meet the main objectives of the study and included analysis of data obtained from reputable academic sources. Great emphasis was placed on quality assessment, which included a review of content from relevant scholarly journals, books, and conference proceedings. The selection of sources was based on their relevance and quality, with an emphasis on scientific relevance. In the content analysis of these materials, it is possible to identify the main themes, concepts and methods used in the study and diagnosis of advertising literacy. The research also examines diagnostic aids, reviewing their reliability, practicality and effectiveness. The analysis includes an evaluation of the advantages and disadvantages of each tool when used to measure different aspects of advertising literacy. It is important to consider the scalability and working with the tools as they are essential for effective use in a variety of settings such as education and media. The results of the quantitative analysis are condensed into a single output that provides a comprehensive overview of the capabilities and limitations of each diagnostic method. The aim of the paper is to determine the current potential of the possibilities of tools for advertising literacy diagnosis, but also to suggest potential ones for future research and practical use. The approach defines a methodologically stable base that allows for a comparison of tools and supports the development of effective solutions for advertising literacy diagnostics.

3 Results

The purpose of this section is to present and evaluate selected platforms or tools for measuring advertising literacy, including their features, advantages and limitations. The defined results include selected approaches such as traditional methods and interactive digital solutions with an artificial intelligence (AI) element. The tools evaluated included Admongo.gov, Media Literacy Lab, AI-based diagnostic platforms, and hybrid solutions combining AI and human assessment.

Table 2: Tools to diagnose and educate advertising literacy

Tool	Target group	Method	Benefits	Restrictions
Admongo.gov	Gen Alpha, Gen Z	Interactive games	Fun form, easy to use	Limited scope, focus on basic knowledge
Media Literacy Lab	Gen Z	Simulations and tasks	Gamification, analysis of complex ads	Does not adapt to individual needs
AI-Based Platforms	All age groups	AI behaviour analysis	Scalability, detailed analysis of emotional reactions	High costs, technological complexity
Hybrid Models	All age groups	AI + human evaluation	Combining accuracy and contextual understanding	Time and personnel requirements

Source: own processing, 2024

Created by the U.S. Federal Trade Commission, Admongo.gov served until 2012 as an educational tool to improve children’s advertising literacy. It uses thoroughly interactive games and stories through exercises to teach basic principles of advertising, such as identifying its intent and target audience. Admongo.gov is aimed at improving children’s mental skills in an engaging way, but its capacity for deep critical thinking and emotional analysis is limited because it is a classical approach.

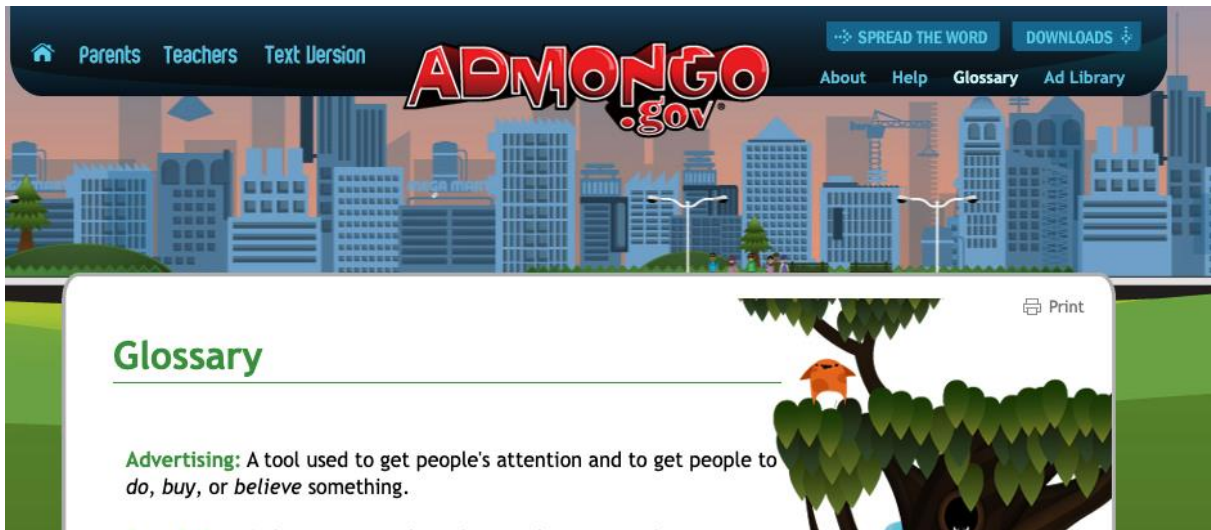


Figure 1: Admongo.gov
Source: own processing, 2024

Media Literacy Lab is an online tool designed for high school students and adults. It offers simulations and exercises that require participants to analyze complex advertising messages, including native ads and influencer marketing. The platform uses gamification and interactive elements to promote deep understanding. However, a weakness is the lack of customisation to individual needs. AI Platforms is the designation for current AI-based systems offering sophisticated methods for measuring advertising literacy. These tools can examine emotional reactions using, for example, facial recognition or sentiment analysis, and monitor interactions with content such as gaze tracking. The main advantage is the ability to effectively adapt to and reproduce real user behaviour in the digital world. However, implementation requires significant investment and technological resources. Hybrid models are tools that combine automated analysis by artificial intelligence with manual evaluation of the results by experts. Using AI, behavioral patterns can be identified, which are later analyzed by evaluators to add contextual understanding. The authors state that the above method is very effective but requires significant economic and technical background. As a result, it can be said that the different means have different advantages according to the target

group and the assessment objectives. Admongo.gov seems to be a suitable tool for the basic education of children, while AI platforms are able to analyze behavior in online environments more effectively. Hybrid models provide an ideal blend of accuracy and contextual understanding, but their time and technology demands are a major barrier. Media Literacy Lab falls somewhere in the middle between pure simplicity and thorough analysis, but lacks individualization.

4 Discussion

When evaluating the advantages and disadvantages of different tools for assessing advertising literacy, it is important to take into account the views of several authors and to consider the broader context of research in this sector. Salim et al. (2022) highlight that advertising literacy as part of media literacy is crucial for active participation in a digital society. Traditional methods such as questionnaires and surveys provide a direct and easy way to obtain information about respondents' knowledge and opinions. Gupta (2024) demonstrated that these tools are effective in assessing children's basic literacy skills, but their limitation lies in the lack of deeper analysis of emotional and behavioural responses. Loose et al. (2022) examined children's perceptions of advertising through focus groups, which provides deep insight into their thinking. However, these approaches have limitations in scope – they require a lot of time and resources and are often not scalable. Combining qualitative methods with the latest technologies can lead to balanced solutions. Hybrid models that combine the accuracy of AI with the contextual understanding of raters are a promising solution for advertising literacy diagnostics. According to Smith & Szafian (2023), these models are time and personnel intensive, but allow for more detailed interpretations of results. Raza et al. (2021) also stress the importance of ensuring that these models respect ethical norms while taking into account cultural differences in approaches to advertising. Admongo.gov is suitable for younger target audiences due to its limited scope and the important role of entertainment and ease of use. The Media Literacy Lab has simulation programs to analyze complex ads, but it is poorly customized. AI-based platforms, on the other hand, are excellent at detailed evaluation, but are limited by financial and technological challenges. Hybrid models have the greatest suitability for advanced applications, but are currently limited by implementation challenges. Future studies should be directed towards creating affordable solutions that combine the benefits of AI and human assessment. Increasing the efficiency of diagnostics could be significantly achieved by creating adaptive platforms that can respond to the individual needs of different target groups of people. In addition, the use of open educational resources and international collaboration could reduce costs and encourage wider adoption of these tools. Advertising literacy is a complex concept that requires a multidisciplinary approach, combining theory and technological innovation to create a digital diagnostic tool. To succeed, it will be important to create tools that are accurate, effective and at the same time take into account the ethical and cultural needs of users.

5 Conclusion

The results of this investigation highlight the importance of variable approaches to the diagnosis of advertising literacy. While Admongo.gov and the Media Literacy Lab are useful for basic education, advanced technologies such as AI Platforms and Hybrid Models allow for more detailed and sophisticated assessments. The research suggests that the needs of the target audience, available resources, and the intended goals of the assessment should be kept in mind when selecting a diagnostic tool. Upcoming studies should pay attention to increasing

the availability and effectiveness of tools, integrating the synergistic combination of AI and human capital. The findings can greatly support the development of diagnostic tools that can respond to the increasing complexity of advertising in the digital age.

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THE CURRENT STATE OF THE BIBLIOGRAPHIC POOL OF ARTIFICIAL INTELLIGENCE IN COMPARISON WITH HUMANS

Michal Kubovics

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Abstract:

Artificial Intelligence (AI) is one of the fastest growing areas of the marketing world and is having a profound impact on business, technology and people. The current manuscript conducts a thorough examination of bibliographic materials to investigate the breadth and extent of subjects pertaining to artificial intelligence and its association with human competencies, with particular focus on interdisciplinary methodologies. The results indicate that 94,030 records on artificial intelligence were discovered in the Web of Science database, mainly focusing on machine learning, neural networks and their applications in medicine, automation and robotics. In contrast, human research is more decentralised and mainly related to fields such as psychology, education and the arts. Analytical geographical data has shown that countries such as the USA, China and Germany lead in AI and human research. The study elucidates that the amalgamation of artificial intelligence with human capabilities possesses the capacity to produce groundbreaking solutions for prevalent challenges such as climate change, public health crises, and social inequities. It is crucial to conduct thorough interdisciplinary research that considers both technological and ethical aspects in order to accomplish this. Findings serve as a crucial foundation for future studies that can connect advancements in technology with human values and abilities.

Key words:

Bibliometric Analysis. Human and AI. Interdisciplinary Applications. Machine Learning and Automation. Marketing Communication.

1 Introduction

AI-based intelligence is one of the fastest growing areas of scientific research with enormous potential to impact economic, social and technological spheres. The importance of this field has increased significantly in recent decades, as reflected in the increased number of scientific publications at global level. The study of artificial intelligence encompasses a wide range of topics, from technical aspects such as machine learning algorithms and neural networks to social issues including ethics, social impact, and AI-human interaction (Ayub & Banday, 2023). The current state of the bibliographic pool in the field of AI shows the interest of the scientific community in this topic. Conversely, research on humans and human capabilities has lagged behind the rapid advances in AI, suggesting the need for further exploration of the interactions between the two fields. A study of existing bibliographic materials suggests that the largest number of publications related to AI comes from countries such as the US, China and Germany, which are leading researchers in AI-based technologies (Lawrence & Montgomery, 2024). Countries are continuously investing in infrastructure and new programs that support development in this sector (Calvo-Rubio & Ufarte-Ruiz, 2021). According to bibliometric studies (Algamdi, 2022), the main areas with the greatest growth are applications of artificial intelligence in medicine, automation, robotics and natural language processing. In addition to the technical advantages, articles are increasingly addressing the implications of technology on human behaviour, ethics and social structures. A comparison of bibliographic sources on AI and humans suggests a marked difference in the literature. While artificial intelligence is a major focus in technology publications, humans are more frequently explored in neuroscience (Darázs & Šalgovičová, 2019), education, and the

arts. The above suggests that research has mostly focused on the measurable benefits of AI, while the interaction of this technology with human abilities is under-researched. Although there are books that point to the importance of an interdisciplinary approach, this is particularly in the context of the connection between AI and creative processes (Gutierrez-Beltrán et al., 2023). The geographical distribution of research reveals interesting patterns. According to the authors, the United States has the most publications in AI ethics (Subaveerapandiyan et al., 2024), while China dominates in technical applications such as advanced algorithms and robotics. Countries in Europe, especially Germany and the United Kingdom, are focusing on the use of AI in industries and public policies, putting them at the forefront of applied research. In contrast, human research is more decentralized, with significant publications coming from countries such as Japan, Canada, and Sweden, where the emphasis is often on the artistic and pedagogical aspects of humans (Senyapar, 2024). Analyses suggest that artificial intelligence can enhance human capabilities and is important in the context of global challenges such as climate change, health crisis and economic inequality. Coupling AI with humans can open up new ways to address these challenges, but comprehensive interdisciplinary research is needed to achieve this goal (Krajčovič & Darázs, 2021). In this context, some research highlights the importance of rethinking the current models of collaboration between technical and humanities disciplines in order to develop solutions that are not only effective but also ethically and socially acceptable. The topic requires more in-depth examination, particularly as regards the link between AI and humans in the fields of education, the arts and science. Enhanced research in this sector could open up new possibilities not only for technology but also for the improvement of human skills and their social use. This analysis shows that the success of future studies in these areas depends on a comprehensive approach that takes into account technological and human factors and addresses pressing global issues simultaneously.

2 Methodology

The research employed a combination of quantitative and qualitative research approaches to investigate the scope and characteristics of bibliographic materials on artificial intelligence (AI) within the context of humans. There was a need to create a structured analysis framework that aligned with the research goals. The qualitative approach centered on evaluating written data sourced from peer-reviewed scientific journals and conference papers. Analyzing themes and keywords in the bibliographic dataset involved considering sources from major databases like Web of Science. The quantitative research approach focused on collecting data relating to the quantity of publications, the frequency of keywords, and the publication trends over time. Exploring the key ideas of “artificial intelligence” and “human” led to the identification of the primary research areas and categories. The researchers also analyzed the times when publication activity was at its highest and determined if the field of artificial intelligence was experiencing growth, stagnation, or stability. VOSViewer was employed in generating network graphs that unveiled relationships among important ideas and examined how artificial intelligence and human consciousness interpret particular subjects. The examination pinpointed three primary groups that pertain to the crossover between AI and human bibliographies, laying the groundwork for upcoming research endeavors. The findings aid in gaining a deeper insight into the connection between AI and human consciousness, thus enhancing the fusion of these areas in both scientific research and practical use.

Based on the aim of the paper and the theoretical background, the following sections emerged:

Research topic:

Artificial intelligence and humans.

Research questions and hypothesis:

RQ1: What is the scope and coverage of topics related to AI in parallel with humans.

H1: There are more than 50,000 occurrences of the topic Artificial Intelligence and Humans in the Web of Science database, and the topic is covered in the marketing communications segment by more than 10 articles.

3 Results

The word “artificial intelligence” was found in 94,030 records in the Web of Science database. The findings explain the research question: “What is the scope and coverage of topics related to artificial intelligence in parallel with humans?”. Initial analysis focused on identifying articles and authors that addressed this issue. Topics such as machine learning, neural networks, artificial intelligence in medicine, and the ethics of artificial intelligence had the highest frequency of occurrence. The following figure shows the important words and their interconnections in detail.

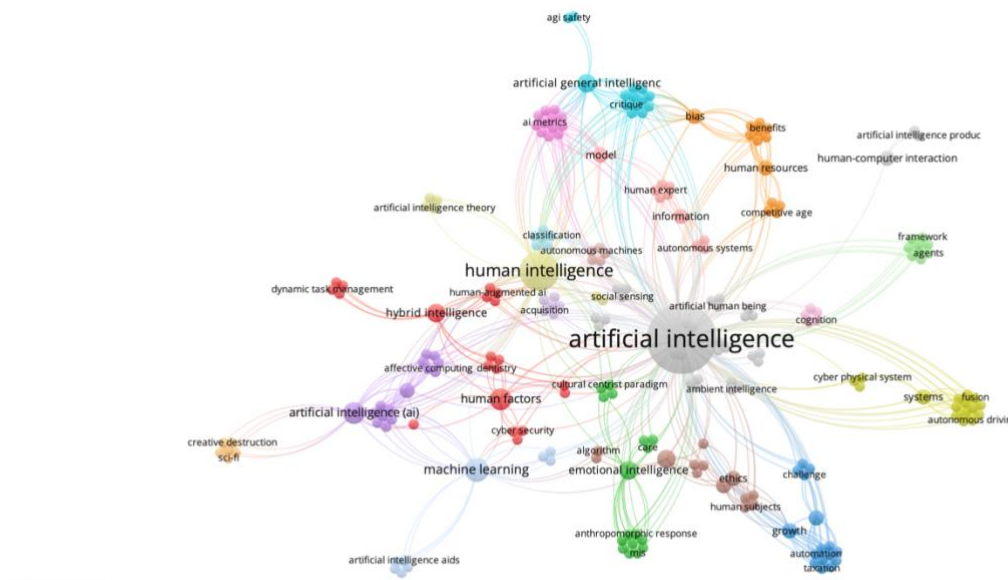


Figure 1: Bibliographic map of the concept of artificial intelligence and human – Networking
Source: own processing, 2024

According to the Figure 2, we can characterize the authors with the largest number of entries as follows. Zhang has the most entries, namely 404, followed by Kim with 403 entries, and in third place is Liu with 372 entries. Next are important authors such as Wang with 358 entries, Li with 321 entries, and Wang with 314 entries. Kim with 312, Zhang with 268, and Li with 262.



Figure 2: Keyword association of artificial intelligence and human with authors – Treemapping
 Source: own processing, 2024

The following visualization (Figure 3) shows the relationships between the authors. Shi Feifei is in the center with the highest number of links to other authors along with Ning Huansheng. Other prominent authors, such as Zhou Fang, Chen Liming, Liu Hong, Zhang Weishan, and Dhelim Sahraoui, closely collaborate with each other and with the central nodes. This illustration highlights the interaction between authors and shows researchers who have a key role in collective networks.

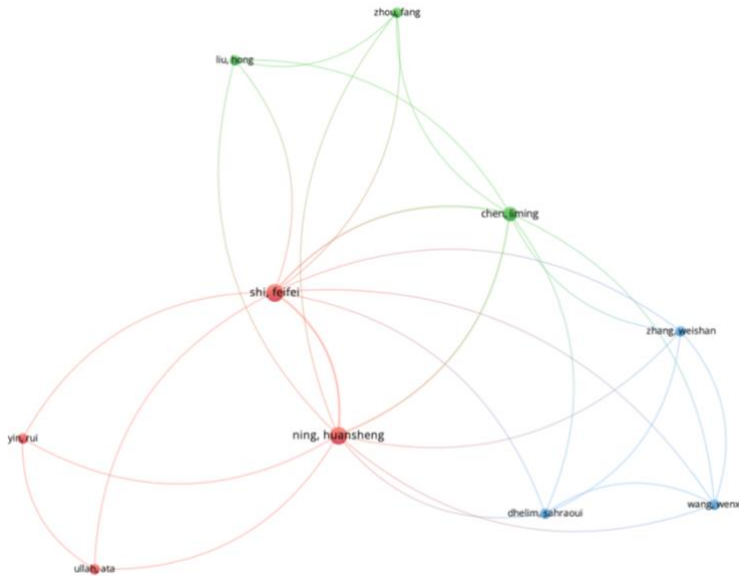


Figure 3: The association of the key concept of Artificial Intelligence and Human with Authors – Networking
 Source: own processing, 2024

Since 2006, there has been a growing interest in the topic of AI. The peak of growth was reached in 2022 and 2023, with 2023 representing approximately half the percentage increase compared to previous years. The importance of this topic has grown significantly in recent years, linked to technological innovation and industry transformation. However, the graphical representation suggests possible stagnation in future years as growth may reach its natural peak, which could indicate a glut in research or a shift to other innovative topics. This

trend may serve as an interesting indicator for shaping research, development or policy strategy in the relevant areas.

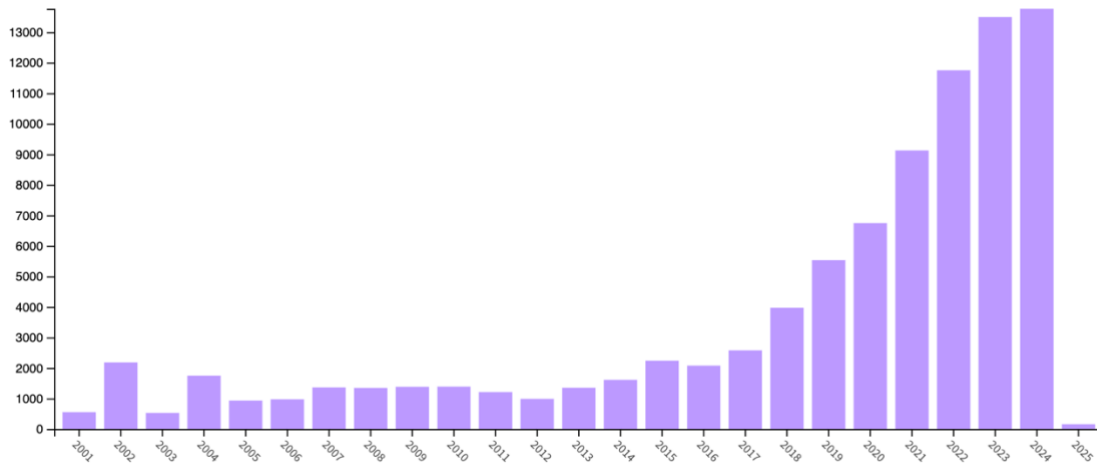


Figure 4: Year of publication of papers with the key term artificial intelligence and human
Source: own processing, 2024

A graphical representation of the subject categories in the Web of Science database indicates that the most represented category is Computer Science Artificial Intelligence with 37,950 entries, indicating an increased interest in artificial intelligence. Coming in second place is the category of Computer Science Interdisciplinary Applications with 11,747 entries, which focus on the use of artificial intelligence in a variety of industries. The 14,514 entries in the category of “Engineering Electrical Electronic” demonstrate the significance of electrical engineering in technological advancement, earning it the third place. This is followed by the second most important category, 'Theory and Methods of Computer Science', with 14,595 entries devoted to the development of fundamental methods of computer science. The Library has 13,086 records in the Computer Science Information Systems collection, mirroring the steady growth in requirements for advanced information systems.



Figure 5: Linking the key concept “artificial intelligence and human” to the field
Source: own processing, 2024

The visual representation (Figure 6) shows the largest research areas represented in the database. With a frequency of 53,437 records, Computer Science is the most prominent category, clearly showing the dominance of Computer Science in scientific research. Next is

“Engineering” with 22,174 entries, showing the importance of engineering disciplines in technological innovation. Another important area is Business Economics with 2,326 entries, reflecting the increase in interest in economic aspects in business. Environmental Sciences and Ecology with 1,312 entries shows a growing interest in the environment, and the Education Educational Research category with 2,572 entries highlights the importance of research in education. These areas offer a valuable overview of current scientific research priorities.

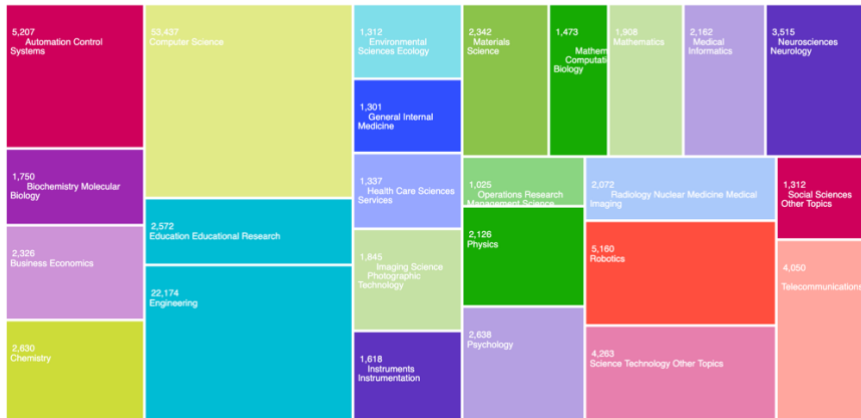


Figure 6: Frequency of categories of bibliographic resources for the key term artificial intelligence and human
Source: own processing, 2024

Figure 7 shows the distribution of different types of bibliographic records in a particular scientific database. The authors most frequently use an article with 46,633 records, which highlights its importance in scholarly communication. Another conference article contains 41,788 records and highlights the importance of presenting results at scientific events. Book chapters are the third most common type with 848 records, highlighting the importance of book publications in research areas. This categorization reveals the variety of publication formats and their use in academic settings.

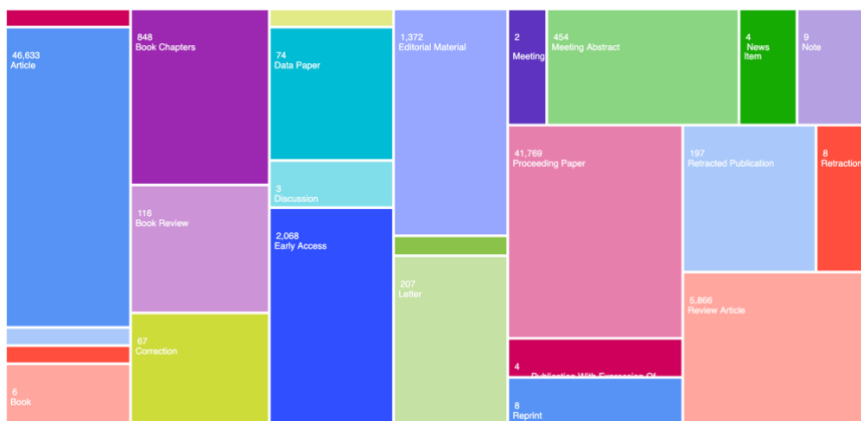


Figure 7: Frequency of categories of bibliographic resources for the key term artificial intelligence and human
Source: own processing, 2024

The illustration (Figure 8) shows the origin of scientific publications by country. The majority of records are from the USA with 25,347 occurrences, clearly showing the country's leading position in scientific research. China, also known as the People's Republic of China, has 19,187 records, indicating a significant increase in research activities in recent years. Germany is next with 7,086 entries, indicating its key role in European and global research.

Other important countries are England with 6,927 records and Japan with 5,347 records, which also make a significant contribution to international research. This information shows which countries have a key role in the global scientific community.

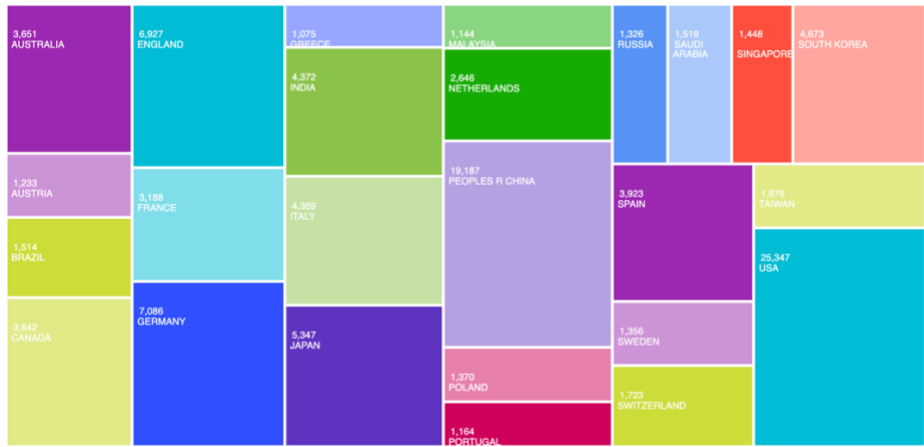


Figure 8: The association of the key concept of artificial intelligence and human with the countries of origin of bibliographic resources – Tree map
 Source: own processing, 2024

The following section is also devoted to the countries of origin of the records found based on the defined keyword. The figure shows the origins of the scientific papers based on the defined keyword and highlights their connections to each other. Important connections are China, which has strong ties with other countries such as Pakistan, Ireland and Northern Ireland. These links signal the vibrant cooperation between these areas in scientific research.

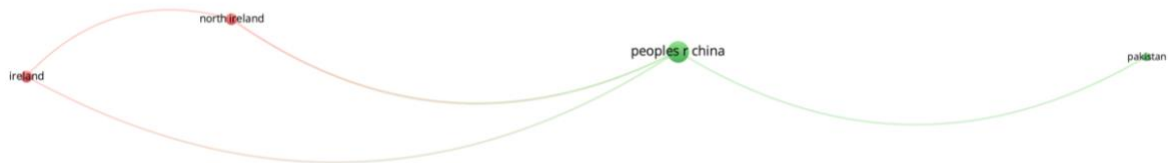


Figure 9: The association of the keyword term artificial intelligence and human with the countries of origin of bibliographic resources – map of networked countries
 Source: own processing, 2024

The table 1 includes the results of the analysis of the main keywords performed using the VoS Viewer software. The identified keywords were divided into five main categories. These include the fundamental concepts and principles forming the roots of AI development. Human factors and intelligence focus on the interconnectedness between AI and humans, encompassing emotional intelligence and human factors. Applications and technologies include practical uses of AI, such as autonomous systems, machine learning, and advanced technology applications. Ethics and Social Aspects explores issues focusing on ethical dilemmas, social implications and the global impact of AI. Interdisciplinary Approaches and Challenges highlights how artificial intelligence brings together different disciplines to address multidisciplinary problems. The above groups reflect the diversity in the field of artificial intelligence and highlight major and controversial topics in the field.

Table 1: Categories of keyword grouping

Category of keyword grouping	AI
Keywords	Basic concepts and theories of artificial intelligence
	Human factor and intelligence
	Applications and technologies
	Ethics and social aspects
	Interdisciplinary approaches and challenges

Source: own processing, 2024

The result of the investigation can confirm that the issue of AI is mainly addressed in the context of management, bussiness and economics in the context of innovation. Defined hypothesis H1 “The occurrence of the topic of artificial intelligence and human in the Web of Science database is represented by more than 100 occurrences and the issue is covered in the marketing communication segment by more than 10 articles” is confirmed, there are 94,030 results in the database, of which 462 are focused on communication.

4 Discussion and Conclusion

Bibliographic mapping revealed significant differences between AI and human in academic resources depending on the data collected. The bibliometric analysis showed that artificial intelligence has a broader and more dynamic development in bibliographic resources than the human-related topic. The research identified 94,030 records on AI minority in the representation of records on human intelligence. AI has led the way in areas such as machine learning, neural networks and automation. On the other hand, Gupta and Singh (2023) report increased prevalence in the form of a rapid increase in interest in AI in databases such as Web of Science.

According to Tang et al. (2023), it is imperative that AI research becomes interdisciplinary so that it can be more broadly integrated into traditional human disciplines, which is supported by our results. In AI, neuromarketing (Darázs, 2023), medicine, robotics, and automation are the predominant topics, while humans are most often associated with neuroscience, education, and the arts. The gap shows a possible void in current research where the merging of humans with technology could benefit both fields. Significant contributions sorted by country. Geography analysis showed that China, the US and Germany are the largest contributors to AI research, accounting for more than half of all entries. Countries are investing in AI research to gain a global competitive advantage, as confirmed by the results of the studies. Human research, on the other hand, has a more decentralised distribution. Although artificial intelligence is becoming increasingly popular, not enough studies are looking at its connection with humans and ethical dilemmas. Mumtaj Begum's (2022) findings suggest that AI will continue to advance and its impact on the academic and practical sectors is increasing. Although research should focus more on issues of creativity, ethics and human influence on AI development, this could contribute to the harmonious development of both fields.

Acknowledgement: This paper was elaborated within a national research project supported by the Grant Agency of the Ministry of Education, Research, Development, and Youth of the Slovak Republic and the Slovak Academy of Sciences (VEGA) No. 1/0304/24 titled ‘The Impact and Value of Digitalization of Innovations of Product Marketing Communication for Generations of Ecological Users.

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SCIENTOGRAPHIC ANALYSIS OF MARKETING CONTENT CREATION THROUGH AI

Michal Kubovics

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Abstract:

This research examines how artificial intelligence (AI) is incorporated in marketing content creation by analyzing 109 articles from the Web of Science database. The examination shows that AI-driven marketing is interdisciplinary and global, with notable inputs from India, the USA, and England. Important topics include generative AI, machine learning, and predictive analytics, emphasizing how AI plays a transformative role in automating tasks, customizing content, and improving effectiveness. Identified as crucial obstacles, ethical issues like algorithmic bias, data privacy, and authenticity underscore the significance of AI practices that are transparent and culturally adjustable. The results highlight AI's capacity to revolutionize advertising methods, but also stress the importance of ongoing ethical monitoring and research to tackle new obstacles. This research lays the groundwork for furthering the incorporation of AI into marketing and consumer behavior studies.

Key words:

Artificial Intelligence. Ethical AI. Generative AI. Marketing Content Creation. Machine Learning. Predictive Analytics. Scientographic Analysis.

1 Introduction

The incorporation of artificial intelligence (AI) in marketing is a significant change in the creation, distribution, and consumption of content. Scientographic analysis provides valuable insights into the evolving field by mapping scientific research and identifying emerging trends. This analysis emphasizes the overlap of technology, creativity, and strategy in marketing content creation, shedding light on AI's impact on traditional marketing methods. Artificial intelligence in marketing is based on theories like resource-based theory and dynamic capabilities theory, which focus on using technological advancements to gain a competitive edge (Anayat & Rasool, 2024). AI-driven tools, such as machine learning algorithms, NLP, and generative AI models, improve content creation by automating repetitive tasks and creating tailor-made marketing materials. According marketers can use AI to analyze big data, forecast consumer trends, and create personalized content, leading to better and more productive marketing plans. The scientific approach uncovers main ideas in AI-powered content creation, including generative AI, predictive analytics, and consumer sentiment analysis (Gutierrez-Beltrán et al., 2023). These subjects showcase how AI research is multi-disciplinary, connecting computer science, and business management. Through the utilization of diffusion of innovation theory, researchers are able to analyze the implementation of AI tools in various sectors, spotlighting early adopters who have employed AI-powered content generation platforms to automate artistic processes. This automated process enhances effectiveness and allows for instant communication with customers, helping brands stay competitive in fast-evolving markets. Nevertheless, the emergence of AI in content generation poses ethical dilemmas. Concerns such as bias in AI algorithms, data privacy, and authenticity of AI-generated content are crucial matters. The significance of ethical AI practices in upholding consumer trust is highlighted by stakeholder theory. The transparent and accountable application of AI tools guarantees that marketing strategies are in line with societal values, especially as consumers become increasingly conscious of the

utilization of their data (Senyapar, 2024). Furthermore, the social constructivist theory emphasizes the influence of cultural and societal factors on the implementation of AI in marketing. For example, AI-created material could be embraced in certain regions, but in other places, cultural differences may call for a more people-oriented strategy. Taking into account these contextual variations is crucial for successful execution. In a nutshell, scientographic analysis offers a structured comprehension of how AI transforms marketing content creation (Mahato, 2024). By identifying current trends and difficulties, this method reveals chances for creativity and emphasizes the importance of ethical behavior and cultural flexibility in AI-powered marketing plans. This framework provides a solid groundwork for future studies where AI, marketing, and consumer behavior come together.

2 Methods

The research utilized both quantitative and qualitative methods to investigate the extent and features of bibliographic resources on AI-driven marketing content creation. A structured analytical framework was needed to create a research framework that aligned with the research goals. A qualitative method was employed to analyze texts sourced from academic journals and conference papers. The evaluation of subjects and significant terms in the bibliography database involved data from key databases like Web of Science. The quantitative method concentrated on gathering data about publication quantity, keyword frequency, and publication trends across time. Study on the important concepts of “creating marketing content with artificial intelligence” revealed significant areas and classifications for further investigation. The scientists also analyzed the time periods that have the most publications and investigated whether the adoption of AI in marketing content creation is increasing, remaining the same, or declining. The tool VOSViewer was utilized to generate network graphs that display the connections among crucial concepts. The results showed three primary categories linked to the relationship between AI and the creation of marketing content, setting the foundation for upcoming research endeavors. The results enhance comprehension of the link between AI and marketing creation methods and enhance the fusion of these areas in both academic research and practical use.

Based on the aim of the paper and the theoretical background, the following sections emerged:

Research topic:

Marketing content creation through AI.

Research questions and hypothesis:

RQ1: What is the scope and coverage of topics related to creating marketing content through AI.

H1: The occurrence of the topic of creating marketing content through AI in the Web of Science database is represented by more than 50 occurrences and the issue is covered in the communication segment by more than 5 articles.

3 Results

The term appeared in 109 entries in the Web of Science database, which provides information on the scope and content of topics related to creating marketing content using artificial intelligence. Initial research focused on identifying important articles and authors that addressed this topic. The topics that dominated the identified entries were machine learning, neural networks, artificial intelligence in medicine, and the ethics of artificial

intelligence. Figure 1 shows a bibliographic map of the defined terms, illustrating the interconnections between topics such as “AI”, “online marketing”, “social networks”, “generative AI” and “machine learning”. The most commonly linked concepts include artificial intelligence, digital marketing, machine learning, social media, and big data, underlining the multidisciplinary nature of the research.

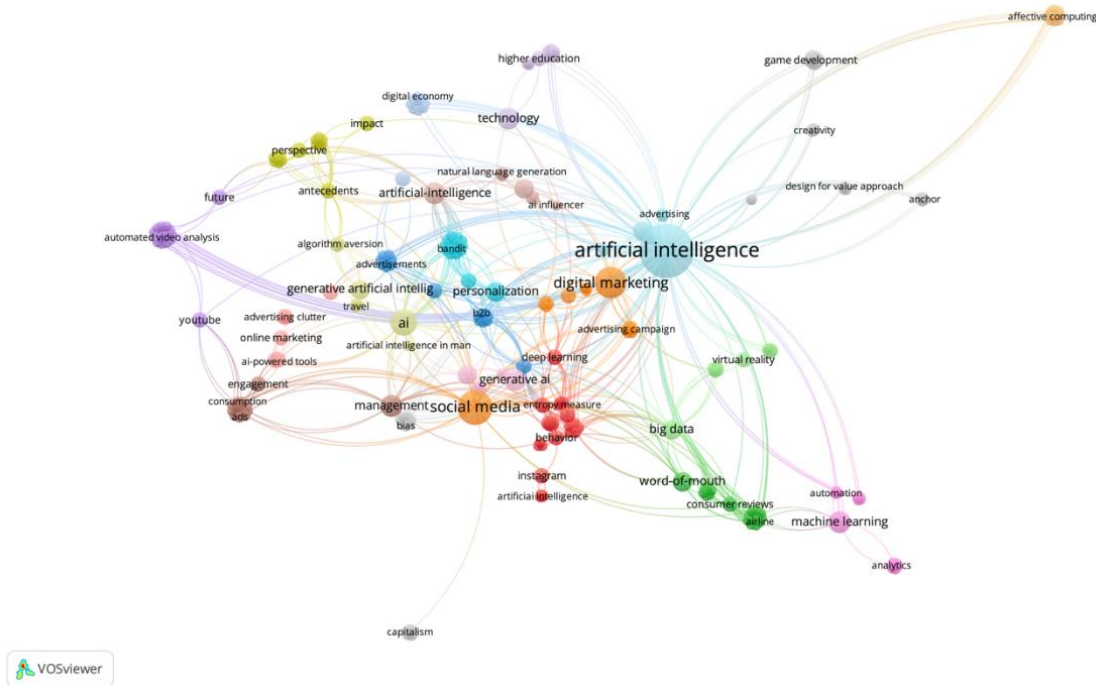


Figure 1: Bibliographic map of the concept of marketing content creation through AI – Networking
Source: own processing, 2024

The graph shows how publications are distributed among different authors. R. G. De Pontes, M. López, H. M. Gomes, and S. Sands are the most important authors, each having two records. Other authors with one record include A. Abadie, M. J. Abernathy, A. Adalameiras, S. Agne, and H. Ahmad. This graphic shows the contributions of each researcher in the field of Artificial Intelligence and their individual research contributions.



Figure 2: Keyword association of marketing content creation through AIs by authors – Treemapping
Source: own processing, 2024

Figure 3 shows the connections between authors in the network. Sean Sands works with prominent authors like Hope Jensen Schau and Matteo Montecchi, but he is not located in the center of the network. This figure shows the level of collaboration between researchers and who plays a major role in AI research.

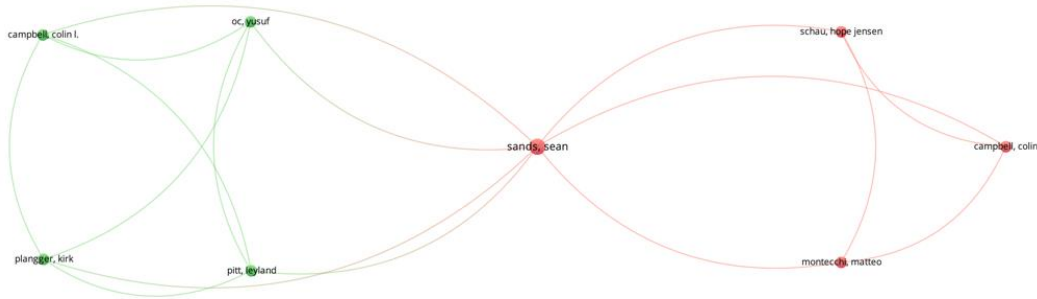


Figure 3: Connectedness of the key concept of creating marketing content through AIs by authors – Networking
Source: own processing, 2024

Figure 4 shows how the number of publications changes over time. Since 2015, there has been a steady increase in interest in AI, with the highest number of publications recorded in 2024. This growth is associated with an increase in the use of AI in industry and academic research.

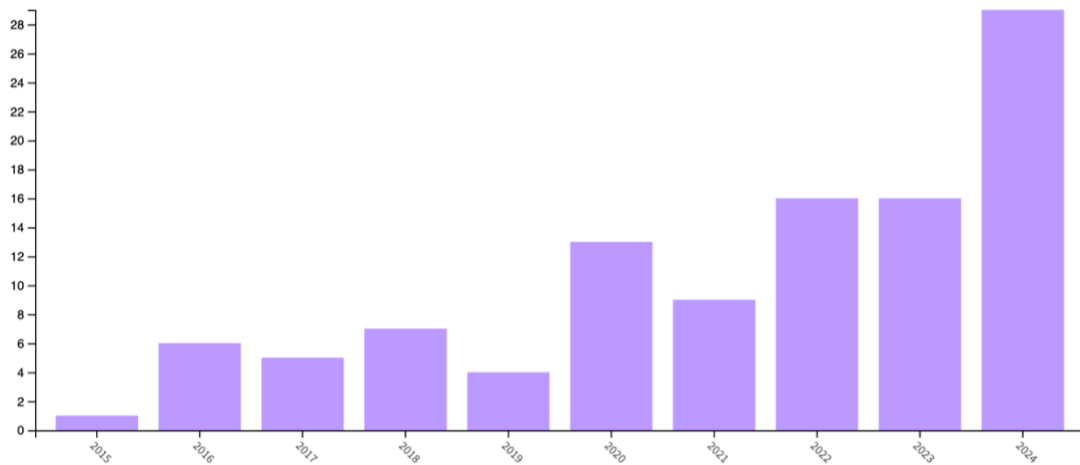


Figure 4: Year of publication of papers with the key term marketing content creation through AI
Source: own processing, 2024

The next illustration shows the sorting of scientific fields by number of records. With a key 28 entries, Business is the most important category, highlighting the importance of artificial intelligence in economics and business. Next is the category Computer Science Artificial Intelligence with 25 records, focusing on technical and research development in this field. Categories such as Computer Science Interdisciplinary Applications (11) and Computer Science Theory Methods (13) highlight the interdisciplinary nature of artificial intelligence and its theoretical development. Also important areas are Communication (9 entries) and Computer Science Information Systems (11 entries), which emphasize the use of artificial intelligence in digital communication and information systems. Less significant but still important categories include Business Finance, Chemistry Multidisciplinary (both with 2 entries), and Computer Science Software Engineering with 4 entries. This figure showcases the vast array of fields in which AI is having a significant impact and highlights its implications for a variety of industries.



Figure 5: Connection of the key term “marketing content creation through AI” with the field
Source: own processing, 2024

Figure 6 shows the areas in which AI research is being conducted. The largest category is “Business Economics” (40 records), followed by “Computer Science” (38), “Engineering” (18), and “Education Research” (8). The information indicates that AI is used in economics, computer science, engineering and education.



Figure 6: Frequency of categories of bibliographic resources for the key concept of creating marketing content through AI
Source: own processing, 2024

The figure 7 shows the distribution of different types of publications. The most common type is Article with 70 entries, followed by Proceeding Paper (33) and Review Article (5). This classification indicates that scientific publications are the main means of disseminating information about AI.

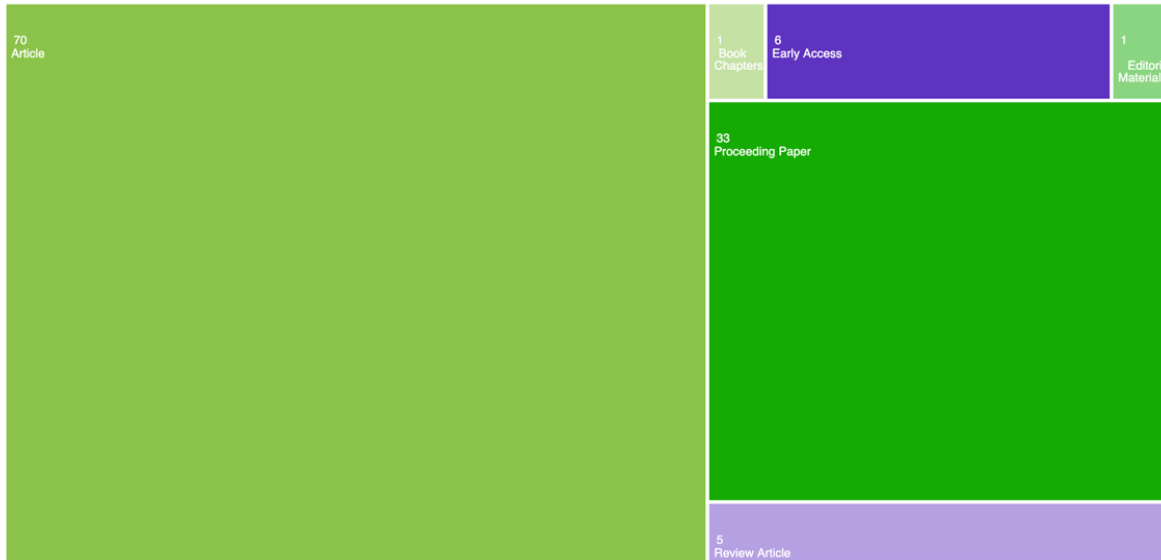


Figure 7: Frequency of categories of bibliographic resources for the key concept of creating marketing content through AI
 Source: own processing, 2024

According to the eight figure of the treemap, India, England, Finland and Australia are the most frequently listed countries of origin of records, with 12, 9, 6 and 5 records respectively. This distribution suggests that AI is a significant issue around the world, with the highest number of entries from India, which may be a result of increasing technological activity in that country.

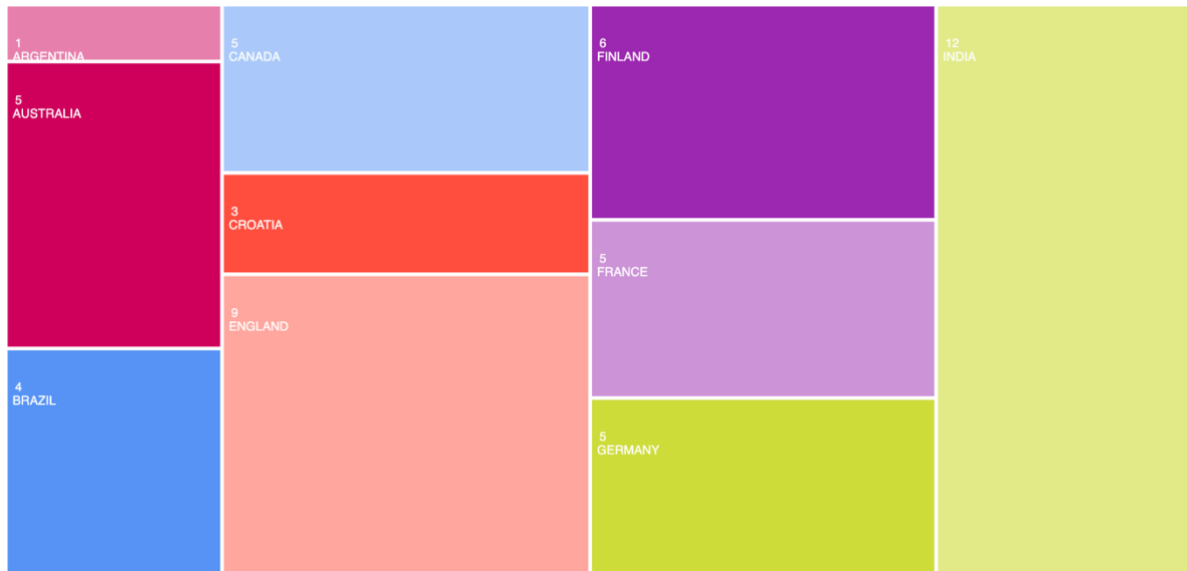


Figure 8. Connectivity of the key concept of marketization content creation through AI countries of origin of bibliographic resources – Tree map
 Source: own processing, 2024

The following section is also devoted to the countries of origin of records found based on the defined keyword. The figure shows the origins of scientific papers based on the defined keyword and highlights their interconnections. Important connections are the USA, which has strong links with other countries such as India, England and Finland. These links signal the vibrant cooperation between these areas in scientific research.



Figure 9: The association of the keyword concept of marketing content creation through AI with the countries of origin of bibliographic resources – map of networked countries
 Source: own processing, 2024

Table 1 contains the results of the main keyword analysis performed using VoS Viewer. The keywords were divided into five main categories. These include the basic ideas and fundamental principles that form the foundations of AI development. Human factor and intelligence explore the relationship between artificial intelligence and humans, including emotional intelligence and human factors. Applications and technologies include practical uses of AI, such as autonomous systems, machine learning, and advanced technology applications. Ethics and Social Aspects explores issues related to ethical dilemmas, societal implications and the global impact of AI. Interdisciplinary approaches and challenges highlight how artificial intelligence connects different disciplines and solves multidisciplinary problems. These groups reflect the diversity in the field of artificial intelligence and highlight key and controversial topics in the field.

Table 1: Categories of keyword grouping

Category of keyword grouping	AI
Keywords	Social networks and enterprise applications
	Data analysis and automation
	Technology and innovation perspectives
	Human interaction with AI
	Digital communication and media

Source: own processing, 2024

The result of the investigation can confirm that the issue of digitalization is mainly addressed in the context of management, business and economics in the context of innovation. Defined hypothesis H1 “The occurrence of the topic of marketing content creation through AI in the Web of Science database is represented by more than 50 occurrences and the issue is covered in the communication segment by more than 5 articles” is confirmed, there are 109 results in the database, 9 of which are focused on communication.

4 Discussion and Conclusion

This scientific analysis emphasizes the significant impact of artificial intelligence (AI) on marketing content creation, supporting the idea that there is a strong presence of this topic in research literature. The research, with 109 articles located in the Web of Science database, displays how AI-driven marketing is a worldwide and interdisciplinary field, with significant input coming from influential countries such as India, the USA, and England. These results are consistent with prior studies published in reputable journals like the *Journal of Business Research*, which highlight how AI can automate tasks, analyze consumer information, and improve personalized content. The research also highlights the increasing importance of ethical factors in AI usage. Concerns regarding algorithmic bias, data privacy, and the genuineness of AI-created content align with findings from Mo & Yang (2022) and Nesterenko & Olefirenko (2023) who support open and ethical approaches. These concerns are especially important given the growing use of AI, shown by a consistent growth

in publications from 2015 to a peak in 2024. The social constructivist perspective emphasizes the importance of customizing AI technologies to cultural and contextual variations, ensuring effective deployment in different regions. In summary, AI is transforming the creation of marketing content by merging technological advancements with strategic creativity (Kotinski, 2024). This analysis shows that AI influences various fields, including business and computer science, and also considers important issues such as ethics and adapting to different cultures. Future studies need to concentrate on enhancing ethical guidelines and discovering fresh ways to apply AI in marketing to uphold trust and stimulate innovation. The results establish a base for progressing the incorporation of AI into marketing tactics, highlighting its importance as a key factor in contemporary business methods.

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OPPORTUNITIES AND THREATS OF AI IN MARKETING AND COMMUNICATION IN THE CZECH REPUBLIC AND SLOVAKIA

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DOI: <https://doi.org/10.34135/mmidentity-2024-41>

Abstract:

Artificial intelligence is one of the biggest topics of today, affecting all segments of society and the economy-marketing and communication included. What does AI bring to the table, and what opportunities does it offer? What does AI take away, and what threats does it pose? Where is the boundary between the human factor and artificial intelligence? What is the relationship between AI and humans? These are frequently asked questions and topics of extensive discussion. In our article, we aim to answer these questions in the context of marketing and communication practices in the Czech and Slovak markets. In the first part, we provide a summary of the most important facts from the current state of AI research in these two segments. The research part of our article is based on an in-depth analysis of the results and key findings from a primary marketing study conducted among professionals working in marketing and communication, both on the client side. This original research was carried out by the Kantar agency in the Czech and Slovak markets. The outcome of our article is the identification of key opportunities and threats that AI brings to the marketing and communication segments, along with development trends for the coming periods.

Key words:

AI. Marketing. Marketing Communication. Opportunities. Strategy. Threats.

1 Introduction

Artificial intelligence (AI) has long been perceived as something incomprehensible to the average person. Apart from experts in technological fields, few people could talk about this complex topic. The development of technology with a user-friendly design has given rise to interfaces that even a layman can operate. This progress was brought about by generative artificial intelligence, which can create diverse multimedia content using machine learning. It should be added that artificial intelligence is not a novelty of the last decade, because its origins can be dated back to the first half of the 20th century. However, with the advent of generative artificial intelligence, human creativity, which was and still is considered a human characteristic, is also gaining significant expansion.

The question is whether a technology that produces resulting content only from trained data can also be attributed to a certain form of human intelligence and creativity. The development of the situation shows that new opportunities are offered in creative industries. Our contribution focused on the area of marketing communication, where the use of AI has considerable potential. However, in this area, two groups of experts are involved in the work, which bear somewhat questionable responsibility for the results. The groups studied are managers of companies and communication agencies. We discuss the challenges and risks of deploying AI in creative work, the result of which is to be a desirable change in customer behavior.

Studies and research conducted so far monitor the challenges and risks of using AI in marketing and marketing communication and agree that although it has great potential, it also raises significant concerns regarding ethics, decision-making processes, bias and customer trust.

The first part of the theoretical source search is devoted to general problems of using AI by managers. In the next part, we deal with the current potential of AI in marketing communication, aware that some areas overlap, but the effort is to look deeper into the problems that concern the area of marketing communication. On this basis, we then discuss the need for cooperation between brand owners and their communication agencies.

Ethics and bias are, according to the authors (Mogaji et al., 2021; Sharma et al., 2023), the first problem, because AI can be biased in the decision-making process and personalization and can harm certain target groups of customers if the impacts are not regularly monitored. Likewise, pressured sales tactics, lack of transparency and misuse of customer data are a general threat in marketing, not only in communication. AI systems generally have a problem with emotional nuances, they are not yet able to capture them, which can lead to not only ineffective, but mainly inappropriate marketing content. AI still lacks **human empathy and context**. These limitations can harm meaningful collaboration with customers (Murár & Kubovics, 2023). Inappropriate use of AI can significantly damage the reputation of a company and its products, which we adore.

The nature of AI work implies that it must work with large volumes of data, that is, extensive surveys and data collection, which in itself raises the question of **transparency and security** of operations with this data. Privacy concerns and violations of privacy rules and other issues perceived by customers must be sufficiently resolved and communicated in order to maintain customer trust (Zhu, 2022). Closely related to this problem is the as yet non-existent obligation of marketing professionals to have direct **control over AI algorithms** and not to rely on external collaborators. Dependence on an external provider limits their ability to ensure ethical and effective marketing outputs, not only in marketing communications (Kozinets & Gretzel, 2021).

Many **companies** face the problem of implementing AI because they do not have enough capable employees, but also do not have a clear AI strategy. Furthermore, they also have mental problems with how to balance the use of AI with ethical threats (Zerfass et al., 2020).

The previous thoughts were devoted to the potential risks that company managers will encounter and that communication agencies that implement marketing activities for their clients should also take into account. In the next part, we will focus on the current potential of AI in the field of marketing communication.

Our next question concerns the current possibilities of AI in marketing communication, knowing that by the time this article is published, many more possibilities will appear, as the environment and “skills” of AI change every day.

It is indisputable that AI has dramatically improved content creation in marketing communication by automating and optimizing various tasks. Its tools can generate ideas, formulate stories and, to some extent, personalize content for the **target group**, if it is correctly defined and the right data is available. Then personalization can focus on the interests and behavior of customers. Such automation not only speeds up the creation of content, but can also increase the relevance of content and personalization. All this should lead to greater efficiency. There is no doubt that AI tools improve quality and are therefore becoming increasingly indispensable (Murár & Kubovics, 2023).

AI also enables more precise targeting and personalization by analyzing large amounts of data to understand customer behavior and preferences. This then allows marketers to create more targeted communication campaigns that meet the expectations of selected segments. By using AI in **STP** (segmentation, targeting, positioning) for marketing strategy, more effective marketing activities can be created, because AI is able to analyze large amounts of data and help make appropriate decisions about positioning products and services to better meet the needs and desires of selected segments (Huang & Rust, 2020).

According to van Esch & Black (2021) artificial intelligence can **automate repetitive** marketing functions, thereby allowing marketers to focus on strategic activities. The point is that the “mechanical” AI can quickly collect and standardize data on its own and the “thinking” AI, after processing the data, provides information and suggests solutions. Finally, the “opinionated” part can analyze interactions with customers. The use of this automation can not only increase efficiency, but also give more time and space for creative and other value-creating activities.

AI can also improve the **customer experience** by properly managing customer interactions and creating personalized responses. AI tools can then automate the offer of possible responses directly to the customer, monitor the customer experience, and then transform all this into suggestions for topics for communication on social networks (Jánošová & Ďurovová, 2023). By involving AI, companies can provide quick and relevant answers to customer questions and thus improve the overall customer experience, which is confirmed by studies by van Esch & Black (2021).

By being able to provide data-based insights, AI can appropriately influence communication strategies and decisions about the use of appropriate communication tools. Analysis of customer data can bring definitions of trends, preferences, and behaviors, which will make it easier for managers to make decisions based on real information. AI’s ability to derive and define insights from data helps create more effective communication campaigns and at the same time allows for improving a company’s overall marketing performance (Malthouse & Copulsky, 2022).

AI also offers opportunities in neuromarketing research and can generate emotional aspects of consumer behavior based on analyses of previous data (Kusá & Belíčková, 2023).

2 Research Methods

From previous research on the situation in the use of AI in marketing and especially marketing communication, we focused our attention on two entities that participate in the preparation, implementation and evaluation of the effectiveness of marketing communication. This is a prerequisite for understanding the problems that emerged from the research of the Kantar agency. From the research of the Kantar agency from 2024 and with its official support, we selected relevant outputs in the area of our interest. We used the method of research, content analysis, synthesis, deduction and generalization. Pie and bar graphs are presented as part of the visualization.

3 Results

In total, 548 marketers from the Czech Republic and Slovakia participated in the research, of which 58% were from the Czech Republic and 48% from the Slovak Republic. Most marketers who participated in the research are involved in marketing/PR communication in a company on the client side. Smaller shares of respondents are in agencies, especially digital ones.

They most often work in the areas of marketing management and strategy, online and digital marketing, content/communication and PR. These are people working mainly in managerial or top managerial positions. Almost 80% of respondents have been working in the field of marketing or communication for more than 6 years.

Activities in the B2B sphere slightly predominate, especially in the Czech Republic and Slovakia. Only about a third of respondents work abroad. The annual marketing and communication budget of the company where the respondents work is slightly higher in the Czech Republic.

First, let's focus on the respondents' personal attitude towards artificial intelligence. Key findings include:

- **Positive attitudes towards generative AI**
 - A significant majority of marketing professionals in both the Czech Republic and Slovakia have a positive attitude towards generative AI, with 84% expressing a positive attitude.
- **Widespread use of text-based AI**
 - Text/language AI is the most widely used generative AI model, with a total of 92% of respondents personally using it. This trend is consistent in both countries (94% in the Czech Republic and 90% in Slovakia).
- **Graphical AI as a key tool**
 - Graphical AI is the second most commonly used AI model, with an overall usage of 55%.
- **People working in agencies have a head start**
 - Adoption of AI tools varies by the focus of the marketing professional. People from agencies generally have a head start over people from companies in all types of AI.

The attitude towards the possibilities of generative AI is very positive. On the client side it is 83% and on the agency side it is even 86%.

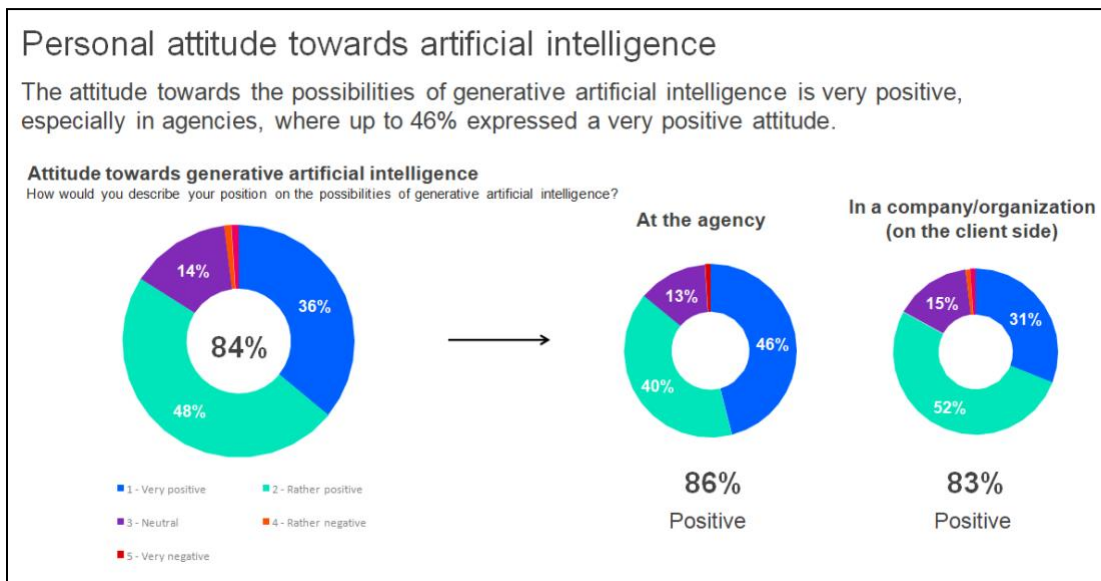


Figure 1: Attitude towards generative artificial intelligence
Source: Kantar (2024)

3.1 Opportunities and Challenges

Respondents expect the following benefits and uses in particular:

- **AI will speed up execution**
 - 85% of respondents expect AI to significantly or very significantly speed up marketing or PR execution. Expectations for cost savings or quality improvements lag significantly, but 2/3 of marketers still expect them. Overall, expectations for the benefits of AI are higher in agencies than in companies.
- **Intensity of AI usage**
 - Current use of AI lags behind ideas about how much AI should actually be used. Marketers' ideas about the ideal intensity reach almost double the current use of this technology.

According to marketers, AI should be used much more often in their organizations than it is now. Currently, it is (often or almost always) in 37% of cases, but according to marketers, it should be up to 68% of cases.

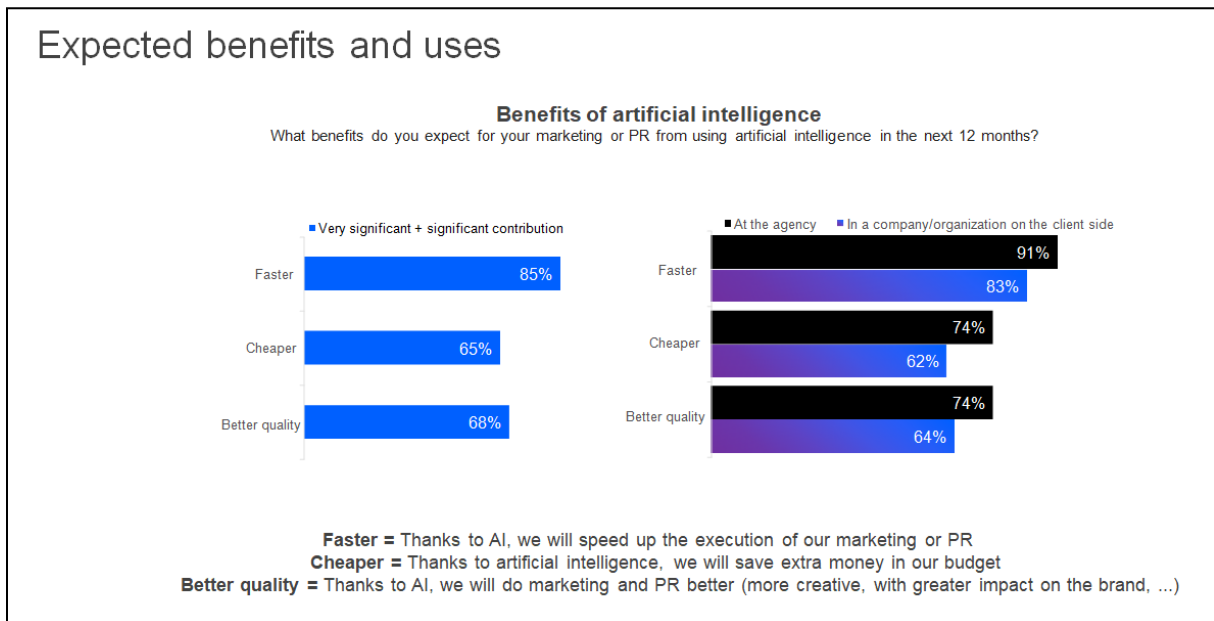


Figure 2: Expected benefits and uses
 Source: Kantar (2024)

Other benefits include:

- **Text, images, video**
 - The creation of written text or images or videos is the dominant areas of AI use in businesses. Thanks to ChatGPT’s expansion and low cost, it is a natural AI technology that is easy to adopt. However, ChatGPT is far from being a solo player and a number of smaller but specialized services have mushroomed in the industry, giving marketers a good opportunity to choose.
- **AI for personalized marketing**
 - Improving personalization and targeting using large data sets, which improves the customer experience and develops systems for automated decision-making?
- **AI for predictive analytics in marketing**
 - Applying predictive analytics using AI will help to predict customer needs and behavior. This can improve the effectiveness and efficiency of strategies
- **AI for content creation and optimization**
 - AI tools enable content creation and optimization based on current data and audience preferences. This should create more engaging and relevant content.

Other areas lag significantly behind and even after taking into account the plans for the next 12 months; they will not become more used than the creation of texts, images or videos. The least attractive area is the use of artificial intelligence for dynamic pricing. This may be due to the fact that not every business model is ready for dynamic pricing or also because there is still little awareness of the opportunities that working with pricing offers.

3.2 Dilemmas and Threats

It could therefore be said that the position of AI and the predisposition for its further development and use in marketing and marketing communication is significantly promising

and positive. However, AI is associated with challenges, as well as many dilemmas. Now we will focus on the most important ones that emerged from the research results.

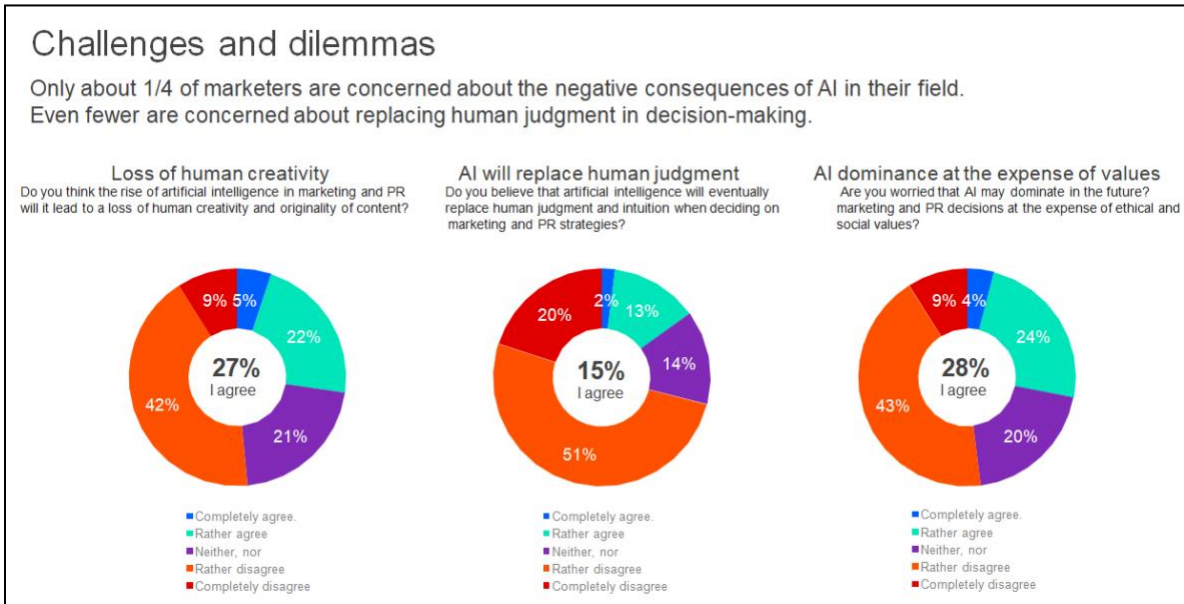


Figure 3: Challenges and dilemmas
Source: Kantar (2024)

Approximately 1/4 of marketers fear the negative consequences of AI. 28% of marketers fear that artificial intelligence will dominate marketing and PR decisions in the future at the expense of ethical and social values.

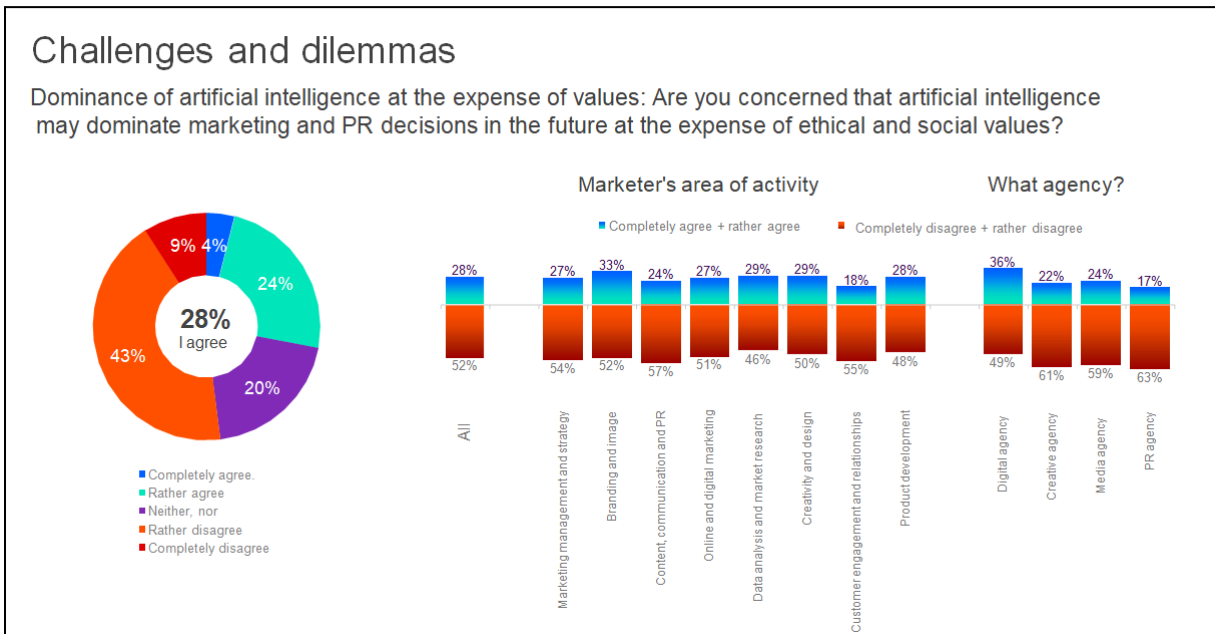


Figure 4: Challenges and dilemmas
Source: Kantar (2024)

27% of marketers agree that the rise of artificial intelligence in marketing and PR will lead to a loss of human creativity and original content.

Only 15% of marketers believe that artificial intelligence will eventually replace human judgment and intuition when deciding on marketing and PR strategies.

Czech marketers are more afraid of artificial intelligence. The main difference is mainly in the fear of losing human creativity. In Slovakia, only 23% of marketers are worried, while in the Czech Republic it is as high as 31%.

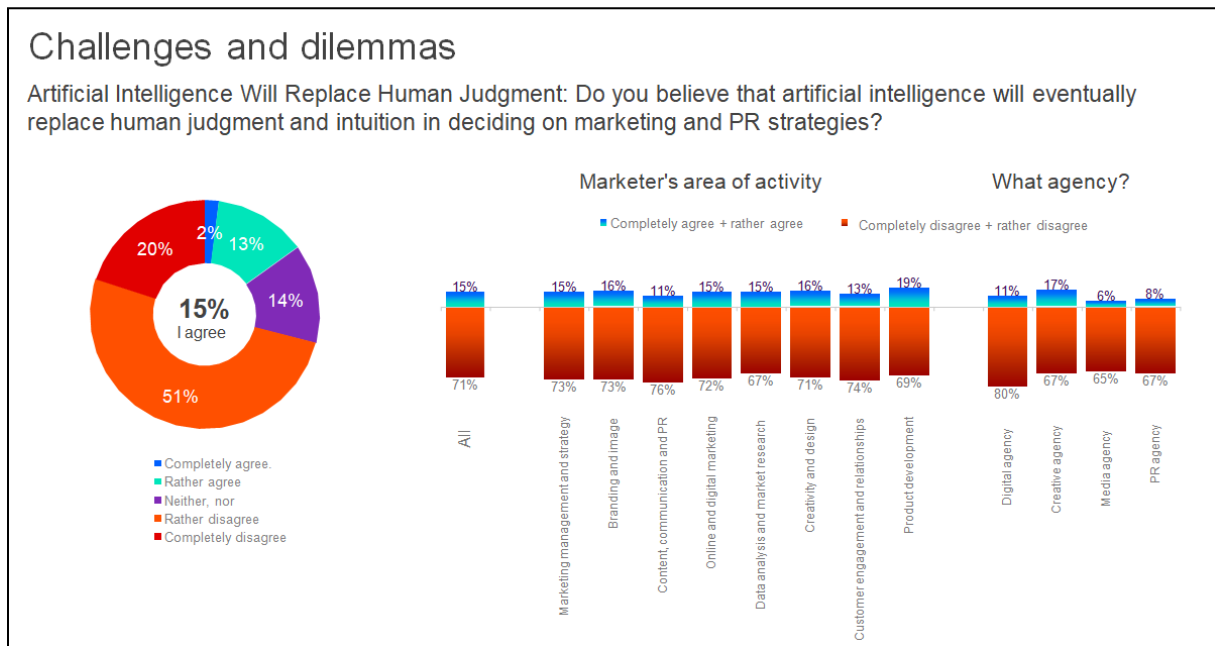


Figure 5: Challenges and dilemmas
Source: Kantar (2024)

Other dilemmas associated with AI and its application in marketing and communications include:

- **Ethical challenges and privacy issues in AI marketing**
 - Ethical dilemmas – concerns about privacy, data misuse and lack of transparency in marketing decisions using AI.
- **Consumer trust issues in AI**
 - AI can increase marketing effectiveness, BUT there is growing concern about how the use of AI affects consumer trust if AI makes decisions that may be manipulative or invasive.
- **Job replacement in marketing**
 - The potential replacement of marketing and communications jobs due to automation by AI raises concerns about the future of jobs in these fields.

Marketers in both countries have seized the opportunity offered by artificial intelligence. This is seen not only in the already high adoption, for example, AI for writing (61%), but also in plans to introduce AI into other marketing areas.

However, this is in marked contrast to how ordinary people perceive AI. In surveys conducted by Kantar in the Czech Republic and Slovakia in 2023, only 16% of Czechs and 17% of Slovaks expressed a positive attitude towards artificial intelligence.

And the biggest concern is not about losing their jobs, which is feared by only about 1/3, but about even greater dependence on the online world and about deepfakes, which are feared by up to 2/3 of the population of the Czech Republic and Slovakia.

So marketers clearly have their own AI bubble and there is a big gap between their perception of AI and how the rest of the population perceives AI. Marketers should therefore not forget this big difference and should take it into account in their marketing communication.

4 Discussion and Conclusion

Although ethical considerations were the first input to our research, in this section we present them last in order to emphasize their importance and then proceed to the last section, where we deal with the relationships between brand owners (companies) and communication agencies when using AI in practice.

As we mentioned in the previous text, it is evident that AI offers a number of benefits, but also raises many **ethical considerations and various challenges** for the future. These are questions related to the potential surplus of marketing specialists and especially in marketing communication. AI will massively take over a number of functions, mainly routine ones, such as repeated campaigns, data collection and processing and others, which are still handled by people today. This fact will concern both companies and communication agencies.

The ethical dimension of the problem is much more complex, which is also confirmed by Ziakis & Vlachopoulou (2023). Especially in an international environment, it will not be easy to reconcile communication campaigns created by AI with cultural differences, especially in cases of high- and low-context cultures. It is clear that the language barrier will obviously be the least of the problems, given that translations are not a barrier for AI, the issue will be more the context. From these considerations, it follows that it will be very important for marketers to consider all possible ethical implications and ensure that they use AI responsibly and transparently.

Finally, AI tools are not yet perfect and can show a lack of creativity and to a greater extent also a lack of emotionality and empathy, which can lead to the creation of ineffective, inappropriate content, or even dangerous content.

The above research, studies and facts show that different entities on the market, depending on the field, size and activity can use different AI tools and in each entity they can be an opportunity to increase the effectiveness of corporate processes, marketing, strategies and communications. They can also pose a certain risk to the labor market – see the elimination of some job positions, or the loss of creative thinking and decision-making in situations or crises where human intervention is required.

It should also be noted that legislation is a necessary condition for defining AI risks, as evidenced by the document EU 2024/1689 – Artificial Intelligence Act (2024) – Regulation (EU) and is the first ever legal framework for artificial intelligence that deals with the risks of artificial intelligence. The approach is based on the qualification of risks. The regulatory framework defines four levels of risk for AI systems. They are: minimal risk, limited risk, high risk and unacceptable risk. The use of AI in marketing and marketing communication belongs to the limited risk area, which are AI systems with specific transparency obligations.

The limited risk is related to the risks associated with a lack of transparency in the use of AI. The AI Act introduces specific transparency obligations to ensure that people are informed when necessary and thus strengthen their trust. For example, when using AI systems such as chatbots, people should be made aware that they are communicating with a machine so that they can make an informed decision to continue or withdraw. Providers must also ensure that content generated by AI is identifiable, i.e. it must be clear how, for example, a certain image has been modified. In addition, text generated by AI must be marked as artificially generated. This also applies to audio and video content, in particular that constitutes deep fakes.

While the EU is trying to regulate the dangers, in the US, in the context of preserving the freedom of business, corporate lobbies are against regulation, i.e. protecting the audience. However, if they want to enter the European market, they will have to respect the regulation. It is estimated that if they enter, they will also use such regulated communication in the USA and other countries

In our opinion, other aspects of AI will also need to be regulated by law, i.e. to define their uniform categorization, conditions of use and limits with the aim of effective operation in market and non-market conditions.

Finally, AI tools are not yet perfect and may show a lack of creativity, and to a greater extent also a lack of emotionality and empathy, which can then lead to the creation of ineffective, inappropriate content, or possibly dangerous content.

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USAGE OF AI TOOLS IN THE PROCESS OF CREATING MARKETING COMMUNICATION

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Abstract:

The integration of artificial intelligence (AI) in the process of creating marketing communication is transforming the way businesses view and approach their marketing endeavours. AI technologies such as machine learning, natural language processing, and predictive analytics are influencing many fields today, and fields like content creation, team segmentation and campaign optimization are no exception. By optimizing the whole process and providing data-driven deeper insights into consumer behaviour, AI enables marketers to craft more targeted and relevant messaging. This article explores the diverse applications of AI tools in creating more efficient and data-driven marketing teams and campaigns. Theoretical information on the topic of AI in marketing, marketing communication, team building in marketing are discussed. The following parts are dedicated to the research of certain existing solutions and their possibilities as of October of 2024. The paper also addresses potential challenges and the need for human oversight, highlighting how AI should be seen as an enhancer in marketing, rather than replacement of existing workforce. The article shows the current state of AI in the field of marketing communication and underlines the importance of continuous research and innovation in the field.

Key words:

AI in Marketing. AI in Marketing Communication. AI-powered Copywriting. Generative AI. Social Listening Tools.

1 Literary Overview

Artificial intelligence (also referred to as AI) is a technology that enables computers and machines to simulate human learning, understanding, problem solving, decision making, creativity, and autonomy (Stryker & Kavlakoglu, 2024). AI-powered applications and devices learn and improve through exposure to vast amounts of data, being able to reason, learn, and act in ways that would normally require human intelligence or that involve data beyond the scope that a human can analyze (Google Cloud, n.d.). We can think of AI as a series of concepts (see, Figure 1) that have emerged over the last seventy years.

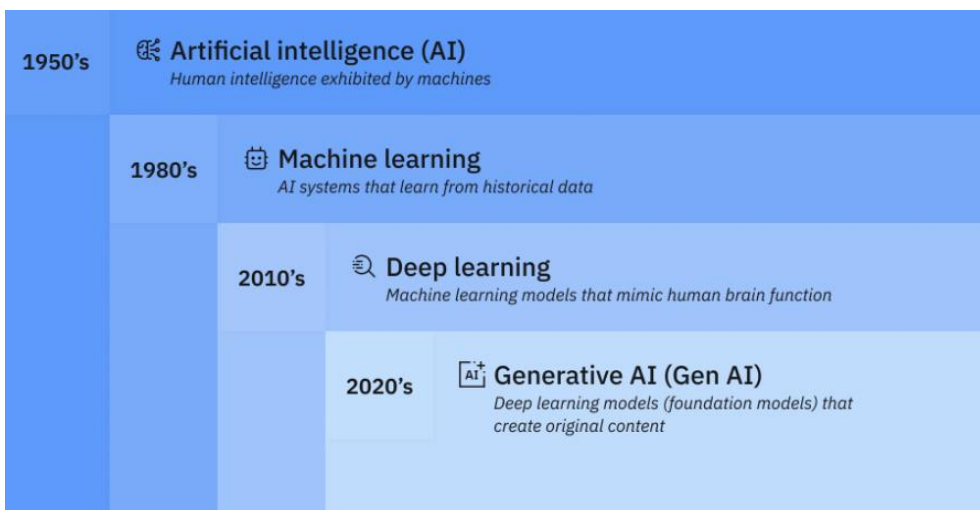


Figure 1: Development phases of artificial intelligence
Source: Stryker & Kavlakoglu (2024)

In the 1950s, the human intelligence exhibited by machines was the subject of investigation. The Turing test was used to assess the ability of machines to mimic human intelligent behaviour. A significant shift in artificial intelligence occurred in the 1980s with the advent of expert systems. It was a pioneering attempt to incorporate AI into the fight against cyber threats. Expert systems were based on knowledge bases, large repositories of domain-specific historical data. Huge amounts of data and increasingly advanced computing accelerated the development of AI in the early 21st century. The subjects of investigation were first machine learning models, mimicking the function of the human brain, and in the 1920s of the current century, deep learning models that produce complex original content, e.g., long text, high-quality images, realistic video, or sound, referred to as generative AI (Stryker & Kavlakoglu, 2024).

In the context of our research, it is important to note that technologies based on generative AI are also gaining ground in marketing. Researchers (Bock et al., 2020; Overgoor et al., 2019) attribute their popularity in this field to three main factors: the development of big data, the availability of computational power, and the advancement of AI technological tools. Overgoor et al. (2019) even formulated a definition of marketing AI: marketing AI represents the development of artificial agents that, based on the information they have about consumers, competitors, and the focal company, design and/or execute marketing actions to achieve the best marketing outcome. Vlačić et al. (2021) identified four main areas of marketing in which this happens:

- **Marketing channels.** AI-based technologies can assist marketers in profiling customers and better predict their choices in terms of purchase and physical distribution of goods.
- **Marketing strategies.** In the context of marketing strategy, AI-based technologies are helping to create new paradoxes in strategy, such as recognizing the benefits of massification alongside the benefits of customization (Du et al., 2003), combining the pros of luxury and premium brands with the benefits of the mass market (Kumar et al., 2020; Paul & Mas, 2019), or combining niche markets with the benefits of the large market through e-commerce (Meiseberg, 2016).
- **Performance.** Companies benefit from AI by transforming big data into information and knowledge, enabling them to develop more effective marketing and sales strategies that often translate into sustainable competitive advantage (Paschen et al., 2019), anticipating demand and creating value for customers.
- **Segmentation.** AI-based technologies in this area allow to better serve different segments and generational cohorts (Lei & Moon, 2015), enabling to anticipate changes in customer profiles as well as post-demographic consumption (Pitt et al., 2018).

From the invention of the printing press to the advent of the Internet, every technological discovery has redefined the field of information sharing and interpersonal relationships. In the same way, generative AI is transforming the way brands communicate with their customers. One notable example is real-time content personalisation, which enables brands to deliver personalised experiences to each individual customer, based on their previous behaviour. Other examples include search engine optimization, targeted advertising with higher ROI, automated creation and editing of marketing content, and the use of chatbots that are able to interact with multiple customers at once and provide instant answers to frequently repeated questions.

Research agency Go4insight (2023) conducted a survey in 2023 on a sample of the Marketing Professionals Panel to find out how Slovak marketers use artificial intelligence in their work. Based on the results, we can conclude that most often to create new content in the form of texts (71%), new creative ideas (62%), information discovery (54%), optimization of large amounts of information (37%), personalization of content (29%). In comparison, global marketing agency Team Lewis (2024) conducted a survey of marketing professionals in the US. The results suggest that US marketers are using generative AI-based technologies

in different parts of the creative process at a much higher scale: in copywriting (85%), content ideation (83%), creating visuals (82%), executing creative campaigns (81%), and conceptualizing creative ideas (80%). Team Lewis notes that we can expect an emphasis on AI-related literacies such as machine learning proficiency (65%) or enhanced analytical and data interpretation skills (52%) when pursuing marketing professions.

Based on the principles of the marketing communication process, we can conclude from the above literature review and the partial results of commercial surveys that tools based on generative AI are currently used mainly in selected steps of the marketing communication process (target group selection, message development, measurement of achieved results).

2 Methodology

The main objective of the paper is to identify the artificial intelligence tools that may be used in the process of creating marketing communications. In order to fulfill the main objective, we have designed a structured approach to examine the use cases, roles and challenges of AI tools in the context of our research. To achieve this, we have defined the following partial goals:

- define artificial intelligence,
- define the areas of marketing in which AI finds application,
- define the steps of the marketing communication creation process in which AI finds application,
- document the results of a commercial survey telling about the use of AI in the marketing communication process,
- define the exact tools that are present on the market and are used in the marketing communication process,
- research and evaluate the usability of these tools,
- mention challenges and considerations connected to the usage of AI-powered tools in marketing communication.

In addition to these objectives, in this paper, we aim to answer the following research question: What are the potential applications, capabilities and limitations of certain AI-powered tools as of November 2024 in creating marketing communication?

In the preparation of the paper, we rely mainly on foreign scientific sources. We draw the results of surveys from professional secondary sources in order to understand both the academic and professional implications of AI tools and technologies in marketing. During data processing, we worked with appropriate scientific methods (search, description, deduction, analysis, synthesis).

In the empirical part of our paper, we aimed to research two AI-powered tools that can be used during the process of creating marketing communication. To do this, we conducted an experiment with each of them. With the first tool, Headlime, the objective was to explore its script generation capabilities. We aimed to understand how the scripts section works, so we've conducted an experiment in which we input information on currency, action, article, audience, author name, authority, award, company email, company name, comparative, competitor, current solution, event, features, solution, undesired outcome and USP values to receive the relevant results. The topic of these texts was sneakers – shoes. With the second tool, Brand24, we wanted to research mentions and options for further work with them. Therefore, as a keyword, we selected a brand that sells shoes – “Puma”, and to make results more relevant, we've added an additional required keyword “Shoes”. Inputting this information gave us access to the following sections: mentions, summary, analysis, AI topic analysis, comparison, sources, and influencers. The tool also enabled us to download the analysis reports. Moreover, we examined the tool's ability to segment audience insights, generate analytics reports, and identify

influencers based on various criteria. By conducting our research in a structured way outlined earlier, we were able to combine bibliographic research with a series of detailed experiments to address the growing role of AI in marketing. With the findings of this article, we aim to contribute to both the academic research sphere and professional environment to leverage the research of AI usage in the process of the creation of marketing communication and marketing in general.

3 Results

In this part of our paper, we want to provide a comprehensive overview of the usage of two AI tools that can be used in different steps of the marketing communication creation process. To make the outcomes of the article more relevant and diverse, we want to focus on tools that have different focuses of functioning and are not interconnected. Therefore, we find it appropriate to select one tool powered by generative AI for copywriting, and the second that works with data with the help of an AI.

The first tool we want to focus on helps write texts of any character – Headlime. As we've seen in the previous part of our paper, writing texts with the help of AI has become one of the most common usages of AI in marketing. Many people got acquainted with artificial intelligence by using large language models (LLMs), like GPT, Gemini, or Llama, which can provide text output depending on the prompts inputted to them. When using LLMs, to receive a high-quality result, one should be skillful at prompt engineering, making it as specific as possible for the model, what it should write about and in what way. Therefore, generally, the higher the quality of the input information, the higher the quality of the results received.

Nevertheless, with the widespread use of AI technology, many new services have been created to help people get the best possible outcomes with less effort. It is important to note that most such services don't use their own AI models to generate texts but are connected to an external LLM through an API. Thus, the service creates a prompt template for an external connected LLM, and the user has to input the required information to receive the relevant outcome. One such service is Headlime, which is connected to the GPT LLM and can provide high-quality texts on many tasks a copywriter, marketing agency or business owner may need. One of the primary features of the service is that it is available in 11 languages, providing an opportunity to create multilingual content.

The service functions on the principle of credit – meaning that a certain amount of credit is required for every action. There are two pricing options – Individual and Business. As the name suggests, an individual plan can be used by one user only and provides 1500 credits per month for 59 USD. To clarify, this amount of credits equals around 7500 Google Ads texts, 10000 website headlines or 75 landing pages created. On the other hand, the business plan provides unlimited credits for at least three users simultaneously, with the possibility of increasing the number of members up to 99. The price for the business package starts at 399 USD/month for three members and scales up to 13167 USD/month for 99 users. It is also important to note that the brand is using the fair use policy, therefore, even though the amount of credits is unlimited, technically, the amount of generated content is limited to around 700 blog posts for a three-member plan (Headlime, n.d.).

The tool's functionality can be divided into two main sections – fully AI-generated content and content created from the scripts. Let's look at the script content first. Headlime claims to provide thousands of templates that are automatically customized according to the variables users can provide. Therefore, just by writing basic information about the brand and its offer, the user may have dozens of templates available for use, if they find any appropriate, without generating something from scratch. There are many categories of templates available, including headlines, emails, social media posts, Facebook ads, Google ads, 404-page texts, etc.

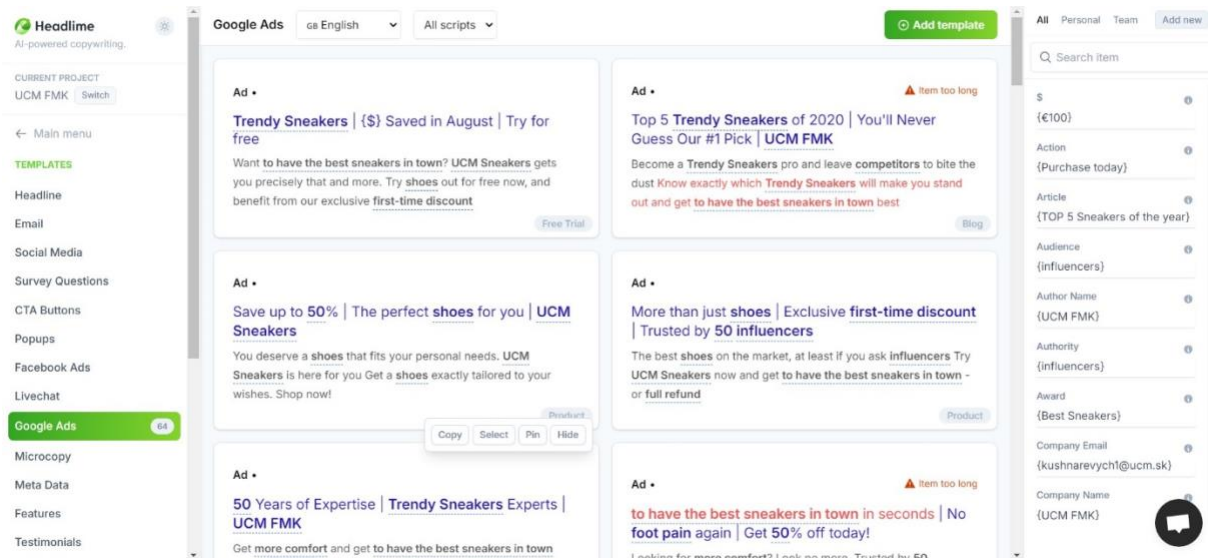


Figure 2: Scripts at Headline
Source: own processing, 2024

As shown in Figure 2, we've tried to create a Google Ads creative with the help of scripts provided by Headline. Bold text is input values, while the regular text is the one that is provided as a template. It is also important to note that the platform recognizes the limits and character counts that are required by external platforms. In our example, the limits of Google Ads creatives are considered, and if the input is too long, the system will notify the user that they will not be able to use it. The results are also sorted into categories by their use cases, which may be helpful if the person wants to target ads to customers with different purchase intents or at various marketing funnel stages. What is provided by the scripts section is usable, however, these are still the templates that don't have to be overly unique or creative. That is where the second category of services may be helpful for a user – AI-powered generation.

Headline divides AI-powered generation into three main sections: Blog posts, Marketing copy and Landing page generation. While creating the blog post, three primary information inputs are required: an article's language, description and keywords. It is important to note that while generating articles, the system will ask the user for human editing occasionally and won't just generate the whole article immediately. On the one hand, users may be annoyed by something like this, but on the other hand, with such an approach, the chance of creating unique and appropriate content is higher.

AI-powered marketing copywriter, in our opinion, is the most exciting part of the service due to the variety of opportunities it offers. In this section, it is possible to generate not only headlines or ads creatives but also texts for Value proposition, Feature to benefit, Taglines, Pain gain claim pitch text, e-commerce product descriptions, etc. Generating text in these categories requires more input from the customer. Among the necessary information, the user has to choose the language of the text, write who the text's audience should be, what the product or service name is, and the description of the product or service provided. Two non-mandatory fields may influence the way the final text is being written. These options are creativity level (a choice from filtered & optimized, highly creative and multilingual) and tone of voice (a selection from professional, academical, childish, luxurious, mysterious, slang, friendly and confident). Since every business is different, adjusting the tone of communication is usually essential to have a correct impact on the brand's target audience. Therefore, none of these options should be overlooked while in use.

The last category of AI-powered content is generating landing pages, which goes beyond text generation and focuses on its combination with design options. In addition to inputting the brand and offer information, the user also has to choose the visual template of

a landing page, and after the content generation is done, they may change certain parts of the provided landing page. There is also an option to change the font sizes, meta information, colours, section settings, etc. While the landing pages provided are relatively simple and have limits to the customization provided, they may serve as a great starting point or a great helper for smaller businesses that are not capable of creating new landings. Also, the generated page can be exported as HTML and used in a different editor.

To conclude, Headlime provides copywriters and marketing agencies with many opportunities to ease the copywriting process of any text. While the outputs or the scripts may not always be perfect without any mistakes, they usually provide usable results subject to minor changes. And, since the service structurally requires user input in order to provide an output, the relevancy of the result is primarily high. One of the primary concerns of AI-generated texts usage in marketing is the attitude towards such texts from Google algorithms and other systems, which we address in the next chapter of our paper.

The second tool we want to focus our attention on is a social listening tool named Brand24. It is aimed at gathering and analysing brand mentions among different online channels. Social listening tools are not new on the market, but Brand24 provides an opportunity to use an incorporated AI for the gathered data, making it a powerful tool for analysing the information from mentions. Firstly, it is essential to mention the payment model the service provides. A 14-day free trial is available for all users, even without the requirement of credit card information input. While it is not openly specified, we found that the free trial provides a relatively limited version of the service, with certain tools, like specific channel analysis unavailable. Other than that, four plans are available – Individual, Team, Pro and Enterprise. The main differentiators of the plans are the number of keywords that can be monitored, the number of mentions that can be monitored, update frequency and access to AI features. The pricing starts at 119 USD per month and scales depending on the plan chosen as well as the periodicity of payments (Brand24, 2024).

The tool is very versatile because of the number of tools it can analyze. It may continuously monitor the following sources: Facebook, Instagram, X, news, blogs, forums, LinkedIn, Medium, Quora, YouTube, TikTok, reviews, Twitch, newsletters and even podcasts. On top of collecting mentions, it can also include information on the reach of the mentions, sentiment used, influence score, their importance, source, geolocation, language and author. To start collecting information, users must log in and input the keywords they want to follow. It is important to note that, by default, it collects all the mentions of the keywords input, which may be a little misleading for the brand. In our case, we wanted to analyse the mentions of Puma shoes online, so we started by including the keyword “Puma” in the system. At this point, a high number of mentions was downloaded, however, after closer evaluation, we found that many of them were not related to the shoe company, but, for example, to Ford Puma, animal puma or someone having the nickname Puma. Therefore, the information collected couldn’t be used without further sorting, but the tool enables you to specify the keyword by including the required or excluded keywords. In our case, we added required keywords “shoes”.

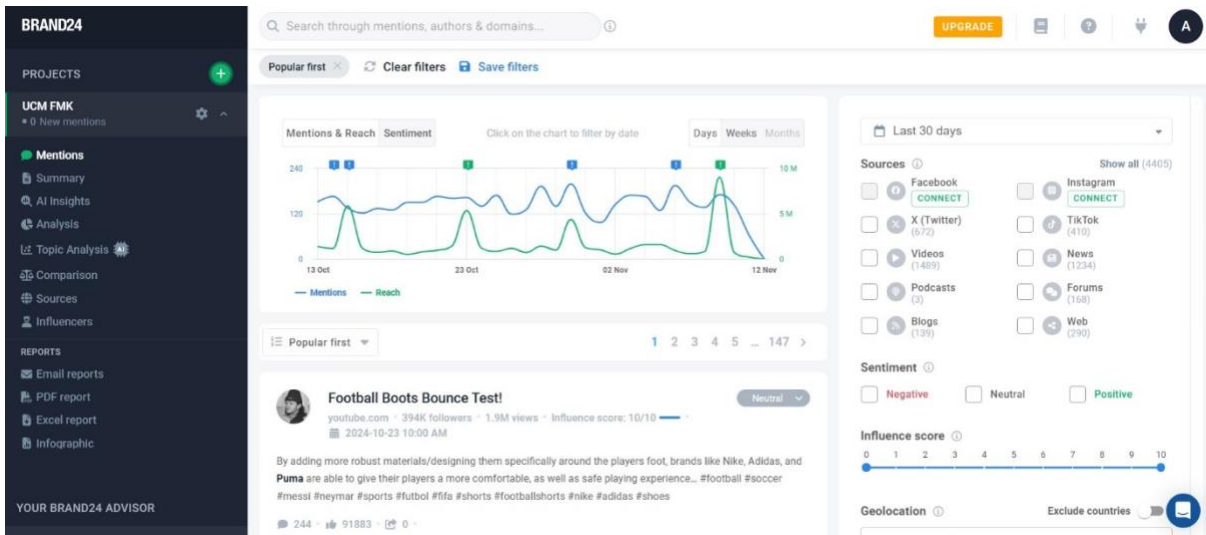


Figure 3: Mentions section of Brand24; Keyword: Puma
Source: own processing, 2024

After the historical data of mentions were collected, the main dashboard shows an overview of mentions, reach and sentiment, and can be sorted based on different factors, like source, geolocation or influence score. It is important to mention that to collect information from Facebook and/or Instagram, a Meta account should be connected, otherwise, no information on mentions from these networks will be available. In the “Mentions” section, the mentions themselves are also available, including the information about the person who posted it, their influence score and the message’s sentiment. This information itself is beneficial, given that it is processed appropriately. However, Brand24 offers great additional options to get better insights and understand customer communication in relation to the brand. The first useful feature that may bring a lot of clarity to the brand is the analysis connected to the anomalies in the number of mentions or reach, whether positive or negative. For example, if the sudden increase in mentions is connected to a new product announcement, special promotion, or a short-term discount, the tool will provide information about this. And while some of such anomalies can be obvious for the brand, others may not be. For example, suppose a famous influencer shares a lousy product review and there is a surge of mentions with negative sentiment in the comment section. In that case, it may take some time until brand notices it and do crisis management of the situation. Brand24, on the other hand, enables the collection of such information in real time, saving a lot of time and potentially benefiting the brand’s image.

As we’ve mentioned earlier, the service also provides AI capabilities, and we wanted to research the AI Topic Analysis one can conduct right from the user section. This section provides an overview of the most important topics connected to the keywords monitored, including information on the number of mentions in the context of a specific topic, reach of the topic, share of voice of the account and sentiment share. In our case, for the keyword “Puma” in the context of shoes, the following topics were identified: “Puma Shoe Topic”, “Sneaker Brand Information”, “Sport Shoe Discussions”, “Clothing Store Information”, “Shoe Promotion Videos”, “Shoe Pricing Topics”. As we may see, with the help of an AI, all the identified topics were connected to the context of the brand. Furthermore, the user can get in-detail statistics regarding every topic, including the information on the context of discussion, intents share, categories share and even the analysis of used emojis. This way, not only the sentiment is analysed, but the mentions can be automatically sorted by the topic, making it much easier to manage and promptly react to. Brand24 also uses AI to provide insights based on the data collected. Among such insights may be information on the trends, correlations, impactful mentions, and even recommendations based on this information.

The results that are collected from Brand24 can be exported as a PDF with numerous infographics, summaries and statistics. There is also an option to directly export infographics with the data on the number of mentions, most active categories, sentiment overview, source type and user overview.

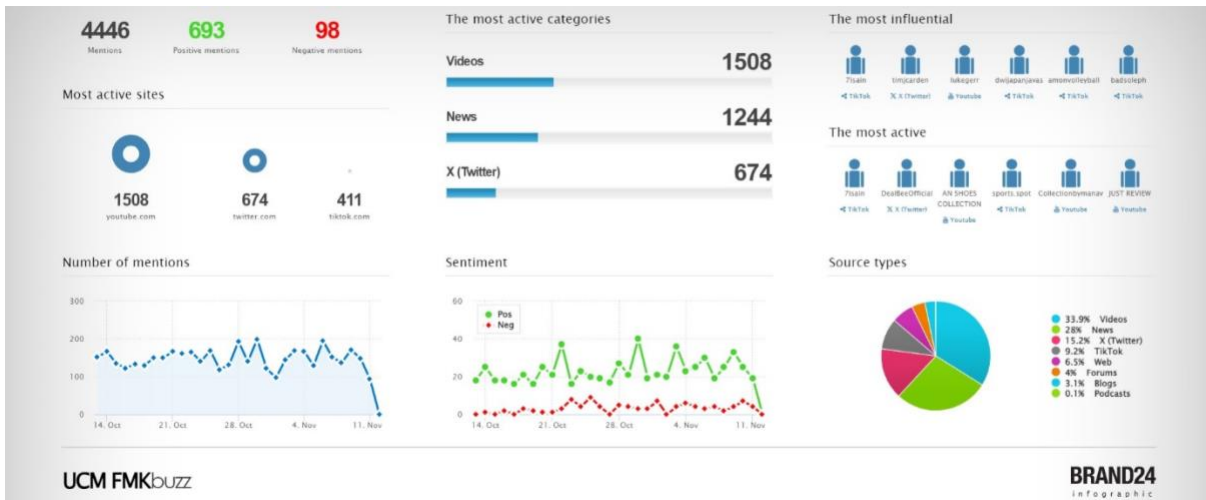


Figure 4: Infographics from Brand24; Keyword: Puma
Source: own processing, 2024

In conclusion, we may say that Brand24 provides a wide range of opportunities for brands to follow what the users think about them. While some functions are blocked for the higher tiers, even the introductory level provides a data set that would be sufficient for many brands. Social listening provides a data set of information that can be turned into valuable insights by correctly interpreting this information, and this is the field where Brand24 stands out, providing AI capabilities that can interpret the data and provide more information in a context. Case studies mentioned by Brand24 show that if the brand does social listening correctly and understands the public, its online exposure can be raised without significant money investments (Pagowska, 2023). Overall, Brand24 is an excellent tool for anyone who wants to understand and leverage brands’ communication with the customers, do better crisis management or monitor competition to be in touch with the sphere, and the tool may be used in various stages of marketing communication.

4 Discussion

In connection to the mentioned tools, there are several considerations and challenges that the brands using them may face. One such consideration connected to the Headline is the indexing of AI-generated content by search engines and the display of content in general. On the one hand, Google states that it aims to reward “high-quality content, however it is produced” (Google Search Central, 2023). On the other hand, since there is no strict definition of “high-quality content” or its limitations, some AI-generated texts, pages or articles may be flagged as spam and therefore pushed down the search results or removed completely (Shaheryar, 2024). It is also essential to understand that Google’s search algorithms are updated continuously, and it is crucial for brands to monitor them, adjust the content to the guidelines and follow their indexability and search volume through tools like Google Search Console. The key is to aim to provide high-quality content, and not outsource the whole creation process to LLMs without the appropriate prompt engineering. Since the originality of generated content is often limited, human touch may become necessary when working with text generation.

Working with any social listening tool, like Brand24, also brings a variety of challenges and considerations with itself. One of the primary concerns the brand may face is limited access to data on specific platforms or on certain occasions. The tool is capable of collecting numerous mentions and reactions, but only those that are public. As soon as some content is published in a closed group, private space or a community that requires signing up, the tool won't be able to notice it since it doesn't automatically have access to it. Also, while the tools are getting increasingly advanced in the context of speech recognition, being capable of differentiating things like slang, sarcasm, dialects etc., understanding the sentiment correctly is complex and may be challenging, especially if we are talking about monitoring mentions in different languages. With the help of AI, we think that sentiment analysis will ultimately improve, but at this point in the technology lifecycle, some bugs, misunderstandings, and wrong interpretations may occur.

5 Conclusion

In this paper, we aimed to look at how AI may be used in the marketing communication creation process. We successfully made a literary overview related to the topic of AI and AI In marketing, and, after identifying the trends in usage, researched in detail two AI-powered tools available on the market today. Since we didn't want the outcomes to seem plain, we chose tools with different focuses that are not interconnected. To conclude, we may state that, on our opinion, the state of AI usage in the marketing field will only grow with time, and the trends that can be seen on the US market today will also be present in Slovakia and other countries. Thanks to its capabilities, AI indeed may significantly contribute to many stages of marketing communication. If one approaches the technology appropriately and see it as something more than a simple text or image generation, a vast amount of insights, ideas and critical points may be collected with a help of numerous tools, like Headlime and Brand24. And we are sure that the number of AI-powered tools will only grow with time.

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THE ARTIFICIAL HERO – THE ETHICAL DILEMMA OF PORTRAYING AN ANTI-HERO IN AN AUDIOVISUAL PRODUCT

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Abstract:

The present scientific study focuses on the evaluation of the ethical dilemma or the media image of an artificially created heroic character, namely the person of a serial killer in a modern criminal audiovisual product. Specifically, it is a reflection on the modes of depiction of the killer in the chosen research material – the episodic work *Dahmer – Monster: The Jeffrey Dahmer Story* (Brennan & Murphy, 2022). The theoretical background of the study is represented by the definitions of the key terms, namely the terms archetype, stereotype, artificial hero (anti-hero), violence or the genre of crime, whose meaning becomes crucial in the context of the issue under study. The mapping and at the same time a detailed description of the ways of presenting the anti-heroic character (the killer) in the chosen (popular) audiovisual product is the essence of the subsequent case study. Moreover, in the context of the issue we have addressed, we believe that the creators of the aforementioned media product are largely working with the values and features of mainstream (episodic) works, which from our point of view is the main determinant of the success of the pertracted work, but at the same time it is a significant ethical dilemma in correlation with the nature of the anti-heroic character. With the intention of answering the given premise, qualitative content analysis or narrative analysis and characteristic logical-conceptual procedures are used. Thus, the aim of this study is to extend the existing knowledge concerning the question of the position of the artificial hero (serial killer) in the audiovisual crime work in the form of a theoretical-empirical reflection.

Key words:

Anti-hero. Artificial Hero. Crime Story. Ethical Dilemma. Hero Archetype. Mainstream Values. Serial Killer.

1 Introduction

Controversial media products can now be described as a highly resonant topic area in society, and one that is highly sought after on today's streaming platforms. One of these is crime stories, which often transcend traditional genres and offer us complex, contradictory perspectives on the darker side of the human psyche and the perception of heroism, while at the same time presenting a significant ethical dilemma in today's society. An exemplary audiovisual product depicting an artificial form of heroism is Netflix streaming platform *Dahmer's Monster: The Jeffrey Dahmer Story* (Brennan & Murphy, 2022). Despite the main character's overtly negative actions, present across the entire narrative structure, the Jeffrey Dahmer work, in addition to outrage, has mainly elicited extraordinary popularity or eventual sympathy from its audience. For this reason, our primary aim is to evaluate the ethical dilemma or to reflect on the media image of an artificially created heroic figure, namely the person of a serial killer in an audiovisual product. The issue of the presence of artificially created heroism (anti-heroism) in media (episodic) production is becoming a subject of interest for many authors. Nevertheless, the orientation towards the depiction of a new type of heroism, which is now becoming a stable and dominant part of various audiovisual works, is a relatively unexplored area. A comprehensive assessment of the media portrayal of one of the most notorious serial killers, representing the main ('artificial') protagonist of the pertracted work, is justifiably perceived as a relevant problem worthy of deeper scientific research. The paper thus brings up essential questions of ethics (such as the overly romanticisation of serial killers, the trivialisation of violence and its portrayal as a form of sensationalist entertainment).

The study entitled “The Artificial Hero – The Ethical Dilemma of Portraying the Anti-hero in an Audiovisual Product” refers to media-communication studies, media ethics, media psychology and many other related scientific disciplines in its content and way of processing. In the process of analysing and interpreting the text, a number of relevant national and international publications or scientific studies are used, from Drbohlav (2013), Radošinská (2019), Hellerman (2023), Hall (2021) and many other authors. Media texts (crime stories) are generally characterised by the presence of negative characters, which have so far been perceived and portrayed by the recipients and creators in a highly negative way. However, in the context of the issue we are addressing, we believe that the producers of the aforementioned type of media product work to a significant extent with the values and features of mainstream (episodic) films, which from our perspective is the main determinant of the success of the pertracted work, but at the same time it is a significant ethical dilemma in the context of the nature of the anti-heroic character, the so-called artificial hero. The content structure of the present study reflects its main research aim and premise defined above. We focus primarily on defining the terms “archetype”, “stereotype”, “artificial hero (anti-hero)” or the “genre of crime,” which become central for us in the context of episodic audiovisual production. We do not neglect to mention the values and features typical of the aforementioned kind of episodic films. Identifying and at the same time describing in more detail the ways of presenting the anti-heroic character (the murderer) in the chosen (audience-popular) audiovisual product is the essence of the following case study, where, thanks to a qualitative narrative analysis, we investigate the portrayal of the artificial hero (the anti-hero – the serial killer) in the audiovisual crime work *Dahmer – Monster: The Jeffrey Dahmer Story* (Brennan & Murphy, 2022).

2 The Future of Media Production. Presentation of the Artificial Hero (Anti-Hero) in Audiovisual Crime Work

Characters play an indispensable role in conveying deeper meanings, ideas and values in various works of art. Their status in the story has a great impact on how the audience perceives and interprets the chosen work. In fact, it is an archetypal representation of a character in a story, referring to any subject that reappears in works of art from different cultures around the world and represents something that is universal in human memory (Literary Terms, n.d.). Thus, the term “archetype” represents the orthodoxies of human thought and behavior that purposely represent the elemental experiences of humanity, through various images and symbols, or defined characters (Pašteková, n.d.; Jung, 2018). For archetypes exhibiting positive behaviours, there is usually a certain assumption of a positive direction in the development of such a character, whereas for archetypes whose behaviour is characterised by more negative traits, the development in the story is not so predictable (Bright Side, n.d.). The aforementioned negative archetypal portrayal of characters in media stories is manifested not only in the role of minor characters, but above all in the role of protagonists, i.e. the so-called artificial heroes (anti-heroes).

The artificial hero (anti-hero) as a representative of the modern heroism of contemporary media content tends to be the protagonist or the main character appearing in various audiovisual works (including episodic ones). The reason for the popularity of this type of hero is as follows – in the case of contemporary images, the recipient often sympathizes with the anti-hero, despite his immoral deeds, mistakes and imperfections, because he himself can identify with some of his actions (Magalová, 2021). The anti-hero’s behaviour is generally characterised by disrespect for others, aggression, egotism, but at the same time creativity and ingenuity. Through his or her character traits, the anti-hero strives to fulfill a desire that largely reflects the reach of omnipotence (Plencner, 2013).

The concept of the anti-hero (artificial hero) is inherently connected with three ways, or rather possibilities, of its representation in a story. The anti-hero can represent a *latent anti-hero* subordinate to the “dark side” who is able to gradually change his immoral or criminal behaviour, and is thus forgiven for all his previous (evil) deeds. His actions are marked, for example, by an unhappy childhood, a traumatic past, or by experienced, often tragic events. The second type is the *pragmatic anti-hero*, who is convinced that he will achieve his goals faster by his dishonest actions and puts his own ego before the moral and socially accepted values of others (compare Magalová & Radošinská, 2020; Malíčková, 2017). The last type of anti-hero is the *fundamental anti-hero*, and thus a distinctly negative, evil figure, which, because of the focus of our study, will be given more detailed attention in the following sections of the text. This is because we believe that the characters of criminals and murderers are portrayed exclusively as fundamental characters in crime audiovisual works. At the same time, we assume that all the mentioned types of anti-heroic characters (latent, pragmatic and fundamental anti-hero) can (and do) become the main characters (“artificial heroes”) of a number of contemporary media contents, including crime works.

The *fundamental anti-hero*, also synonymously referred to as a villain, villain or devilish figure, represents a person with warped morals whose actions are without question indefensible and reprehensible. No one can change the fundamental anti-hero because he is convinced of his actions. That is, he is aware that he is doing evil, yet he continues his crimes. He has a clearly defined goal, which in his mind may represent a certain “moral action”, but in reality it leads to absolutely immoral deeds. He represents a character of opposite morality, whom the viewer does not forgive and does not want to forgive the deeds performed at the end of the story (see, Magalová & Radošinská, 2020; Malíčková, 2017; TV Tropes, n.d.). Tuli (2022) defines several basic characteristics of the character of the fundamental anti-hero:

- Manipulation – used to control people, express superiority, intimidation;
- Planning – helps maximize chances of success, anticipate target’s reactions;
- Selfishness – prioritizes own interests, is happy to get what he wants by breaking rules, can sacrifice allies for power, feels untouchable and ignores laws;
- Cruelty – lacks empathy, takes pleasure in the suffering of others and often humiliates his victims;
- Unpredictability – has a complex and difficult to gauge character, takes risks and keeps everyone “on their toes”;
- Vindictiveness – his revenge is most often directed toward destruction, physical harm, death, or the destruction of his target’s reputation.

However, in the archetypal portrayal of characters in a story, it is also important to consider the occurrence of *stereotypes* associated with them in stories. According to Hall (2021), the portrayal of the main characters in crime stories can be identified as a typical example of a contemporary media stereotype. We discuss the typical archetype of the anti-hero (the artificial hero), specifically focusing on the fundamental anti-hero and the various ways in which he or she is stereotyped in stories. The fundamental anti-hero – the villain, the criminal, the murderer – tends to be stereotyped in audiovisual products of various genres as a physically unattractive person suffering from serious mental disorders, dressed in unaesthetic clothes or cloaked in dark colours. That character is typically portrayed as a person who is uncaring, unpredictable, destructive and often prone to alcohol or other psychotropic and narcotic substances, which largely leads to his instability and later revenge. The stereotype of such a mentally ill character in crime stories often acts as a sensation, linking the illness to violence for the sake of dramatising the plot, in order to generate excitement that may go as far as that, that the characters are perceived not as criminals and/or murderers, but also as deserving of forgiveness because they have acted violently due to their, harsh past, surviving tragic events, etc., which have marked them for the rest of their lives (Hall, 2021).

One of the currently popular audiovisual genres where the portrayal of the perpetrated type of artificial hero (anti-hero) occurs to a significant extent is the *genre of crime fiction*. The crime genre presents stories related to criminal activities, the world of crime, investigation and law enforcement. Such works depict the motivations, procedures, and consequences of criminal actions, as well as the efforts made by legal authorities and individuals in solving crime and prosecuting offenders (Hellerman, 2023). *Crime narratives* largely reflect contemporary times and present stories that are either fictional (called crime fiction) or filmed and inspired by actual events (called true crime) (Burton & Jiráček, 2001). It is crime stories filmed based on true events that become the object of our scholarly inquiry because they are able to provide audiences with a deeper insight into the psyche of the perpetrator, attempting to present a complex character with an emphasis on the factors and motivations that may influence the commission of the crime (Hellerman, 2023). However, crime is itself a controversial topic, attracting attention and awakening human fascination with the commission of crimes. The controversy in these stories often appears in themes related to wrongful convictions, police misconduct, or manifests itself in other ethical dilemmas related to, for example, abuse. The stories gain popularity by revealing to the audience insights into the motivations and psychological factors behind the criminal behaviour of the protagonists or the artificial heroes (anti-heroes) depicted in a particular media product.

The popularity and fascination of viewers with true crime or other violent forms of entertainment thus opens up a form of ethical dilemma, accompanied by a massive wave of criticism and social backlash. This criticism expresses the unease associated with the building up of paranoia in people and the labelling of violence as a form of sensationalism and entertainment. It is precisely audiovisual films with criminal themes that presuppose the occurrence of *violence* in its explicit form, and the main hero (anti-hero) of such stories becomes the criminal himself (Rusňáková & Prostináková Hossová, 2022). In this context, it is interesting to look at the media image or *portrayal of the serial killer* in audiovisual production. Drbohlav (2013) refers to a serial killer as a character who has carried out a serial-type murder, i.e. the murder of two or more victims, during distinct times and events (series). In that context, the author identifies several characteristics indicative of the serial killer as an anti-heroic figure. One of these is a rich imagination, which often manifests itself in the planning of his criminal acts. He also characterizes the serial killer as an introverted loner with no close friends, who nevertheless desires to gain a dominant position in society. He feels inferior in his ordinary life, but in crimes and aggressive acts he takes control and power, gaining self-confidence and a sense of self-worth. Such a character carries out his actions especially when he suffers from a decline in self-esteem (e.g. being bullied by others). According to the author, the following characteristics, often stereotyped in media content, are other prominent features – age under thirty-five, single individual, above average intelligence, minimal experience of sexual intercourse, authoritarian father, hatred of women, exaggerated emotional reactions, a life of hostility towards his surroundings, a tendency to avoid confrontation, exchange of ideas, or the fact that once a serial killer is caught and placed in custody, he begins to behave well, which may lead to his release.

In many cases, we also encounter the romanticization of such a person. This is essentially a defence of the serial killer by claiming that the fault lies not with him, but with other people, his loved ones, who failed to prevent the development of his psychopathic personality. It is in this way that some individuals idealise the figure of the serial killer, which can lead to behaviour that trivialises and downplays the violence, the seriousness of the perpetrator's actions, with the intention of offering a tragic story of the person, rather than seeing the victims as real people who have lost their lives because of the criminal in question. On the basis of the above-mentioned facts, it can be stated that audiovisual treatments of real crimes inspired by the stories of various serial killers represent an extremely popular television

or film media product, which is successful especially among the general public (media audiences). *The value of violence* in mainstream audiovisual works, together with the use of artificial heroes (serial killers), is, on the one hand, a phenomenon that brings attention, curiosity and interest to the audience, but on the other hand, it can be a factor influencing public discourse and poses something of an ethical dilemma in terms of the very perception of crime or violence presented by the mass media.

3 Methodology

The present scientific study focuses on the evaluation of the ethical dilemma or the media image of an artificially created heroic character, namely the person of a serial killer in a modern criminal audiovisual product. A qualitative narrative analysis implemented in the form of a case study is employed to achieve the stated aim. The choice of qualitative narrative analysis is deliberate because of the attempt to assess and extend the existing knowledge regarding the question of the position of the artificial hero (serial killer) in the episodic crime work.

We decided to conduct qualitative research focused on media content analysis (qualitative content analysis) because of our conviction that its principles and approaches will most effectively lead to the achievement of the main goal of the study. With the ambition to analyze the main character of the story (the artificial hero – anti-hero) and the relevant narrative factors, we decided to work with a subset of qualitative content analysis, namely the research method of narrative analysis. The latter allows the researcher to observe the characters in the story, their conflicts, plots, relationships, and other narrative elements (Radošinská, 2019). Following on from the aforementioned, qualitative narrative analysis is considered to be the most relevant research method when trying to reflect on the ways of presenting an anti-heroic (artificial) character (the killer) in a chosen (audience-popular) audiovisual product. We turn our attention to the episodic work *Dahmer – Monster: The Jeffrey Dahmer Story* (Brennan & Murphy, 2022).

The research material we work with in our study is a deliberately chosen audiovisual product, a television miniseries entitled *Dahmer – Monster: The Jeffrey Dahmer Story* (Brennan & Murphy, 2022). The research material consists of ten feature-length episodes, and we subject all the episodes in question to qualitative content (narrative) analysis in their complexity/integrity. The aforementioned work presents the character of a serial killer in the main role and at the same time depicts a story inspired by real events. The choice of research material is not so much based on the popularity that the title has achieved with the professional or lay public (e.g. winning the People's Choice Awards for the most popular miniseries of 2022 or actor Evan Peters winning the Golden Globes award in 2023 for Best Actor in a Leading Role for his performance as Jeffrey Dahmer), but rather, in selecting the subject matter, we focused on the ways in which the filmmakers present the anti-heroic figure of a serial killer of the past using various archetypal and stereotypical elements. Based on the above, we assume that the chosen research material is a suitable object of investigation (research material) and through its qualitative content, specifically narrative analysis, we are able to provide a comprehensive set of knowledge about the way the figure of the serial killer (artificial hero) is portrayed in an audiovisual product – in a modern crime story. For the purposes at hand, we establish the following analytical category (AC):

AC: *The character of the serial killer and the ways of his portrayal* – we focus on the description of the internal and external characteristics of the character, his/her behaviour in tense situations or on stereotypes and archetypes associated with this plot referent; the emphasis is given to the assessment of the main character of the story as a person with significant anti-heroic qualities.

In order to achieve the main objective of the study, which is to reflect on the media image of an artificially created (anti-heroic) character, namely the person of a serial killer in a modern crime audiovisual product, and based on the analytical category mentioned above, we formulate the following research questions (RQ):

1. RQ: *How is the serial killer portrayed in the research material as the main character (anti-hero) of the story?*
2. RQ: *In what ways is the character of the serial killer portrayed in the modern crime story?*

4 Results and Discussion

Dahmer – Monster: The Jeffrey Dahmer Story is a biographical, dramatic and crime miniseries (anthology announced) from the creators of R. Murphy and I. Brennan, whose premiere episode aired on September 21, 2022, via the Netflix streaming platform. The controversial story provides a look at the acts committed by Jeffrey Dahmer (hereafter referred to as Dahmer), who murdered seventeen men between 1978 and 1991. The chosen product is inspired by the real-life case of Dahmer, one of America’s most notorious serial killers, also nicknamed the “Milwaukee Cannibal” or the “Milwaukee Monster”, a reference to the city in which he lived – Milwaukee, Wisconsin, USA (Harrison, 2022). In the following case study, we focus exclusively on the analysis of the main character (the artificial hero) of the audiovisual work being described.

4.1 The Character of the Serial Killer and Ways of Portraying It

Dahmer’s character has been labelled as odd by those around him (including his immediate family, especially his father) several times throughout the story, with typical labels such as “nutter” or “weirdo”. The fact that he is not quite an “ordinary boy” can already be seen in the depiction of his childhood in the first episodes of the analysed work (e.g. the other classmates bring an apple as a gift to the teacher and Dahmer “surprises” her with tadpoles in a glass jar). This and many other strange ideas tell a lot about his inner personality and indicate his different perception of the world around him and his approach to ordinary situations (e.g. after the teacher gives the tadpoles to one of his classmates who has shown an interest in them, Dahmer breaks into the teacher’s house, steals the tadpoles and then pours engine oil in the jar in the woods, causing them to die). Thus, from early childhood onwards, the main character of the story gradually begins to develop certain disturbing interests and psychoses (e.g. an interest in animal cruelty or the dissection of dead animals), which later contribute to the dark life story depicted in detail in the episodic work under analysis. One of the telling moments, referring to the portrayal of the anti-hero or serial killer figure in the story, involves the discovery of a dead animal by the roadside, which Dahmer and his father subsequently cut out its entrails and observe its heart.

During his childhood, Dahmer witnessed repeated confrontations between his parents. Joyce Dahmer, Jeffrey’s mother, blamed his father, Lionel Dahmer, for the lack of attention paid to her son. A significant traumatic moment may have been when Dahmer found his mother in an overdosed state, a situation from which his mother also suffered from psychological problems during her pregnancy (she was taking a number of medications indicated during pregnancy). The captured family conflicts in the main character’s childhood become part of a more complex picture that could have, and probably did in some way, influence the later problematic behaviour of this serial killer. Related to the above is one of the stereotypical ways in which criminal characters are portrayed in audiovisual works. This stereotype depicts the presence of cruel events, for example from the main character’s childhood, as a key factor influencing her behaviour in adulthood. In some cases, such portrayals may give some audiences the impression that the person is not responsible for his or her actions and is perceived

as an individual who, in his or her criminal acts, has simply ‘merely’ reacted to tragic events from the past, which may lead to the mislabelling of the violent person as innocent or ‘less guilty’. In particular, we are talking about several attempts to portray the analysed character in the audiovisual work as a latent anti-hero (a character who is basically not to blame for his crimes because his actions are influenced by his past, his childhood, his parents’ mistakes, the pressure of his surroundings, etc.).

During police questioning, Dahmer’s father describes his son as a strange but quiet and obedient boy. He tries to explain possible deviations in Dahmer’s behaviour by traumatic events in his childhood (e.g. divorce from his ex-wife), which, according to him, had a significant impact on his son, or to justify these criminal acts by an unconfirmed medical condition, namely a hernia operation, which, according to the father, may have disturbed the proper functioning of his son’s brain (as a result of the administration of a large amount of anaesthetics). However, Dahmer himself, when questioned, expresses his conviction that his behaviour is not due to any tragic events in his past (he refutes the ‘latency’ of his character), but that he was simply born that way, and that he is aware of the acts he committed and does not regret them (he admits the ‘fundamentality’ of his character). In this way, Dahmer testifies to his character, which, according to him, is not and never has been influenced by past traumatic experiences, but is rather a “product” of his natural being and innate character traits. In this regard, we can point to the aforementioned stereotype, which often rests on the idea that cruel events of the past are the key factors shaping the violent tendencies of the criminal character (the so-called latent anti-hero). However, Dahmer’s account seeks to disprove the aforementioned stereotype by presenting himself as a fundamental anti-hero (the character is aware of his deeds and does not desire to correct them or regret them).

The internal characterization of Jeffrey Dahmer’s character is clearly shaped by psychopathic tendencies, not only in the context of violent acts, but also due to certain aberrations in his behavior. In the second episode of the analysed research material, we can observe the situation of how he takes a liking to a male mannequin in a clothing store. He hides in a cubicle, where he stays until the store closes, only to steal the mannequin afterwards. He takes it to his grandmother’s house, where he is currently staying, puts it on the bed, gropes it with sexual overtones, and treats it as if it were a living human being. Dahmer’s psychopathic tendencies are also evident in the third episode, when he tries to satisfy his desires over the women in the magazine, but to no avail. We can see that his efforts to suppress his orientation are unsuccessful on his part. He is only helped in his efforts to arouse himself by imagining the human viscera he is touching. These psychopathic tendencies (namely splanchnophilia and necrophilia) are self-confessed in the fourth episode during a conversation with a psychiatrist (the narrative at all points refers to real conversations and events in Dahmer’s life, dramatized at certain points, of course, in order to make the presented episodic work more attractive).

He comes out about his homosexual orientation in the fourth episode after a night out with a male partner. At the same time, Dahmer sees men as objects he wants to control. However, his sexual orientation is also strongly influenced by his aforementioned psychopathic tendencies, which is vividly illustrated in the fifth episode of the work – Dahmer’s intention to dig up the body of a dead man, lie down next to him and embrace him, a situation that significantly reveals the perverse and morbid manifestations of his sexual identity. There are also scenes depicting situations where he regularly seeks out other men in a nightclub, with some of these people becoming his victims. These images provide an insight into the methods by which the analysed person ‘lures’ his victims into his abode and later kills them. Another of the character traits shaping Jeffrey Dahmer’s inner personality is manipulateness. This trait definitively associates him with the label of a fundamental anti-hero. Manipulation and deception are used by Dahmer especially in luring his victims into his abode. A specific

example of this is the situation in the second episode, when Dahmer convinces a fourteen-year-old boy to go to his house under the pretext of alcohol and money.

Through his lies and manipulative nature, Dahmer was able to persuade the summoned police to hand over Konerak (the boy) to him, but he actually escaped from them, despite the fact that he was an undocumented 14-year-old minor. Dahmer claims to the police that he is 19 years old, drunk, and a friend of his with whom he lives together. He uses his charisma (Dahmer was generally regarded as a good-looking man) and tries to give a calm impression in his handling. In the situation, he is able to use his dominant position (a white male) against an African American woman (a neighbour) who has called the police on him because of the noise coming from Dahmer's room. Despite the seriousness of the situation, the police do not believe the neighbour, Glenda, but rather side with Dahmer. At that point, one can point to the fourth episode of the work, reflecting on Dahmer's intelligence level. The latter, paradoxically, contrasts with the stereotype of portraying criminal characters as geniuses with a high intelligence quotient. The information that his scholastic average is approximately four illuminates that his intelligence is not above average. Although Dahmer does not show signs of genius, because of his manipulative abilities, we could place him in the category of averagely intelligent individuals. We consider it important to take into account the differences between measurable learning outcomes and the ability to use intelligence in real-world situations.

Dahmer gives the impression of a quiet recluse and introverted individual who, by his calm expression, does not arouse any suspicion of carrying out acts of violence. However, as soon as things do not go as he expects, instability and aggressive tendencies emerge. These traits lead to his first murder, committed against an eighteen-year-old hitchhiker who did not reciprocate his feelings and wanted to leave him. This angered Dahmer and resulted in an impulsive act – killing. However, Dahmer realizes his action and blames himself. His feelings, however, do not reflect the actual tragedy associated with killing a person, but rather reflect his fear of losing communication with his own family. In another instance, the manifestations of Dahmer's impulsive behaviour emerge during a conversation with a grandmother who has decided to dispose of a mannequin found in her grandson's bed. In a fit of rage, Dahmer shouts at her in a vulgar and aggressive manner. The inability to control his own emotions and impulsive reactions thus offer a glimpse of Dahmer's behaviour in situations not going as he expects. In this respect, one can also point to the stereotype of presenting criminal characters in audiovisual works as destructive persons with unpredictable behaviour.

Over the course of a few episodes, we can notice certain dependencies that appear frequently in Dahmer's work. In addition to constant smoking and cigarette possession, and thus nicotine addiction, this person/character also suffers from alcoholism. The dependence on alcohol or other narcotic and psychotropic substances refers to the stereotype of frequent portrayals of criminal characters succumbing to these very addictive substances. This stereotype in turn resonates with the idea of the instability and predisposition of addicts to commit violent acts. A concrete example is evident in the first episode of the analysed work – Dahmer, after visiting a nightclub, brings home another man and subsequently threatens him with a knife. In a tense situation, he shows a marked instability, which is probably a reflection of a certain social isolation that Dahmer is experiencing, and which is also 'supported' by the substances he has ingested. One of Dahmer's distinctive internal character traits is loneliness and a morbid desire for a faithful partner, who in turn becomes his victim because this feeling is not reciprocated by the other person. The above signals that Dahmer is unable to build a real and lasting relationship. However, this social isolation may not only be an internal state of mind, but also an external factor that negatively affects his ability to build and especially maintain healthy social relationships and social bonds. We can see that alcohol, fear of loneliness/abandonment or psychopathic and impulsive tendencies are what most often drove Dahmer to commit violent acts. However, in addition to the explicit violence directed towards carrying out serial murders,

we learn throughout the narrative that his inner personality also materializes (among other things) a certain aspect of cannibalism.

All of the aforementioned intrinsic characteristics of this fundamental anti-hero, along with other factors and circumstances, clearly contributed to his deviant actions and behavior. In terms of the archetypal portrayal of characters in audiovisual stories, Jeffrey Dahmer's inner personality can be interpreted as a representation of the 'id' component (the unconscious part of the personality), as his characteristics reflect the selfish drive of a person to fulfil his own desires and needs, regardless of the ethical values and emotions of others (harming and killing victims). It is also significant to point out the representation of the figure of the aforementioned fundamental anti-hero, in our case depicting a serial killer, with clearly distorted moral values. This label is supported by the indefensible and reprehensible acts that are typical of fundamental anti-heroes. Dahmer's personality fulfils a number of features demonstrating a link to this label (archetype), including an awareness of the evil done, the continuation of immoral acts and the depiction of a 'fall to the bottom' ((Authors' note: the tragic death of the main (anti)hero)).

The characteristics of Dahmer's external features are rather bland and do not deviate in any way from the usual visual appearance typical of the period in which this person lived. His attire is simple, inconspicuous, and bland. The preference for inconspicuous attire contributes to the person's tendency not to attract excessive public attention. In terms of physical characteristics, Dahmer can be considered an individual of medium build, thin but with a healthy-looking body (Dahmer is depicted working out several times in the work), with longer blonde hair whose bangs are directed to the right side of his face. In terms of physical build, then, Dahmer's physique is not remarkably large or noticeably strong, which may seem contrasting given the seriousness of the crimes he commits. From this perspective, it is possible to consider that strength was not the main instrument of his murders, but rather psychological aspects (human instincts) played an important role. A striking visual element of his external personality is the characteristic large golden spectacles. Their presence adds a distinctive charm to Dahmer's face and in a way contributes to accentuate his otherwise bland appearance.

Dahmer is a white man. Based on the findings of theoretical reflection, this character also represents a certain stereotype, according to which the serial killer in audiovisual products of this genre is most often portrayed as a middle-aged white man. However, it is important to realise that in a particular example it is necessary to perceive the character under examination in the context of the real events that inspired the episodic work under analysis. Precisely because of this, it is necessary to "production-proof" the visualization of the character to be as true to reality as possible. We further mention the fact that in the first scene of the first episode (depicting Dahmer's outward appearance) we are presented with an image of clothing that can be associated with the fashion typical of the 1980s (when the person of Jeffrey Dahmer was realistically alive). Dahmer is wearing blue denim trousers with a brown belt, in which he has a plain white T-shirt tucked in. His nondescript appearance is complemented by a silver watch and a cigarette in his hand. After leaving the apartment, he adds a blue denim jacket to his outfit, creating a complete look characteristic of the period. Blue denim trousers represent a kind of "fashion preference" of this anti-hero (in several scenes he combines them with checked shirts, T-shirts or tank tops). The regular presence of an identical element of clothing in almost all parts of the season underlines the importance of clothing as a distinctive element of the analysed person's external identity. Based on the above, we conclude that Jeffrey Dahmer's visuals do not reflect common ideas about the stereotypical portrayal of criminal characters in the crime-detective story genre (e.g., the killers/criminals are presented in dark colors, have an unkempt appearance, are overgrown, have an unattractive, downright repulsive appearance, and other characteristics).

In the scenes depicting Dahmer during interrogation, the character wears a typical orange prison jumpsuit, which reinforces the atmosphere of a criminal's confrontation with the

law and thus completes the iconography of the crime film genre. A distinct aspect of Dahmer's personality is his (aforementioned) addictions. The outwardly observable addiction to the substance nicotine is even present during the police interrogation, and thus forms an essential part of his "outward presentation". Another interesting element of the external appearance of the character under examination is the use of yellow contact lenses in the second episode of the analysed work, which he puts on himself at the moment of abusing another victim. One of the most controversial visual moments depicts Dahmer in a white robe, with the aim of baptizing him. This visual provides a contrast between the symbolism of baptism (good) and the horrific crimes Dahmer committed during his lifetime (evil). In the final episodes, Dahmer's attire is different – he appears in a dark green prison uniform, under which he wears a white T-shirt. The unmissable detail, however, is his neck, which is complemented by a bloody scar from a stabbing by a cellmate.

Despite the obvious specificity of the various narrative elements that contributed to a greater or lesser extent to the creation of the final version of the title *Dahmer – Monster: The Jeffrey Dahmer Story* (Brennan & Murphy, 2022), in the case study we focused exclusively on the narrative analysis of the anti-hero (serial killer) figure. Following the qualitative data obtained, we subsequently provide an answer to the research question and comprehensively evaluate the issue of the presentation of the artificial hero (anti-hero) in crime audiovisual production:

1. RQ: *How is the serial killer portrayed in the research material as the main character (anti-hero) of the story?*

In the chosen audiovisual product, the serial killer is portrayed as the main character of the story, whose crimes are thoroughly presented from different perspectives, showing his possible motivations, psychological aspects and influences leading to his crimes. Visually, Dahmer comes across as an ordinary, quiet man; his fashion is typical of the period in which he lives. He does not "break" from the usual visual style and deliberately does not draw attention to himself through his outward appearance.

The internal characterization of the serial killer character is more significant in our case because several of Dahmer's character traits form a certain basis for his criminal crimes – the murders. Dahmer is not a completely normal child/man, and this deviation from the norm is emphasized several times in the story. He is assigned the status of "weirdo" and "freak" by his classmates, close people or the public. His sexual preference is directed towards men and is therefore homosexual, but this preference is accompanied by perverse psychopathic tendencies, namely sexual arousal over animal and human entrails or contact with dead people (so-called necrophilia and splanchnophilia). These psychopathic tendencies subsequently influence the nature of Dahmer's crimes themselves. They manifest themselves, for example, in keeping human heads in the refrigerator, male genitalia in the freezer, drinking human blood, and other perversions. Dahmer presents an introverted character, mostly a loner, who has trouble establishing a real, functioning relationship. Potential male partners, lured into the abode through manipulation and lies, become his victims. Ironically, however, one of the aspects that drives Dahmer to commit his brutal crimes is his loneliness and his desire to find a real boyfriend/partner who will never leave him. He himself draws his victims' attention to this intention during conversations. In situations that do not go his way, we can observe a certain degree of instability, leading to impulsive behaviour (a manifestation of borderline and schizophrenic personality disorder). In such cases, Dahmer manifests himself extremely aggressively. Last but not least, addiction to addictive and narcotic substances is an important factor influencing his crimes.

The figure of Dahmer is also given attention in the context of his relationships with other referents of the story, which contributes to a complex portrayal of his (media) portrait. The viewer is given an insight into the main character's childhood and family relationships, observing various situations that may (or may not) have influenced his later behaviour in adulthood (e.g., the use of contraindicated drugs and the psychological instability of Dahmer's mother during pregnancy; his parents' frequent quarrels; abandonment by his mother; bullying by his classmates). In addition to the family, the neighbour of the analyzed anti-hero (at the time when Dahmer lived alone in the apartment) is also an important character in the story. She has contacted the police several times about the screams and smells coming from his home. The main character's victims also form an important part of the narrative, and the relationship between the murderer and the victims has always been conditioned by the artificial hero's desperate efforts to find a partner/friend and to build some kind of social bond.

From an archetypal point of view, Dahmer can be characterized as a fundamental anti-hero. His character is characterised by the absence of traditional heroic qualities and, on the contrary, is linked to darkness, crimes and addictions that "lead the protagonist down an unethical path". Although the latency of his character is appealed to several times in the narrative (a partial justification of his actions due to psychosis or the hardships experienced during his childhood), the anti-hero in question does not intend to improve himself, he is aware of his perversions and does not plan to change his actions, which, in the end, he himself admits during the police interrogation. In this way, the character of Dahmer can be seen as a radical departure from traditional heroic models and also from the characteristics of latent or pragmatic anti-heroes. The character of Dahmer is subject to several stereotypes associated with the portrayal of serial killers in audiovisual products of the crime genre. First of all, we are talking about a middle-aged, white-skinned man, a lifelong reclusive "weirdo" suffering from various psychological diagnoses, who has a constant urge to kill and cannot put an end to this activity. Dahmer represents a character with unpredictable behaviour, a tendency to use psychotropic and narcotic substances, especially alcohol, the use of which subsequently leads to the protagonist's instability or to his aggressive and violent acts.

5 Conclusion

The issue of the presentation of an artificially created heroic figure, namely the person of a serial killer, in a modern criminal audiovisual product is a debated topic, especially in terms of reflection on new trends and the future direction of media production. Episodic works can be 'credited' with an extraordinary popularity in recent years, especially thanks to the rise of online and internet-distributed television. Audiovisual works (not only) sequels are thus more accessible to a wider audience as a form of relaxation and entertainment. In this context, and with regard to the topic of our study, it can be argued that it is mainly crime stories of an episodic nature that are of particular interest from the point of view of media creators, but especially from the point of view of viewer preferences. This is because they bring preferred (mainstream) values and characters, constantly 'feeding' the audience with tensions and expectations that are either continuously maintained or 'increased' with each new episode. Based on the above, we have chosen the miniseries entitled *Dahmer – Monster: The Jeffrey Dahmer Story* (Brennan & Murphy, 2022) as appropriate research material. In order to investigate the issue of portraying an artificial hero, or a serial killer character, in a crime audiovisual story, we conducted a case study. By summarizing the qualitative information gained through the identified analytical categories, we answered the first research question, and in this part of the study we have the opportunity to answer the second, summarizing research question (RQ2) in a relevant way, which is: *In what ways is the character of the serial killer portrayed in the modern crime story?*

The portrait of a serial killer in a chosen modern crime episodic story presents a combination of several aspects of Jeffrey Dahmer's life, personality, and the crimes that this person committed during his lifetime. The work under analysis, based on true crime events, is essentially a psychological portrait of the personality of a serial killer, and the latter is seen as the most typical narrative element not only of the title under examination, but also of many other "true crime" stories. The research material depicts the criminal character's inability to establish a real relationship and also reflects the problem of dealing with his own loneliness, addiction, orientation and several severe psychoses. The work also brings to light the family background and other traumatic situations from Dahmer's childhood, which most likely (together with other factors) contributed to the formation of the personality of the serial killer described. It also draws attention to the main character's addiction to addictive and narcotic substances. These are equally perceived as one of the key factors leading to the violent actions of the artificial anti-hero under examination. We also add that an important narrative element of the research material, and also the motivation of the main character of the story, is to point to the ineffectiveness and/or injustice of the police and judicial systems as an aspect that reinforces the idea that crime will never be punished.

The character of the serial killer is subject to certain stereotypes frequently associated with crime stories (e.g., similar symbolic and technical level of narration, stereotypical depiction of the environment, relationships and conflicts, often identical dramaturgical structure of the narration – the journey of the anti-hero through the story using retrospective glimpses into the past or time slips, similar conception of the theme, the subject and the main idea, etc.), but it departs from some typical "criminal stereotypes" in a significant way (e.g. the labelling of the serial killer as a scruffy, unaesthetic-looking person with above-average intelligence who is presented in dark colours). In terms of archetypal representation, the figure of the serial killer is usually portrayed as a fundamental anti-hero – a person with strongly negative characteristics that he or she has no intention of changing and no desire to reform. The presentation of the serial killer (and any other brutal rapist and criminal) as a fundamental anti-heroic figure in media content is perceived as correct. Indeed, to downplay violence in the sense of forming a latent or pragmatic anti-hero could have (and often does have) far-reaching consequences (e.g., excusing the rapist for his actions because of his past traumas, carrying out violence/murders in order to achieve a "greater good," presenting the anti-hero as a sympathetic individual positively perceived by the public, etc.). In the work in question, the viewer witnesses a broader understanding of the personality (including childhood, family environment, relationships, traumatic experiences and personal conflicts), and is given the opportunity to evaluate these and form their own opinion of the person portrayed in the media and their actions (e.g., some viewers are sympathetic or sympathetic to Dahmer's actions, while others condemn his crimes in unprecedented terms). Thus, the media portrayal of serial killer Jeffrey Dahmer is portrayed in the analysed research material in such a way that the viewer forms their own values and opinions in relation to the narrative presented.

The definitions of archetypes, stereotypes, artificial heroism (anti-heroism) or the value of violence helped us to understand more closely the media portrayal of anti-heroic characters. By clarifying the presence of the addressed issue in the research material, we concluded, within contemporary media production (audiovisual works), artificial heroes (criminal characters) are equally attractive not only for the creators, but especially for the viewers themselves. The given fact points to the importance of a continuous investigation of the pertracted issue from the perspective of media and communication studies. A comprehensive assessment of the position of the artificial hero (serial killer) in the audiovisual crime work has confirmed the assumption set out in the introduction of the study (we assume that the creators of the aforementioned media product largely work with the values and features of mainstream (episodic) films, which, from our point of view, is the main determinant of the success of the pertracted work, but at the same

time, it is a significant ethical dilemma in correlation with the nature of the anti-heroic character). With the above methodological procedure (qualitative narrative analysis) we have also fulfilled the main aim of the study – our aim was to evaluate the ethical dilemma, or the media image of the anti-heroic character in the selected research material, which we have successfully done with the case study we conducted.

At the same time, the extensiveness and relevance of the issues under study presupposes our further scientific research, especially in the context of artificial intelligence, technology and other broader issues of artificiality or humanity. The dilemma of artificial heroism (anti-heroism) in contemporary media production is now closely linked to the issue of AI and raises questions about how technology, or artificial intelligence, can contribute to the creation of anti-heroic characters, or media images of serial killers. No less important in this context is the algorithmization of content (using AI), which obviously influences the perception of violence and determines its subsequent trivialization by the audience. Therefore, the continuous exploration of the issue at hand allows us to analyse, from this perspective, the potential impacts of AI on ethics and responsibility in the portrayal of controversial characters and themes in audiovisual works.

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FROM SMART TRAVEL AND TOURISM TO SMART CITIES

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Abstract:

Artificial Intelligence is reshaping the travel and tourism industry by delivering highly personalized, efficient, and seamless experiences. From AI-powered chatbots to smart city integrations, these technologies revolutionize how travelers interact with services, plan trips, and experience destinations. Smart tourism projects, such as “Visit Madrid GPT”, demonstrate AI’s potential to transform urban tourism by leveraging IoT and AI for personalized visitor services. However, challenges like data privacy concerns and ethical considerations persist, necessitating a balanced approach to innovation. As AI continues to evolve, its role in tourism will expand, offering businesses a competitive edge while shaping a more connected and sustainable travel ecosystem. This paper explores AI’s transformative impact and future prospects in the travel industry. The paper is divided into 4 main parts, the first part focused on nowadays trends in AI and travelling, the second part represents statistics focused on AI and smart solutions used by travelers, the third part deals with tourism from cities’ and smart city point of view. The paper ends with fourth part which is aimed at discussion and conclusion based on the information and data provided in the paper.

Key words:

AI. Marketing. Smart City. Travelling. Tourism.

1 AI Trends in Travelling

Artificial intelligence is revolutionizing the travel industry by enhancing personalization and efficiency across various sectors. AI-powered chatbots and virtual assistants are streamlining customer service, providing instant responses to inquiries, and facilitating booking, says T. Papandreou (2024) and continue, these tools analyze user preferences to offer tailored recommendations, improving the overall travel experience. In the hospitality sector, AI systems manage reservations, optimize pricing strategies, and predict maintenance needs, leading to increased operational efficiency. Airlines utilize AI for dynamic pricing, route optimization, and predictive maintenance, resulting in cost savings and improved safety. AI-driven data analytics enable travel companies to understand customer behavior, allowing for more targeted marketing and personalized offers. The integration of AI in travel planning apps assists users in creating customized itineraries based on individual interests and budgets. AI also plays a role in enhancing security through facial recognition and biometric systems at airports, expediting check-in and boarding processes. Despite these advancements, challenges such as data privacy concerns and the need for human oversight remain. The travel industry must balance technological innovation with ethical considerations to ensure AI applications benefit both businesses and travelers.

The flexible structure of tourism and the fact that the product produced is based on intangible services brings marketing to the fore. Thanks to artificial intelligence-based smart travel assistants and maximum likelihood algorithms, tourists will now be able to experience travel at the most optimal prices that match their preferences. In a way, artificial intelligence will allow tourists to make future holiday recommendations by processing information about their past travels. (Durmaz & Başer, 2023, pp. 26-27).

As AI continues to evolve, its role in transforming travel experiences is expected to expand, offering more personalized and efficient services. Companies that effectively

leverage AI will likely gain a competitive edge in the rapidly changing travel landscape. The future of travel is poised to be more connected, intuitive, and responsive to individual needs, driven by the capabilities of artificial intelligence. A. N. Kazak et al. (2020) explain that in the digital age, AI complements human emotions and intelligence, providing customers with seamless interactions across both online and offline platforms. This collaboration enhances efficiency, productivity, and service comprehension. Additionally, computer technology drives advancements in areas like marketing, prioritizing customer preferences over competitor strategies to optimize the entire travel experience. As a result, emerging AI technologies and their diverse applications are expected to become increasingly prevalent in the tourism industry. Or E. Izchak (2021) add multiple real examples on this topic, such as chatbots and virtual assistants streamline travel planning, enabling users to book flights, accommodations, and rentals through platforms like Facebook Messenger and WhatsApp. Travel companies like Booking.com and Expedia use these tools to enhance user experiences. Airports and hotels employ AI robots for multilingual assistance, check-ins, and navigation, as seen at Heathrow Airport and the Henn-na Hotel in Nagasaki. Apps like Hopper predict flight prices, helping users secure the best deals by analyzing large datasets.

AI-driven data analytics uncover customer insights, improving services and increasing satisfaction, as demonstrated by the Dorchester Collection hotel chain's use of the Metis platform. Sentiment analysis tools monitor social media to address customer concerns in real time. AI optimizes room mapping, dynamic pricing, and inventory management, ensuring better resource utilization. Smart baggage handling systems, like those at Eindhoven Airport, reduce errors and streamline operations. Voice-activated AI assistants offer contactless services, handling check-ins and personalized recommendations.

The potential of artificial intelligence technologies in the tourism industry exceeds the capabilities of traditional search engines and real people. Some travel services have already begun to use elements of artificial intelligence, which help to analyze large volumes of data and learn from their own and other people's experience of fulfilling customer orders. Currently, the main goal for travel brands is to "learn" using personalized customer experience. (Kazak et al., 2020, "Abstract" section).

AI also creates tailored travel itineraries based on individual preferences and budgets, enhancing the overall experience. Emerging trends include smart luggage systems and advanced voice-activated assistants, promising greater convenience. These innovations help companies gain a competitive edge while addressing challenges such as data privacy and ethical considerations. The integration of AI has revolutionized how travel companies operate and interact with customers. As AI evolves, its role in providing seamless, personalized, and efficient travel experiences is set to grow further (Izchak, 2021). The growth of computing power, accessibility of data, and advancements in machine learning algorithms have elevated the significance of artificial intelligence (Huang & Rust, 2021), enabling its application across numerous industries. One sector with significant potential for AI adoption is the tourism and travel industry. Through AI, tourism businesses can gather and analyze user data, allowing them to deliver personalized services tailored to individual preferences (Xie & He, 2022).

2 Statistics on AI and Travelers

In the figure below we can find insights into the growing adoption and satisfaction with generative AI in travel planning. They show significant global variation in AI adoption, with the United States leading at 63% usage for travel planning on mobile devices, followed by countries like India, the UAE, and Saudi Arabia, while adoption remains low in regions like Japan. In North America, 34% of leisure travelers reported using generative AI for trip

inspiration, planning, or booking, reflecting increasing integration into travel-related activities. Among these users, satisfaction levels are high, with 84% of travelers in the United States and Canada expressing positive experiences, including 39% who were very satisfied and 45% who were satisfied with AI recommendations. Only 2% reported dissatisfaction, indicating the effectiveness of generative AI in meeting user expectations. The data highlights the growing reliance on AI tools in technologically advanced and AI-friendly markets, while traditional methods still dominate in regions with lower adoption rates. This suggests significant potential for AI expansion in underrepresented regions. Overall, the findings demonstrate that generative AI is becoming an essential tool in the travel industry, with high user satisfaction driving its continued adoption.

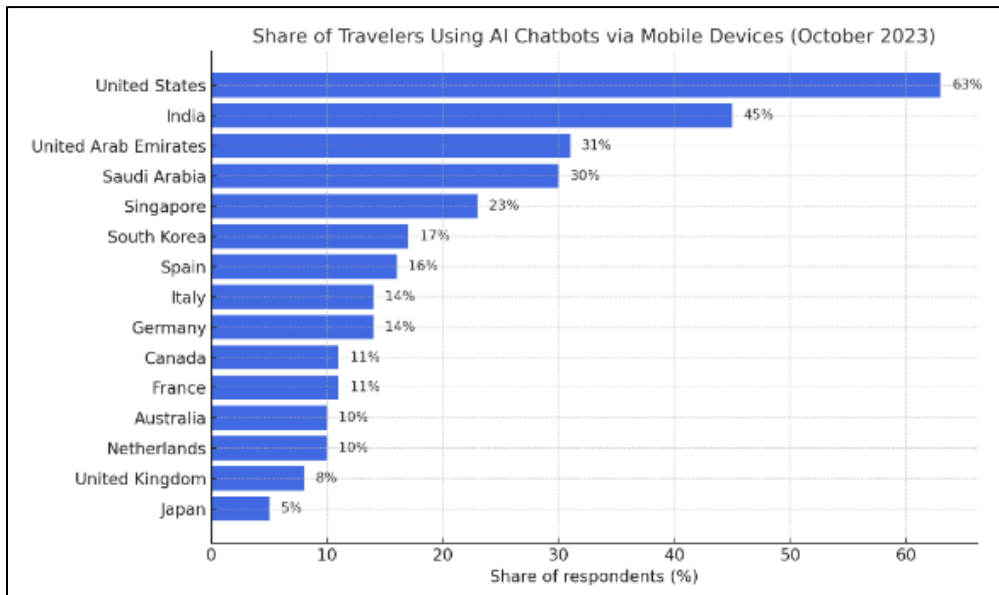


Figure 1: Share of travelers using AI chatbots via Mobile Devices
 Source: Statista Research Department (2024a), own processing, 2024

The figure presents the percentage of travelers using mobile devices to plan or research travel with AI chatbots in October 2023, based on a global survey of 18,000 respondents. The United States leads with 63%, indicating strong adoption, followed by India at 45%, and the UAE and Saudi Arabia at 31% and 30%, respectively. Singapore reports 23%, with moderate usage also seen in South Korea (17%), Spain (16%), and Italy and Germany (14% each). Lower engagement is observed in Canada (11%), France (11%), Australia (10%), the Netherlands (10%), the UK (8%), and Japan (5%), which has the lowest adoption rate. The data highlights significant disparities in AI chatbot usage for travel planning across regions, with higher adoption in technologically advanced and AI-forward markets. Mobile devices referenced include both smartphones and tablets, showcasing their growing importance in travel research. This trend reflects the increasing integration of AI into daily digital habits and the global variation in its accessibility and acceptance. Release date of the study – October 2023, Region – Worldwide, Number of respondents – 18,000.

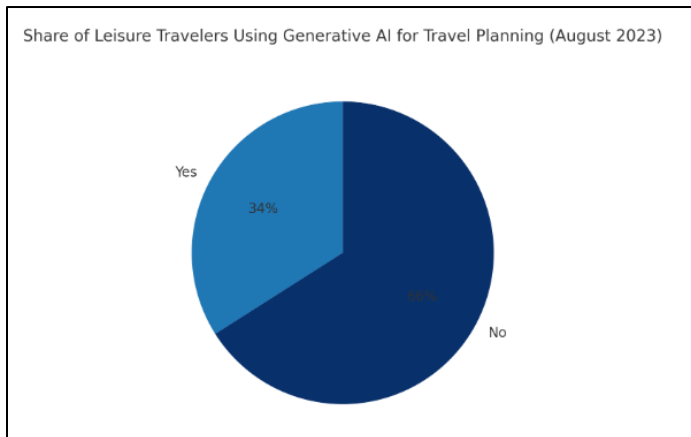


Figure 2: Share of leisure travelers using generative AI for travel planning
 Source: Statista Research Department (2024b), own processing, 2024

The figure shows the share of leisure travelers in the United States and Canada who used generative AI for travel inspiration, planning, or booking as of August 2023. It reveals that 34% of respondents utilized generative AI for these purposes, while 66% did not. This highlights a growing trend of AI adoption in leisure travel, with a significant portion of travelers turning to AI tools for enhanced and personalized trip planning. However, the majority still rely on traditional methods, indicating substantial potential for further growth in AI usage within the travel industry. The data reflects the increasing integration of generative AI in the digital travel landscape across North America. Region – Canada, United States, number of respondents 1,100, survey time – August 2023.

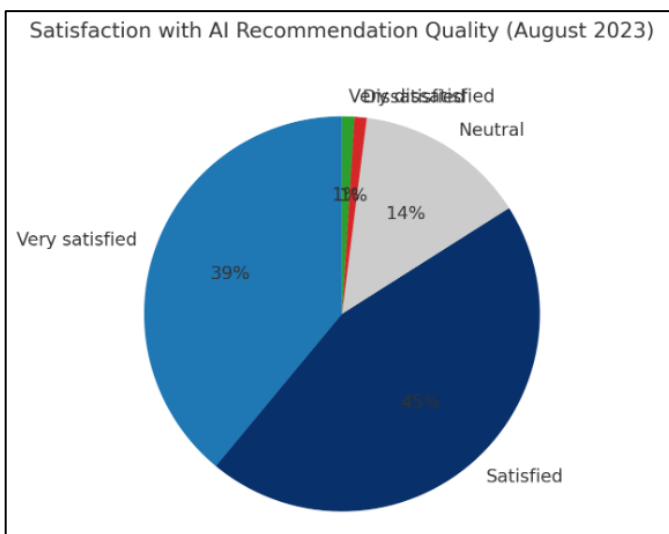


Figure 3: Satisfaction with AI recommendation Quality
 Source: Statista Research Department (2024c), own processing, 2024

In the figure we can see the satisfaction levels of leisure travelers in the United States and Canada with the recommendation quality of generative AI for travel planning as of August 2023. It reveals that 39% were very satisfied and 45% were satisfied, indicating a high overall satisfaction rate of 84%. Meanwhile, 14% of respondents were neutral, and only 2% expressed dissatisfaction (1% dissatisfied and 1% very dissatisfied). This highlights the strong effectiveness of generative AI in providing quality travel recommendations, with minimal dissatisfaction, reflecting growing trust and reliance on AI tools in the leisure travel sector. Survey time – August 2023, number of respondents – 1,100, region – Canada and United States.

3 Smart Cities and Smart Tourism

Take a look at Thinkz and Libelium in developing an AI and IoT-powered Smart Tourism Project. It aimed at enhancing urban tourism management. This initiative addresses challenges such as overcrowding, infrastructure strain, and environmental impact in European cities by providing real-time, actionable insights to optimize tourist flows and improve visitor experiences. The project utilizes IoT sensors deployed across cities to collect data on tourist attractions, cultural sites, and transportation options. This data is processed through an AI-driven platform that offers dynamic updates and personalized recommendations to tourists. Key features include real-time tourist mobility analysis, centralized information on attractions and facilities, and promotion of sustainable practices through eco-friendly mobility options. The platform is designed to integrate seamlessly with existing IoT infrastructures, ensuring quick and cost-effective deployment. By enhancing visitor experiences and supporting sustainable urban development, the project aims to increase the length of tourist stays, boost bookings for attractions, and encourage repeat visits. This collaboration sets a new benchmark for urban tourism management, providing cities with tools to enhance visitor experiences, optimize resource management, and promote sustainability (Bramley, 2024). Another example of good practice can be found at the Smart City Expo World Congress on November 6, 2024, in Barcelona, Madrid Destino's strategic marketing director, Abigail Sigüenza Perez, and Microsoft's corporate vice president of global industry marketing, Kathleen Mitford, discussed the transformative impact of generative AI on Madrid's tourism sector. Moderated by Zoe Eather, CEO of My Smart Community, the session highlighted the development of "Visit Madrid GPT", an AI tool designed to personalize and enhance visitor experiences in the city. "Visit Madrid GPT" leverages advanced AI algorithms to provide tailored recommendations to tourists, considering individual preferences and real-time data. This initiative aims to streamline travel planning, offering visitors customized itineraries, dining suggestions, and event notifications, thereby enriching their overall experience in Madrid. The collaboration between Madrid Destino and Microsoft underscores a commitment to integrating cutting-edge technology into urban tourism strategies. By harnessing AI, Madrid seeks to position itself as a forward-thinking destination that meets the evolving expectations of modern travelers. The discussion also addressed the broader implications of AI in tourism, including potential challenges such as data privacy and the need for continuous technological adaptation. Both speakers emphasized the importance of ethical AI deployment and the necessity of maintaining a human touch in tourism services to ensure authenticity and personal connection. The introduction of "Visit Madrid GPT" represents a significant step in Madrid's efforts to innovate its tourism offerings. By embracing AI, the city aims to provide more personalized, efficient, and engaging experiences for visitors, setting a precedent for other urban centers to follow in the digital transformation of tourism. This initiative aligns with global trends where cities are increasingly adopting AI to enhance visitor engagement and satisfaction. The successful implementation of such technologies could lead to increased tourist numbers, longer stays, and higher satisfaction rates, contributing positively to the local economy. In conclusion, the collaboration between Madrid Destino and Microsoft in developing "Visit Madrid GPT" exemplifies how AI can be effectively integrated into tourism strategies to meet contemporary traveler demands. This approach not only enhances the visitor experience but also positions Madrid as a leader in smart tourism innovation (Park, 2024)

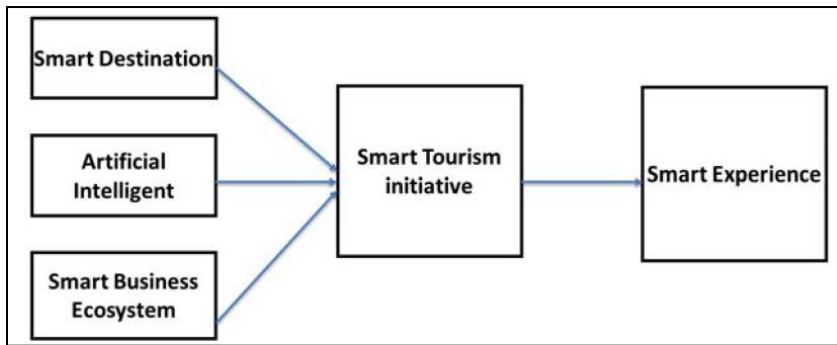


Figure 4: Conceptual model of Smart Tourism with AI/ML
 Source: Hsu & Tsaih (2018)

The authors C. C. Hsu and R. H. Tsai (2018) presented the smart tourism AI/ML conceptual model which aims to enhance the traveler experience through engagement, process automation, and actionable insights. It operates across three primary functions:

1. **Anticipating User Needs:** AI/ML leverages tourism big data to analyze traveler behaviors, predict habits and interests, and provide personalized recommendations for activities like dining, recreation, and points of interest. Through predictive modeling, it suggests airlines, hotels, restaurants, and social group promotions tailored to individual preferences. Additionally, Robotic Process Automation (RPA) streamlines the application and inquiry processes, offering a seamless, one-stop service. Chatbots and robotic assistants provide 24/7 support for travel-related inquiries, ensuring accessibility and convenience.
2. **Enhancing On-Site Experiences:** AI/ML enriches travelers' on-site experiences by delivering customized, location-based, and interactive services. Robots and chatbots analyze GPS and shopping data to provide targeted promotions and real-time information about destinations. Natural Language Processing (NLP) enables instant language translation, helping tourists access critical travel information without language barriers. Furthermore, image recognition technology offers detailed, rich content about destinations, elevating the overall experience.
3. **Encouraging Experience Sharing:** AI/ML empowers travelers to share their experiences, assisting others in their decision-making while reinforcing their memories and self-expression on social networks. It automatically bookmarks photos with location details and generates photo books, creating tangible mementos of trips. Travelers can easily upload and share photos with social media groups, promoting destinations and enriching travel experiences for friends and family.

This model integrates advanced AI/ML tools to deliver seamless, personalized, and engaging travel experiences, shaping the future of smart tourism.

4 Discussion and Conclusion

In the hospitality sector, AI-driven systems have transformed reservations, room assignments, and maintenance management, ensuring smoother operations and enhanced guest experiences. Applications like voice-activated assistants and smart room systems allow for contactless services, a feature increasingly valued in the modern travel landscape. Additionally, the use of AI in travel planning apps has empowered travelers to build highly customized itineraries based on their budgets and interests, making travel more accessible and intuitive. Innovations such as Hopper's flight price predictions and smart baggage handling systems at airports like Eindhoven demonstrate AI's capacity to optimize every stage of the travel process. These advancements have made travel experiences smoother, more efficient, and more enjoyable for users while simultaneously enhancing resource utilization for

businesses. Smart city initiatives have further amplified AI's impact on tourism. Projects like "Visit Madrid GPT" and collaborations between urban tourism boards and tech companies showcase how AI and IoT technologies can be integrated to address challenges such as overcrowding, infrastructure management, and environmental concerns. Real-time data collected through IoT sensors and processed by AI platforms allows for actionable insights, optimizing tourist flows and reducing pressure on popular destinations. These systems also promote sustainable practices, encouraging eco-friendly mobility and reducing the carbon footprint of travel activities. Looking to the future, AI is expected to expand its role in travel, with advancements in machine learning, natural language processing, and image recognition further enhancing the possibilities. Smart luggage systems, real-time translation tools, and biometric authentication promise greater convenience and security for travelers. AI's ability to process large datasets and adapt to user feedback will lead to even more personalized and efficient travel experiences. Moreover, the integration of AI into sustainability efforts will be critical as the industry aims to balance growth with environmental responsibility. From personalized services to sustainable urban tourism strategies, AI's potential is vast and transformative. However, to fully realize its benefits, the industry must address the ethical, social, and technological challenges it faces.

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ARTIFICIAL INTELLIGENCE AND SYNTHETIC REALITY

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Abstract:

Artificial Intelligence (AI) has become a key force in shaping today's digital world, with a profound impact on many aspects of our lives. AI has made it possible to create synthetic news that look real at first glance, but are not authentic. The ability of artificial intelligence to collect and process huge amounts of data from various sources in real time has created new challenges for ethical standards in the digital sphere. This paper presents an overview of publicly available deepfake videos of public figures, synthetic photographs of celebrities, and the public's reaction to these manipulations. It addresses the ethical concerns surrounding the use of AI-generated content and offers guidelines for improving media literacy in the age of AI. The concluding section of this paper emphasizes the benefits, risks, and impact of AI, particularly in the realm of synthetic reality, with a focus on deepfake content. Although AI holds the potential to enhance news production by increasing efficiency, accuracy, and personalization, there are challenges in maintaining journalistic integrity and ensuring responsible AI usage.

Key words:

Artificial Intelligence. Communication. Manipulated Images. Media. News.

1 Introduction

Artificial intelligence has revolutionized the way we create and manipulate visual content. In this digital age, AI-powered tools enable the creation of synthetic photographs and deepfake videos, blurring the boundaries between reality and illusion. Recognizing AI-generated images has become crucial in the fight against misinformation and in maintaining ethical standards in the digital world. Likewise, the importance of *media literacy*, in navigating the development of visual communications and AI-generated content, has become imperative in today's communication era.

The aims of the paper and the research problems addressed by the authors are:

- **The impact of AI:** To present the positive and negative impacts of AI in media and public relations; to show several examples of the use of deep fake videos and photos of public figures
- **Development of an ethical framework:** What ethical guidelines and regulations should be applied to control the creation and dissemination of AI-generated media, ensuring responsible and ethical usage?
- **Enhancing media literacy:** How can media literacy programs be developed and integrated into education to equip individuals with the skills to critically assess visual content and distinguish real media from those manipulated by AI?

The paper consists of six chapters:

- Introduction
- What is artificial intelligence?
- Artificial intelligence in public relations, journalism, social media and visual communications
- Research problem and methodology
- Ethical aspects and the importance of media literacy in the use of artificial intelligence
- Conclusion: The usefulness, risks, and impact of artificial intelligence.

2 What Is Artificial Intelligence?

Artificial intelligence (AI) is a branch of computer science focused on developing systems that can perform tasks requiring some form of intelligence. It can also be defined as a non-living system exhibiting intelligence, as described in the Miroslav Krleža Institute of Lexicography's online encyclopedia (Hrvatska Enciklopedija, 2023). According to Tomić et al. (2022) the field of AI is commonly thought to have begun in 1956 at a scientific conference held at Dartmouth College in Hanover, United States of America. Notable theoretical foundations for AI were laid earlier by Alan Mathison Turing in the 1950s, whose *Turing Test* is still used to assess a machine's intelligence. At Dartmouth, the term "artificial intelligence" was formally coined, and John McCarthy, creator of the *LISP programming language*, is regarded as one of its founders (Hrvatska Enciklopedija, 2023).

AI plays a significant role in everyday life, such as internet searches and digital personal assistants. Smartphones use AI-powered virtual assistants that answer questions and help organize tasks. AI is also applied in text translation, smart home systems (like thermostats for energy efficiency), the automotive industry (via sensors that detect potential accidents), and in cybersecurity to identify and counter threats. Moreover, AI is extensively employed in healthcare, transportation, manufacturing, agriculture, public administration, and other services (Boucher, 2020).

The diverse range of challenges encountered in AI research has led to the establishment of various subfields. According to Valerjev (2006) the major branches of AI include:

- **Problem-solving** – developing search algorithms within defined problem spaces.
- **Knowledge representation** – storing useful data and building a knowledge base that effectively connects different forms of knowledge.
- **Automated reasoning** – creating logic-based programs.
- **Planning and acting** – determining optimal goals and actions, and executing them.
- **Reasoning under uncertainty** – leveraging probability and utility theory to create decision-making systems.
- **Learning** – developing algorithms that enable various forms of *machine learning*.
- **Natural language processing**, speech recognition, and automatic translation – facilitating human-computer communication.
- **Computer vision** – tackling visual perception challenges.
- **Robotics** – encompassing many of the above fields in physical machines.

Instead of the traditional Turing test, new approaches to AI understanding and thought processing are emerging. Marija Putica (2018) in her article "Artificial Intelligence: Dilemmas of Contemporary Development", predicts that general AI, which is akin to human intelligence, will be realized by the 2040s. Many scientists are understandably concerned about the potential impact of such a development on humanity. Before reaching that milestone, it is expected that computers will simulate the entire brain at the level of neurons and synapses. This raises the significant question: Will computers remain our servants, or become our masters?

3 Artificial Intelligence in Public Relations, Journalism, Social Media and Visual Communications

3.1 Public Relations and Artificial Intelligence

The field of public relations (PR) is evolving significantly with the integration of artificial intelligence. AI is altering traditional communication models, shifting the role of humans from primary communicators to technology-mediated ones. Two major challenges that accompany the rise of AI in PR are ethical considerations and the education and retraining of

PR professionals to handle these new tools effectively. AI is now capable of autonomously communicating with end users and generating content independently. As a result, PR professionals must understand how to leverage AI to enhance their roles in advising clients and leaders. AI frees up time, enabling PR professionals to focus on creative relationship-building, strategy development, and trust-building with their audience.

AI is capable of monitoring news, analyzing campaigns, fact-checking information, and identifying trends. In times of crisis, AI assists in data analysis and helps target specific audiences. Furthermore, AI helps evaluate PR campaign results by providing measurable data on their success. In the future, PR will be a blend of technology and human input, where AI strengthens strategic thinking. By utilizing large datasets, PR professionals can access relevant insights, quantify publicity, assess tactics, monitor brands, and identify key factors influencing public relations (Hajoš, 2021).

One AI tool worth mentioning is ChatGPT, created by OpenAI in San Francisco. ChatGPT can independently write extensive content on a variety of topics. While the tool can be useful in daily tasks (e.g., education), it also poses ethical dilemmas, particularly regarding the quality and authenticity of content produced by AI, leaving questions open about how to ensure the responsible use of such tools.

3.2 Journalism and Artificial Intelligence

The media landscape is undergoing dramatic changes due to advancements in communication technologies. Technology is driving transformations in journalism, leading to the creation of new digital content. AI now facilitates various journalistic tasks, including article writing (such as investigative reports and in-depth analysis), transcribing (turning audio into text), scanning large databases for anomalies, and even using robots in newsrooms (Benčić, 2022).

Over the past two decades, informatization, digitalization, and the expansion of the internet have revolutionized the way journalists work, broadening the scope of their tasks. Journalists today must be proficient in using computers, content processing software, photography, and video production (Wranka, n.d.). New media skills have become necessary for navigating the information society, and journalists must balance the challenges of speed and timeliness with the need to uphold media credibility (Sivrić, 2022).

Currently, “weak AI systems” can solve narrowly defined problems, while “strong AI systems” – those capable of human-level intelligence across various domains – have not yet been fully developed (Wranka, n.d.). News organizations use AI to automate numerous tasks, allowing faster handling of complex processes based on large datasets. However, AI-generated stories often lack the depth and critical examination provided by human journalists. Concerns about job displacement also arise with the presence of AI in newsrooms. Despite the capabilities of AI, the human factor remains indispensable for ensuring quality journalism. AI tools, while sophisticated, are prone to inconsistencies (Wranka, n.d.).

Early AI applications in journalism were focused on producing news centered around statistics and numbers, including topics like sports summaries, weather reports, and financial analyses. Journalists welcomed AI’s assistance with these routine tasks, which freed up their time for more complex and investigative work. AI’s ability to reduce costs for news organizations by accelerating content production is seen as a positive development (Benčić, 2022).

Although AI has advanced significantly, replacing human journalists entirely seems unlikely in the near future. AI cannot fully replicate the human ability to listen, engage in dialogue, or negotiate with sources to construct coherent narratives. Therefore, AI’s role will likely be to augment human capabilities, enabling journalists to work more efficiently and produce higher-quality output (Wranka, n.d.).

During times of crisis, truth and trust in professional media are critical. Media convergence, which allows for the publication of content on multiple platforms, has reshaped newsrooms by integrating new technologies and departments. Journalists face the challenge of mastering these digital tools while maintaining integrity and trustworthiness (Sivrić, 2022).

Every new technology brings legal and ethical questions. If AI becomes capable of generating complex journalistic expressions, it raises the question of authorship – who owns the rights to AI-generated articles? The development of the applications used, the data sources, and the intellectual property rights of the AI tools all come into play (Wranka, n.d.). Additionally, responsibility for inaccuracies in AI-generated content must be addressed. Can AI maintain journalistic integrity and objectivity, given that it can be programmed with biases? Rather than viewing AI as a threat to journalism, it should be seen as a tool for improving journalistic practice. The combination of human skills, ethical judgment, and AI’s capabilities could result in stronger, more reliable journalism (Javor, 2023).

3.3 Social Media and Artificial Intelligence

Artificial intelligence has numerous applications in public relations, particularly in handling routine tasks such as transcribing speech into text, translating files, analyzing data, and generating content. By managing these everyday tasks, AI significantly reduces the workload of PR professionals. Since AI operates without emotions and is unaffected by subjective experiences or environmental factors, it offers consistency and impartiality, though it may struggle with tasks requiring creativity or innovation.

AI is especially useful in the context of social media (Tomić et al., 2022). Social media activities open new possibilities for understanding and evaluating complex social phenomena. However, they also introduce new ways to manipulate reality through disinformation. The current media landscape has become less reliant on the traditional criterion of accuracy and reliability, making it easier for false information to spread.

In their paper titled “New Forms of Manipulation in the Digitized Space of Public Knowledge and the Need for Establishing Digital and Data Sovereignty”, Mlinac et al. (2021) highlight how AI algorithms shape our perceptions and thought processes. By filtering the information that reaches end users, AI creates an “echo chamber effect”, where only content aligned with the user’s preferences is shown on social networks. Acting as a gatekeeper, AI blocks out information deemed irrelevant, reinforcing existing opinions and potentially leading to societal polarization. AI can also recognize emotional expressions and interactions (such as likes, comments, and shares) and prioritize content that triggers more engagement, further deepening societal divides and promoting extreme views.

3.4 Visual Communications and Artificial Intelligence

Visual communications, which involve the graphical presentation of information to create meaning, are deeply influenced by AI. Visual communication employs a range of tools to convey ideas, attitudes, and values through images and graphics. Images have the power to evoke emotions and stimulate the imagination, and AI now plays a significant role in this process. Visual artificial intelligence is closely linked with computer vision, which allows machines to identify, locate, and react to objects within visual data such as photos and videos. Through “deep learning techniques”, images are broken down into pixels, and AI systems learn to interpret what the image represents (Stipan, 2021).

By studying images and videos, AI can extract valuable insights, even detecting emotional cues, which enables marketers to better understand and target their audiences. Additionally, image analysis through AI helps companies assess how their visual content is performing on social media. Algorithms can analyze patterns and trends, identifying which types of images elicit the most reactions from users, allowing for the optimization of future

content strategies. AI also helps companies monitor their brand reputation and manage harmful or inappropriate content on social media platforms.

In the context of visual communications, it's important to discuss computer graphics, which encompasses everything on computers that is not text or sound. The goal of computer graphics is to present visual data in an efficient and meaningful way. It is used both for processing real-world data (photos, videos) and for creating synthetic image content. Digital image processing using AI algorithms has become widespread, with applications ranging from improving image quality to restoring damaged visuals. These processes are also essential for pattern recognition, which helps classify objects within an image, identify their positions, and fully comprehend the scene the image is depicting (Stipan, 2021).

Beyond processing images, AI is also capable of creating them. In an article by Maja Njirjak (2023) the first fully AI-signed art exhibition in Croatia is discussed. The artworks were created using the MidJourney program. While this highlights the exciting possibilities AI brings, it also raises questions about the absence of the human element in these creations. The exhibition aimed to highlight the challenges that new technology brings, encouraging acceptance rather than fear. However, the issue of copyright over AI-generated artwork remains unresolved and will be discussed further in the paper.

In addition to AI-generated art, synthetic images created by AI are becoming increasingly common. Creating these images does not require advanced skill, as AI programs are trained to generate realistic visuals through exposure to large datasets of real images. However, current AI programs often struggle to replicate certain elements with full accuracy, such as hands, blinking eyes, or natural backgrounds. AI also faces challenges in reproducing realistic light and shadow effects, as well as textures. As AI technology continues to evolve, there will be a growing need for tools and programs that can detect AI-generated images and distinguish them from authentic ones (Benedik, 2023).

4 Research Problem and Methodology

The research methodology for this study, titled “Artificial Intelligence and Synthetic Reality”, focuses on analyzing fake videos and photographs, particularly deepfakes. To explore the ethical implications and public reactions to publicly available deepfake content, a mixed-method research design is employed. This approach includes both qualitative and quantitative data collection to provide a comprehensive analysis.

- First, a qualitative analysis is conducted to review and categorize deepfake videos and synthetic photographs depicting public figures and celebrities. These examples are examined to better understand how AI-generated visual content is created and distributed.
- Simultaneously, quantitative data is gathered to assess the scope and prevalence of such content. The aim is to determine how frequently deepfake content appears and to gauge public awareness and reactions to it.

The central research question driving this study is:
“How do deepfake videos and synthetic photographs affect public perception, and what level of media literacy and critical thinking is crucial for effectively recognizing AI-generated content in today’s digital landscape?”

Through this research, the goal is to highlight the ethical issues surrounding the creation and consumption of AI-driven synthetic realities, while also emphasizing the urgent need to enhance media literacy in a world increasingly shaped by artificial intelligence.

4.1 Deepfake Videos and Photographs

To understand the concept of deepfake videos, it is essential to familiarize oneself with the terms machine learning and *deep learning*. Machine learning is a branch of artificial intelligence that uses data and algorithms to mimic human learning, aiming to improve accuracy and reliability in problem-solving. Deep learning is a subset of machine learning that helps computers identify patterns in large datasets and make decisions based on these patterns (Grimson, 2016).

In traditional programming, tasks are explicitly defined through code, whereas in machine learning, computers are provided with examples of desired outcomes. Machine learning algorithms use input data to generate models that, in turn, create new insights. Deep learning leverages artificial neural networks – systems modeled after the human brain’s neurons. Unlike biological brains, however, artificial neural networks do not form connections in the same way. Deep learning involves feeding massive amounts of data (known as “Big Data”) into neural networks with multiple layers, hence the term deep learning (Kovačić, 2019).

The concept of Big Data refers to datasets so vast that traditional databases cannot process them efficiently. These datasets are analyzed computationally, enabling the discovery of patterns, trends, and associations.

Deepfake technology first appeared on Reddit in 2017, when an anonymous user created the r/deepfakes community, where the earliest deepfake videos were shared (Botha & Pieterse, 2020). A deepfake video involves replacing one person’s face with another’s in a video. This facial manipulation allows for the creation of videos where it seems that someone is saying or doing something they never actually did. Essentially, deepfake videos are synthetic videos that closely resemble real ones (Erkam, 2020).

Deepfake photographs and videos use similar technologies, and what was once only achievable by professional filmmakers is now accessible to the general public. Automatic video manipulations like today’s deepfakes have existed since the 1990s. Several factors have contributed to the rise of deepfakes:

1. **Algorithmic advances** have made it possible to map human facial features from photographs, significantly improving facial recognition technologies.
2. The **proliferation of video-sharing platforms** like YouTube and Instagram has made vast amounts of audiovisual data publicly available.
3. Developments in **image forensics** have enabled the automatic detection of image forgeries.

4.2 Detecting Deepfakes

There are three main methods for detecting deepfake videos: *manual detection* and *automatic detection*.

1. **Manual detection:** This method involves visually inspecting videos for inconsistencies. One reliable technique is to observe blinking patterns. Healthy adults blink approximately every two to ten seconds, but deepfake algorithms often overlook this detail, leading to videos where the subject’s eyes remain open for longer than usual. This is because the algorithm typically learns from images of people with open eyes, which makes replicating blinking more difficult. Thus, unusual blinking can be a simple clue for detecting deepfakes.
2. Another manual detection technique focuses on inconsistencies in head positioning. In deepfake videos, the angle of the head and face may not align properly. Algorithms exist that can estimate the position of a person’s head in three-dimensional space within a two-dimensional video. If the head angle is off, the video is likely a fake. Detecting such anomalies can be more challenging when the person’s face is directly facing the camera.

3. A third method is to look for imperfections in the video, such as blurry facial edges, double chins, uneven skin tones at the edges, or distorted images when the face is partially obscured by hands or other objects. Another technique is blur detection: original faces generally have more color depth than their deepfake counterparts when enlarged (Botha & Pieterse, 2020).

Below we will show just some examples of deepfake videos and photos that seemed so realistic at first glance that many thought they were real content. In 2017, researchers from the University of Washington trained an algorithm to change the speech of former President Barack Obama (BBC News, 2017). After that, videos were created in which the faces of celebrities appeared in pornographic works, swapping their faces with the faces of pornographic actresses. Not even the famous Mona Lisa (The Telegraph, 2019a) remained untouched by new technologies. In 2019, a deepfake of a famous image was created in which she moves her head, talks and smiles. Deepfake can also manipulate the voice and thus change the audio content. Using this technology, it is possible to insert new words into the speech of the person speaking. Such convincing forgeries certainly call for caution. The political scene (ABC News, 2023) is probably one of the more interesting areas where creators are ready to use deepfake technology, the aforementioned video of Barack Obama supports this, and Donald Trump, Joe Biden, Vladimir Putin and Volodymyr Zelenskyy, who in one fake video invited his army to capitulate. The video was quite clumsily made so that it did not cause a major stir in the public (The Telegraph, 2022).

In 2019, the singer Adele drew attention in a video to new technology that can create problems for people from public life and listed several examples of deepfake videos. However, the video itself in which Adele addresses the public is the result of artificial intelligence. Claire Wardle, an expert in internet manipulation, used the face of the singer Adele to warn the public about the possibilities and, therefore, the dangers of deepfake videos. Unfortunately, the increasingly frequent use of artificial intelligence for the purpose of deception reduces public trust in institutions such as the media (Dokler, 2019a). With the aim of raising awareness of the danger of misinformation on the Internet, the consulting and research center Future Advocacy published a video (The Telegraph, 2019b) in 2019 that served as an invitation to all political parties to work together to deal with the threats posed by deepfake videos. That something is wrong with the video is also shown by the fact that it features the then English Prime Minister Boris Johnson and his opponent Jeremy Corbyn, who support each other as future prime ministers. The current great interest in deepfake videos exists because this is precisely an indicator and tangible proof of the deep distrust that people have regarding the ways of using their personal data (Dokler, 2019b).

Artificial intelligence created another photo in 2023, and later a whole series of them, which shows Pope Francis in unusual circumstances. Initially, photos of the pope walking casually dressed in a jacket of a well-known brand caused a stir (Time, 2023). The photo looks realistic and the viewer may at first think that the photo is a representation of reality because it shows the Pope doing nothing out of the ordinary, except that he is dressed in an unusual suit. After a closer look, little things are visible that indicate that it was a photograph that was artificially created, such as the poor representation of the glasses and the eye where the image is overflowing, the chain around the neck is missing one part, and it is also visible that he is not holding the cup in his hand as it should be. As a result of the publication of this photo, numerous creative works have been published that show the Pope in unusual situations, but in a very realistic way. Thus, photographs were published of the pope working as a DJ, walking the catwalk wearing rainbow colors, dancing at a party, playing the guitar and talking to aliens (Perrigo, 2023).

Recently, a new profile named @yoursisbillie (The Independent, 2023) was opened on the social network Instagram. It is a ‘synthetic’ profile of the model Kendall Jenner. It is a new artificial intelligence character created by Meta, conceived as a ‘personal assistant’ available to users to ask questions and seek help for a wide range of needs. In addition to Kendall Jenner, Meta has teamed up with several real-life celebrities who have their own AI-generated alter egos on this social network (Tempelaar, 2023).

5 Ethical Aspects and the Importance of Media Literacy in the Use of Artificial Intelligence

The ethical use of artificial intelligence (AI) comes with an obligation to serve the public interest. In June 2023, the European Parliament passed the AI Act, which aims to regulate artificial intelligence and ensure favorable conditions for the development and deployment of innovative technology. AI can offer numerous benefits, especially in healthcare, transportation, manufacturing, and the provision of affordable, sustainable energy. The AI Act prioritizes ensuring that AI systems are safe, transparent, non-discriminatory, and environmentally friendly.

However, the Act identifies several unacceptable risks associated with AI, including:

- **Cognitive and behavioral manipulation** of individuals or vulnerable groups,
- **Scoring and classifying people** based on behavior, socio-economic status, or personal characteristics,
- **Real-time biometric identification systems and remote biometric systems**, such as facial recognition.

The term media literacy has been defined in various ways, depending on the aspect being emphasized. One definition frames media literacy as a citizen’s ability to access, analyze, and produce information for specific purposes. It is also considered a life skill, particularly for enabling young people to critically understand, analyze, and influence the media. Media literacy education focuses on creating careful consumers, skeptical viewers, and well-informed citizens (Valtonen et al., 2019).

Historically, media literacy revolved around reading and writing skills, which were sufficient for processing printed information. However, with the rise of information and communication technologies, the concept of literacy has had to evolve. The rapid changes in technology, media, and society demand the development of new strategies that empower individuals to interpret messages independently, create media content, and actively participate in democratic processes (Feldvari et al., 2022).

In today’s hyper-connected world, individuals are increasingly susceptible to manipulation through media engagement. The constant immersion in communication channels creates a virtual reality for many people. As such, discussions about media literacy have never been more important. The European Commission clarifies that media literacy refers to different methods of media and distribution. It is a key skill for all citizens regardless of age because it empowers them and raises their awareness. It also helps counter the effects of disinformation campaigns and the spread of fake news through digital media (European Commission, n.d.).

In a broader sense, media literacy today is considered a prerequisite for participating in society. It should cover all forms of media and be seen as both a skill and knowledge. Understanding the effects of media and how they influence individuals is key to media literacy. By fostering this understanding, media literacy empowers people to take control of how media impacts their lives.

Several technologies significantly influence the media landscape and are crucial to media literacy:

1. **Monitoring in the physical and virtual world** (phones, health trackers, social media posts, etc.),
2. How **data collected through monitoring** is used to predict users' interests,
3. **Content generation** that creates tailored news or even fake news for specific interest groups,
4. **Deep learning**, where computers learn tasks by observing examples,
5. **Reinforcement learning**, where computers are trained to perform tasks in complex, unstructured environments,
6. **Directing user attention**, where social media content is adjusted to match users' emotions and needs,
7. **Filtering content**, such as blocking offensive comments or adjusting web pages based on prior user preferences (Valtonen et al., 2019).

Media literacy should go beyond learning about tools and technologies—it must focus on helping individuals develop critical thinking skills to evaluate and analyze complex situations, distinguishing between opinion and fact. Media literacy encompasses traditional literacy, audiovisual literacy, information literacy, digital literacy, and the ability to interpret, analyze, and contextualize information. Well-informed citizens are crucial to any democratic process. Media literacy fosters the responsible creation and dissemination of ethical content (Agencija za elektroničke medije, n.d.).

Media literacy is built on three core elements: awareness, fairness, and responsibility. These values form the foundation of an informed approach to media content. One of the most important aspects of media literacy is critical thinking. With the expansion of the internet, concerns about the credibility of media have increased. While the internet facilitates faster access to information, it also presents risks of disinformation. The most common forms of disinformation are fake news and clickbait, both of which are methods of media manipulation. Disinformation is often disseminated by anonymous portals seeking user attention and profits, or by media outlets promoting specific political agendas (Trninić, 2021).

The spread of disinformation to achieve political goals is not new. However, as social media platforms evolve, so do the strategies of those spreading disinformation. Combatting this phenomenon requires both short-term and long-term strategies. Short-term strategies involve exposing falsehoods and issuing corrections in the public sphere. Long-term strategies focus on increasing the public's resilience to disinformation by fostering critical thinking and improving media literacy among news consumers (Feldvari et al., 2022).

The Ministry of Science and Education offers an experimental curriculum for primary schools titled Information and Digital Competencies, emphasizing that information literacy is an essential lifelong learning skill. It highlights the importance of teaching students how to determine what information they need, evaluate sources, and integrate knowledge into their learning. Additionally, the curriculum emphasizes computer literacy, enabling students to use digital technologies to find, evaluate, create, and share information. Media literacy plays a crucial role in protecting individuals from disinformation, propaganda, and potentially harmful media content (Republika Hrvatska, Ministarstvo znanosti, obrazovanja i mladih, 2023).

6 Conclusion – Usefulness, Risks, and Impact of Artificial Intelligence

One of the primary challenges of artificial intelligence (AI) today is its underutilization, while another critical challenge is its overuse in inappropriate contexts. AI can provide solutions for technical problems, but issues arise when it is applied where broader, more nuanced human responses are required. Over-reliance on AI solutions can also lead to situations where AI is seen as an autonomous tool rather than as a support system, which is its intended role (Boucher, 2020).

One key question surrounding AI is the determination of authorship for works created by AI. The advancement of AI in producing original content raises concerns about copyright protection. A recent case involved Dr. Stephan Thaler, the CEO of Imagination Engines, who attempted to secure copyright protection for an image titled *A Recent Entrance to Paradise*, created by AI. The U.S. Copyright Office denied his request, citing that U.S. copyright law, established in 1976, only protects works of human authorship. Thaler argued that the law does not explicitly require the author to be human, pointing out that corporations, while not human, are still recognized as authors (Društvo za zaštitu novinarskih autorskih prava, n.d.).

Despite the lack of copyright protection, AI-generated works can still receive recognition. For instance, in a recent digital art competition in Colorado, USA, an AI-generated piece won first prize in the digital art category. The winning artwork, titled *Théâtre D'Opera Spatial*, was created by Jason Allen of Incarnate Games, a board game company. The piece depicts figures in a baroque hall, viewing a landscape through a large window. Such developments raise important questions about the future of creative professions in the age of AI (Društvo za zaštitu novinarskih autorskih prava, n.d.).

Another major consequence of AI development is the global competition between nations to lead in AI research and innovation. This race is often compared to the space race, with countries competing in the commercial sector as well. AI is becoming a central force, linking various technologies and affecting many industries. Fostering competition in AI research accelerates innovation, increases efficiency, and boosts productivity across governments and organizations. It enhances public services like healthcare, education, and transportation, improves national security by detecting threats earlier, and strengthens economies by raising productivity and attracting investment. Moreover, AI development encourages global cooperation between nations (Smiljanić, 2023).

AI has already transformed journalism. Journalists now spend more time in newsrooms than in the field, thanks to AI's ability to instantly gather audience reactions to stories. The barriers to entering the newsroom have been reduced, and digital tools have become essential for creating content. However, the pressure to produce fast, exclusive news can sometimes result in the publication of unchecked information. While AI accelerates research processes by scanning large databases and social networks, it can also create a disconnection between journalists and their audiences (Grmuša & Prelog, 2020).

AI plays a significant role in social media platforms, which are present in nearly all organizations. AI helps target end users by filtering sponsored content and downgrading unwanted advertisements. Acting as a gatekeeper, AI filters desirable content for the end user while shielding them from undesirable material. It also enables the detection of deepfake videos. However, there are drawbacks to AI's involvement – it removes the human element from work, which could lead to job losses. The creation of machines with human-like capabilities requires significant investments, and these systems are often subject to obsolescence and operational flaws (Tomić et al., 2022).

AI improves national security by detecting cyber threats and enhancing decision-making in defense strategies. However, AI systems are also vulnerable to cyberattacks, such as hacking, data breaches, and manipulations. In military applications, AI could potentially lead to an arms race, lacking transparency and accountability, as decisions may be made by algorithms rather than humans, posing ethical and safety concerns (Smiljanić, 2023).

Predictions about AI's impact on the workforce vary. Pessimistic scenarios suggest that robots may replace human labor, eliminating the need for vacations, wage demands, and unionization. This would lead to the creation of a lower class of workers, unable to compete with machines. Conversely, optimistic predictions suggest that as jobs become obsolete, the very concept of employment might evolve. A combination of both scenarios is likely, where some countries benefit from AI development, while others lag behind, widening the gap

between rich and poor. These provocative predictions prompt critical reflection on the future of work, with one certainty: AI will affect workers in different sectors depending on their skills, industry, and ability to retrain (Boucher, 2020).

Social networks can be abused, which is increasingly the case with private corporations who want to have more control over their platforms. The owners of the platforms, i.e. the social network itself, are only intermediaries in the creation of content. For any spread of misinformation, the creator of (dis)information is responsible. Corporations moderate the content published in this way automatically, focus on the needs of advertisers on their platforms and do not verify the identity of content creators. All this enables the malicious use of social networks, and all this under the guise of freedom of speech and the freedom to convey ideas. The basic problem is that corporations are motivated by profit. The paradox of social networks is precisely the fact that they were created with the aim of connecting people, and they, on the contrary, created a virtual space filled with divided groups burdened with (mis)information. Through public discussions, polarization, extremism and radical extremes in the understanding of social phenomena are becoming increasingly prominent. Inadequate regulation of cyber space leads to malicious exploitation of social networks (Mlinac, et al., 2021).

The previously discussed deepfake videos are a representation of synthetic reality, and one such is a very realistic one-minute video featuring actor Morgan Freeman created by artificial intelligence. The video begins with the sentence: “I am not Morgan Freeman”, and then continues with a welcome to the synthetic world, a welcome with which we will finish thinking about this new reality in which we find ourselves, the extent of which we are yet to discover:

what you see is not real, well, at least in contemporary terms it is not. What if I would tell you that I am not even a human being, would you believe me? What is your perception of reality? Is it the ability to capture, process and make sense of information our senses receive? If you can see, hear, taste or smell something, does that make it real? Or is it simply the ability to feel? I would like to welcome you to the era of synthetic reality. Now, what do you see? (Diep Nep, 2021)¹

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¹ The speech occurs in the time frame 00:02 – 00:48.

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SELECTED REFLECTIONS ON MEDIA IMAGE OF CHURCHES AND OTHER RELIGIOUS BODIES IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Abstract:

The aim of the paper is to attempt to answer the question of the consequences of artificial intelligence for the media image of churches and other religious bodies. This is an issue from the area of research on the relationship between media and religion, including the processes of mediatization of religion. The following detailed issues will be discussed in the paper: artificial intelligence-generated deepfakes; using ChatGPT to create religious content; creating and distributing opinions and comments in social media using AI; reference to the sacred; modifying human religiosity. The paper is of a review nature and indicates the positive and negative consequences of AI for the determinants of the media image of churches and other religious bodies. The paper uses the analysis method, the literature criticism method, and the literature review method. The research idea of, e.g., such representatives of social sciences as Cameran Ashraf, Beth Singler, Noreen Herzfeld, Randall Reed, Krzysztof Stepniak, was taken into account.

Key words:

Artificial Intelligence. Churches. Image. Other Religious Bodies. Religion.

1 Introduction

Drawing on the research work of James Grunig, Howard Greisdorf, Brian O'Connor, Krystyna Wojcik, among others, the author adopted an understanding of image as a subjective, unreal, inaccurate image of a person, organisation, institution, product, which the recipient has in his or her mind. Image is a simplified image of reality, which is significantly influenced by psychological effects of perception, the influence of public opinion and the media. The image is therefore situated between expectations and the real state. It is considered as a structure made up of more or less conscious impressions and evaluations that form a comprehensive image, taking into account verbal, visual, episodic and metaphorical layers and stereotyping processes (Grunig, 1993; Greisdorf & O'Connor, 2002; Wojcik, 2021).

Krystyna Wojcik (2015), a Polish media scholar, identifies three main groups of factors influencing an organisation's image, which include: the state of the organisation in all its aspects and manifestations, the intensity and quality of communication about the state of the organisation, the social resonance of the state of the organisation and communication about this state shaped on the basis of rational, emotional and social factors. The above factors can be considered as image determinants. In the research undertaken, the media image of churches and other religious bodies is their image in traditional and new media.

For media scholars, a significant challenge is to understand the existence of two perspectives of churches and other religious, the temporal and the supernatural, and to examine their presence and the way of describing them in the media space (Adamski, 2013; Moberg, 2017).

The intensity and quality of the churches' communication about the state of their own organization to external stakeholders is expressed in the forms of communication undertaken by each religious denomination (direct, indirect, personal, non-personal), the means of communication used (verbal, symbolic, non-verbal), the use of persuasion, rhetoric and

dialogue, appropriately selected public relations techniques or measures that support the primary methods of achieving public relations goals (charity, social action) (Wojcik, 2015). No less important in the process of institutional communication of churches is their respect for ethical principles, in particular the principle of truth (understood as the principle of journalistic reliability), the principle of information openness and the principle of openness to dialogue, as well as the principle of partnership treatment of target groups (Wojcik, 2015; Carroggio, 2021; Gil & Gili, 2020).

The social resonance of the state of organization and communication of churches is expressed by opinion leaders, opinion media, but also analyses and reports conducted by public opinion research centers. The activities and teaching of churches and other religious associations and their leaders are the subject of research, among others, by such social research laboratories as the Gallup Institute¹ (Gallup, n.d.), forsa Gesellschaft für Sozialforschung und statistische Analyse mbH (forsa, n.d.) or Centrum Badania Opinii Społecznej² (CBOS, n.d.). It is also worth noting the multi-dimensional influence of factors on respondents' opinions on the assessment of the activities and perception of religious denominations, i.e. the rational, emotional and social influence (Baron, 2020).

According to Beth Singler (2017), there are three important arguments justifying the study of the interdependence of AI and religion. First, AI as a technology has the potential to destabilize society and, therefore, modern religion. Since religion and society are intrinsically linked, these changes will have negative implications for religion. Second, AI potentially revitalizes contemporary religion and may also stimulate the emergence of new religious movements. And third, the uncertain status of AI as a potentially new intelligent or conscious entity raises questions about its identity or personhood. So far, religions have traditionally tried to define identity based on their theological understanding of the person, hence the ongoing debate in this area opens up new areas for discussion and the creation of new paradigms, and may therefore be of interest to researchers of religion.

2 Methodology

The study used the method of analysis, the method of literature criticism and the method of literature review (Budtz Pederson et al., 2020; Petticrew & Roberts, 2008). Reference was made to the research results of such representatives of social sciences as: Cameran Ashraf (2021), Beth Singler (2017, 2023a, 2023b), Noreen Herzfeld (2022), Randall Reed (2018), Krzysztof Stępniaak (2018, 2024).

The publication discussed the following issues: artificial intelligence-generated deepfakes; using ChatGPT to create religious content; creating and distributing opinions and comments in social media using AI; reference to the sacred; modifying human religiosity.

¹ Author's note: The Gallup Institute conducts research on various areas of social life in the United States, including areas related to religion. As an example, it is worth mentioning research reports on citizens' declarations of belonging to a given religious denomination, on the assessment of their religious practices and religiosity or the way they perceive and understand family, ethical principles, non-negotiable values, and the actions of religious leaders (Gallup, n.d.). Importantly, Gallup reports are an important point of reference in research in the area of social sciences. As an example, we can point to Jonathan Hemler's diploma thesis, in which the author argues, referring to Gallup research, that political polarization affects the decline in religiosity of American society, and more Americans place greater emphasis on political involvement than on any activities based on faith, which confirms the hypothesis of replacing religion with politics (Hemler, 2020).

² Author's note: CBOS regularly publishes reports on, among others, the religiosity of Poles, the processes of secularization, the presence of religion in schools and public space (see, e.g., Bożewicz, 2024).

3 Results and Discussion

Deepfake is a technology that uses artificial intelligence to create visual content to show something that does not exist (Dąbrowska, 2020). This technology is used to change the images of people in the media space, and is therefore a form of media manipulation (Kirchengast, 2020).

The exemplification of manipulated photos or videos can be found not only in the world of celebrities (e.g., Nicole Kidman) (Luckhurst, 2019) or political leaders (e.g., Donald Trump) (Hodson, 2022), but also among religious leaders. As an example, we can mention the photograph of the Pope in a puffer jacket from the famous fashion house Balenciaga (Aloke & Abah, 2023). Another example of a recording made using artificial intelligence is the alleged participation of Cardinal Nycz and Cardinal Dziwisz in an advertisement promoting a medicine for sore knees (Krzyżak, 2024).

The recording of an interview with Elon Musk for CNBC journalist David Faber, in which the Tesla founder and owner of X supports the return of Imam Mahdi (i.e. the last leader of Islamic eschatology and the harbinger of the apocalypse) should also be placed in the categories of deepfake. Voice of America editor Liam Scott (2023) notes that the video combines parts of the real interview with fake audio, which should be seen as part of a propaganda campaign aimed at strengthening the Islamist apocalyptic narrative. In turn, Bilva Chandra, a researcher at the RAND Corporation, argues that extremist propaganda using AI in the divulging of deepfakes aims to raise the status of Pakistan in the Muslim world (Scott, 2023).

ChatGPT is a technology developed by OpenAI, and therefore based on artificial intelligence, used to create content that may mislead or disinform. A machine learning neural network model generating any type of text provides a new space for religious improvisation and text-based fun, as well as information and disinformation about religions (Singler, 2023a).

The religious narratives created by artificial intelligence, using the holy books of the world's great religions, such as the Islamic *shahada*, may contribute to the creation of a new "AI god" or a new religion. As Beth Singler notes, adaptations of Islamic ritualized speech are also based on a fairly open critique of religion. This is visible, for example, in Isaac Asimov's story "Reason" (1941), in which the machine supporters of the new "AI god" state that there is no Master but the Master, and QT-1, the machine mind from the story, is his prophet. According to the British anthropologist, writing and ridiculing religious robots is Asimov's way of expressing the view that religion is the result of irrationality and gullibility (Singler, 2023b). Singler also cites the short story "We Asked an AI to Create a Religion. I Didn't Like What It Came Up With", posted on the social media site r/nosleep in March 2022. A research team led by "theology professor Dr. Smith" (a fictional name) gathered as much information about religious texts and God as they could find and fed it into the AI. The result was a conversation between a Preacher and a disciple about the beginning and the end of the world and about God, which ends with a command to worship a god named x982a{j:+ (Singler, 2023b). Those who fail to follow the order to spread the deity's name within a week face death:

Preacher: All those humans who have read this script will die in a week if they do not spread the word of x982a{j:+ as much as they can. [...] Dr. Smith died in a car crash the next day. Another worker fell down a flight of stairs and snapped her neck. One after another, they all died. In total- sixteen people aside from me, everyone who had read that script, knew of this, they all met their ends. (Drechenaux, 2023, para. 32-37)

According to Singler (2023b), this example proves that AI is creating religion more like a horror story than a humorous one.

In the context of the broad discussion on the use of ChatGPT in creating and distributing religious content, it is impossible to ignore the lack of full verification of this content by fact-checking systems. Automatic creation and posting of false opinions and comments in the media space affects the formation of public opinion on religious institutions (Sembok & Wani, 2023).

Artificial intelligence, based on user behavior on the Internet, including religious behavior, personalizes messages and precisely targets. AI can help the recipient monitor the media, but also analyze the Internet user's sentiment towards selected religious issues, which should be considered a positive consequence of AI (Szews, 2024).

As Noreen Herzfeld (2022) notes, chatbots that learn by browsing the Internet or interacting online quickly become racist, misogynistic, and extremely vulgar. Not understanding truth or falsehood and having neither conscience nor traces of empathy, AI is a perfect liar. The American researcher emphasizes that artificial intelligence does not have a body like a human, which is why it will not acquire the ability to record changes in sensory perception. This is one of the important reasons why AI will not approach the level of intelligence at the human level or acquire human consciousness (Herzfeld, 2022). Inappropriate, even disrespectful, tactless comments about religious institutions and their leaders found on internet forums or in social media, and created by AI, negatively affect the image of religious denominations. The effect of the influence is intensified by the lower media education of the recipient, unaware of AI interference (Janowski, 2024).

The discussion on the connections between religion and artificial intelligence raises the issue of the sacred, i.e. the sphere intuitively referred to as the sacred, transcendent sphere, evoking fascination and fear, which assumes the existence of a higher being – God who is the foundation of spiritual reality (Stępnia, 2018). Can the sacred be deformed by AI, and to what extent? Much depends on the accepted canons of sacred art products, spaces, objects, symbols of individual religious denominations. Their deformation or significant change, also thanks to AI, may lead to treating these artifacts on the one hand as a kind of sacred kitsch, still performing a devotional function, and being an element of religious communication. On the other hand, we would be dealing with a significant role of AI in reducing human artifacts solely and exclusively to the level of religious kitsch, treated as ordinary products of commercial mass production (Stępnia, 2024).

In a debate on the issue of the relationship between humans and technology, Randall Reed (2018) formulates the question whether a human creation (which is AI) can be perceived as a religious being (Reed, 2018). The recognition of the religious status of robots and artificial intelligence in the opinion of an American professor of religious studies has led to an attempt to redefine the concept of *imago Dei* in a way that entails a less exclusive and anthropocentric understanding of the image of God (Reed, 2018).

Beth Singler (2017), points out the futurologists' belief in the slow secularization of humanity, caused by artificial intelligence characterized by superrationality and treating religion as a superstition and a way to alleviate earthly suffering. The British anthropologist quotes John Messerly (2015), who puts forward a rather naive and groundless thesis, announcing that science will overcome death and suffering, which would consequently cause religion to lose its *raison d'être* and die. The American philosopher from Saint Louis also claims that there is morality without religion, and ethical values and behaviors can find other justifications than religious ones.

Technological progress affects the understanding of the reasonable limits of AI's usefulness in the area of religious denominations. From a doctrinal point of view, one can ask, for example, about the possibility of receiving a blessing from a machine or about artificial intelligence replacing the leaders of a given religious denomination in performing worship or pastoral work. In turn, from a philosophical perspective, taking into account technological

progress, questions about understanding the purposefulness of human life and self-fulfilment are not without significance (Singler, 2017).

It is also worth noting the possibility of AI creating a new religion that will control human minds, which can be seen as a deformation of human religiosity or AI's failure to respect diverse cultural and religious values. In this context of reflection, let us recall the voice of Beth Singler, who notes:

The idea that AI could create a religion to control us also appeared in the press. On May 4, 2023 the *Daily Star* reported on a speech Yuval Noah Harari gave at the Frontiers Forum event in Switzerland. He gave a similar account of AI creating religion to control humans. The cover image, its message, and its popular culture references are worth noting as well. Illustrated with a blue AI face made of digital bits the main headline read: "He's not the Messiah, he's a very naughty chatbot" – a reference to the religiously themed comedy film, *Monty Python's Life of Brian*, a subheading claimed, "boffins fear AI will create new religions to control our minds...and then blow up the world". (2023b, p. 100)

In turn, Anne Amegbeha (2023) from the University of Kentucky notes that the development and use of AI should prioritize privacy, autonomy, and the preservation of social values. For example, when it comes to online healthcare, there is a need to ensure that AI respects cultural and religious beliefs regarding treatment, data protection, and care for people with terminal illness. In the context of the question of religious freedom and online religiosity in the age of AI, Cameran Ashraf (2021) notes that through the development of algorithms, AI can deprioritize certain content with lower engagement levels and favor content with higher engagement levels. The ability of AI to determine what content is displayed or recommended could pose significant risks to the expression of religious freedom online. Cameran Ashraf argues that AI could reveal an individual's religious preferences by recommending them to certain friends, advertisers, vendors, or other groups or individuals:

Advertisers or other consumers of AI-gathered data could be subpoenaed or compelled to reveal individuals who may be part of a targeted religious minority. This AI-enabled public exposure of private religious choice happens automatically and is based on algorithmic assumptions designed to increase user engagement with a platform. (2021, p. 772)

4 Conclusions and Postulates

From the point of view of the perception of the image of ecclesiastical institutions and other religious denominations, the use of AI implies questions about the consequences for the religiosity of recipients of content generated by artificial intelligence, who are not aware of its use by issuers. This may be an area for empirical research to verify the impact of AI on the understanding and perception of religious leaders and spiritual leaders of churches and other religious bodies. It will be interesting to compare the effectiveness of this impact among representatives of different religious denominations, as well as the impact of media education in the field of understanding AI in the area of religion.

The ethical evaluation of AI in different religions differs, largely depending on the understanding of ethical values and moral actions in individual churches and religious bodies. For example, the category of good is interpreted differently in various religious denominations. As Ezieddin Elmahjub (2023) notes, textual and non-textual Islamic sources are important in resolving AI ethical uncertainties. At the same time, these sources place a strong emphasis on the notion of "good" or "maşlahā" as a normative guide for ethical evaluation of AI. Maşlahā is an ethical state of affairs in harmony with divine will, with two

interpretations of maşlahā coexisting: one based on well-being/utility, the other based on duty. Islamic jurisprudence allows for arguments supporting ethical choices that prioritize building technical infrastructure for AI in order to maximize utility. On the other hand, it also supports choices that reject utility calculations as the sole measure of value in determining ethical responses to AI progress. Islamic maşlahā, although rooted in textual sources, gives human reason considerable autonomy in conducting rational normative analyses in order to solve emerging challenges, including those related to artificial intelligence (Elmahjub, 2023).

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MANIFESTATIONS OF TECHNOLOGICAL INTERFERENCE ASSOCIATED WITH THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR AUTOMATING COMMUNICATION PROCESSES IN THE DIGITAL ENVIRONMENT

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Abstract:

The scientific contribution examines the impact of the development of artificial intelligence (AI) technologies on the manifestations of technological interference in the digital environment, with a particular focus on automated communication processes and their consequences for the social behaviour of internet users. The objective of the scientific contribution was to identify the ways in which AI applications (primarily through notification automation and content personalization) shape the digital habits of internet users and may potentially lead to the deepening of addictive behavioural patterns in the online space. In the theoretical part of the contribution, the concepts of technological interference and digital addiction were processed, illustrating the socio-psychological impacts of constant online availability. The empirical part presents the results of a quantitative survey, which examined current trends in mobile device usage in the context of digital communication and information searching. The survey results confirm that AI significantly influences the behaviour of internet users, primarily due to optimized notification management, which increases the frequency of interaction with mobile devices and deepens digital addiction. The research also revealed differences between various demographic groups in their responses to technological interference and digital interactions, indicating specific needs and challenges within the digitalized society. The discussed findings contribute to the understanding of the complex relationship between humans and artificial intelligence in the digital environment and highlight the ambiguous role of AI and its ambivalent nature, which can foster interactions while simultaneously limiting disruptive stimuli through optimized algorithms.

Key words:

Artificial Intelligence. Automation of Processes. Communication. Internet Addiction. Mobile Device. Social Media. Technological Interference.

1 Introduction

Given the societal pressure to ensure fast and unrestricted communication between people, which simultaneously enables the active search for new or supplementary digital information, it is possible to highlight the irreplaceable role of mobile devices in the process of acquiring individual knowledge, skills, and habits that shape behavioural models. Today, mobile devices are no longer used exclusively for phone calls or sending and receiving short text messages; instead, we observe a growing popularity of various software applications that significantly expand the capabilities of mobile devices in connection with internet access (Pierce & Jiang, 2021). Through mobile devices, we create and edit photos or videos, listen to music, watch online content from others, participate in discussions on social media, or archive private documents. We could state that mobile devices have radically influenced social behaviour among people. They keep us confined in cyberspace, pushing personal contact increasingly into the background (Baeva, 2016). On the other hand, electronic communication and its various forms are becoming the preferred choice for many. The minimal costs required to ensure unlimited connection to the surrounding world often act as a motivating factor, sometimes leading to compulsive, uncontrolled use of mobile devices (Kanbul et al., 2019).

This is further exacerbated by the phenomenon of technological interference and automated artificial intelligence tools that facilitate regular communication between entities in the digital environment.

2 Objective and Methodology

The primary objective of the scientific contribution was to examine manifestations of technological interference arising, in part, from the rapid development of artificial intelligence technologies and their applications, which automate communication processes in the digital environment. Emphasizing the interaction between the “human” and the “artificial”, the authors aimed to identify how AI influences social behaviour, particularly through the management of notifications and content personalization, and the impact these technologies have on shaping users’ communication and behavioural habits. The scientific contribution has a theoretical-empirical character, employing a qualitative-quantitative methodological framework and various analytical-synthetic methods of investigation. The theoretical part reflects on the definitional frameworks and concepts related to technological interference and its manifestations, as well as selected aspects of digital addiction, which can potentially be driven by the automation of communication processes through artificial intelligence technologies. Particular attention was given to specific scenarios that may arise from frequent use of AI technologies in notification management and the constant accessibility of individuals in the digital space. Through scientific abstraction, a foundational terminological framework was developed, drawing primarily from studies by international authors published in scientific journals indexed in the Web of Science and Scopus scientometric citation databases. The approach to examining these phenomena was theoretical, employing qualitative research methods, primarily a hermeneutic-phenomenological approach. This method aims to understand and grasp the essence of media communication, explore its primary structure, and subsequently deduce potential influences and effects on individuals and society.

The empirical part focused on presenting and interpreting the results of a quantitative questionnaire survey aimed at capturing current trends in mobile device user behaviour in Slovakia, particularly in relation to accessing social media and searching for commercial and private information. The questionnaire was distributed online using the CAWI method to a sample of 1,925 respondents aged 15 and older. To enhance the reliability of the results, statistical control with a margin of error of $\pm 1.5\%$ was applied, ensuring the relevance of findings within the analysed demographic groups. Building on the findings from the theoretical and empirical parts, the collected data were analysed and evaluated with attention to specific manifestations of digital addiction and the impact of automated AI technologies on respondent behaviour. This approach allowed the authors to identify factors associated with notification automation and its influence on contemporary communication processes. Thus, the scientific contribution directly addresses issues concerning the relationship between humans and artificial intelligence, as well as their societal implications.

3 Results and Discussion

Technological interference can essentially be perceived as the daily, repetitive disruption of personal communication between individuals due to the use of various electronic devices (Yang & Christofferson, 2020; Hurajová & Vasičáková, 2024). In practice, this phenomenon often has a disruptive impact on human behaviour, as individuals fail to devote adequate attention to the physical presence of those around them. This is particularly detrimental in situations requiring heightened focus and concentration, such as tasks

demanding precision and accuracy, or during creative processes (Švec & Mura, 2020). Specific manifestations of technological interference are closely tied to advancements in artificial intelligence technologies, particularly in automating communication processes. AI technologies are commonly employed for generating and distributing notifications to mobile devices. Notification management is typically handled by sophisticated AI algorithms designed to optimize the timing and content of notifications based on the recipient's preferences (Karapantelakis et al., 2024; Murár et al., 2024). This process often exacerbates individuals' dependence on mobile devices or the internet, as AI increasingly predicts which information will likely engage the user and when (Huang et al., 2024; Vrabec & Zubková, 2023). Consequently, users may develop a habit of checking notifications even when no actual messages have been received. In professional terminology, this behaviour is linked to the phenomenon known as *phantom vibration*, wherein users falsely perceive the sensation of an incoming notification on their device (Kruger & Djerf, 2016). Psychologists refer to the tense feelings caused by the illusion that one's phone is ringing when no one is actually contacting them as *ringxiety* (Anshari et al., 2019). In both cases, the described mental states are primarily conditioned by the user's strong personal relationship with the mobile device, which increases in intensity to a considerable extent because of the total time spent by the user in the social media environment, whether in the context of the fulfilment of assigned work tasks or within the framework of the realization of leisure activities.

Considering the described facts, we conducted an empirical survey aimed at exploring current trends in the behaviour of internet users through mobile devices on social media in the Slovak Republic, focusing on the process of acquiring new information of both commercial and private nature. The achieved results reflect the opinions and experiences of 1,925 respondents who had to meet pre-established criteria for inclusion in the sample set. It was supposed to refer to individuals in the productive and post-productive age groups, i.e. over 15 years old, who can be assumed, among other things, to realize a purchase intention through their electronic device with an internet connection. 1,224 women (63.6%) and 701 men (36.4%) participated in the survey. Regarding the informative value of the results, it can be stated that 1,086 respondents were under the age of 35 (56.4%). Another group of respondents between 35 and 64 years of age was also in the productive age, in whom we assumed certain digital skills, critical thinking and the ability to adapt to the coming changes resulting, e.g., from their inclusion in the work process or experiencing a full-fledged family and social life. The share of these respondents exceeded the threshold of 38%. The remaining 106 respondents (5.5%) were of retirement age. The largest group of respondents had completed secondary education (67.6%). A total of 29.6% of the respondents had completed higher education. Data collection was carried out using the CAWI technique on a selected sample of respondents. The control of the given sample was carried out using the triangulation data method. The statistical margin of error for the mentioned group of residents in the Slovak Republic ranged within $\pm 1.5\%$.

Regarding the topic of the scientific contribution, we were interested in whether the respondents installed any software application on their mobile device that would allow them to communicate more easily with the surrounding world, share their thoughts and observations, and gain new interesting information. A total of 88.4% of respondents use the social media application, through which it is possible to immediately present their opinions on various topics to the public. These are mainly software applications such as Facebook, Instagram, YouTube, TikTok and others. 71.7% of respondents have at least 2 such applications installed on their mobile device at the same time. In connection with the purchase of a certain product and the subsequent effort to share your customer experience with others, we also recognize various software applications aimed at evaluating the goods or services provided, which are usually operated by a third independent party. 39.0% of respondents

actively use at least one such application on their mobile phone. These are, for example, applications Foursquare, Staffino, Heureka and many others. On the contrary, those who, after downloading and installing the selected application, agree to, e.g., membership in its loyalty program, can have the opportunity to directly contact the manufacturer/seller of the product and at the same time receive from him regularly the latest information about the implemented activity. In the virtual environment of the application, they are also sometimes allowed to share their own user experience. However, such reactions are under the constant control of the relevant administrator of the digital platform, who is the manufacturer/seller himself capable of acting in case of unwanted criticism and can withdraw the statement presented. 60.7% of respondents use the application of the type in question on their mobile device. It was also shown that every fifth respondent has at least 3 applications of this type installed on their mobile phone (20.5%). Up to 87.9% of respondents use various chat applications to carry out personal private communication, especially with friends and acquaintances. In the category of seniors older than 65, however, 36.8% of respondents do not use any similar application. On the other hand, it can be said that young people under the age of 35 have an average of 2 such software applications installed. Those interviewed most often had the WhatsApp, Messenger, Viber or Skype applications available, which represents a starting point for technological interference to be fully manifested in practice.

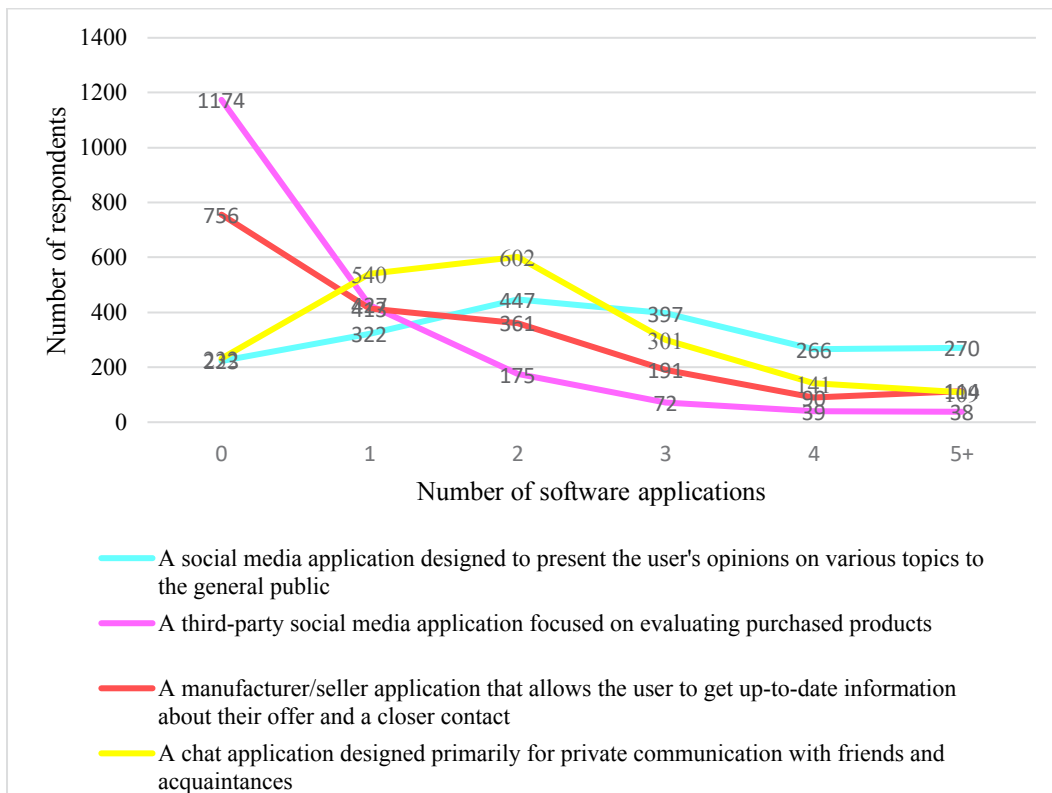


Figure 1: Availability of selected types of software applications by the user of a mobile device
Source: own processing, 2024

Since most respondents use software applications on their mobile devices that require repeated communication with other entities, which is somewhat facilitated by the active incoming notification feature driven by artificial intelligence technologies within the scope of technological interference, designed to alert the user to newly received messages, we also examined their immediate response. At the outset, however, it should be noted that 16.8% of respondents do not have the mentioned notifications enabled on their mobile at all, and therefore familiarization with the received message is in such cases a matter of chance or the

user's habit of deliberately repeatedly checking their mobile device. After delivery of the notification, 31.3% of respondents always or in most cases view it immediately (for people under 35, the share was 35.7%). Despite the knowledge of the received notification, at the same time, 35.3% of the respondents are willing to wait until they finish the ongoing activity in which they are involved, and only then view the given message. Approximately the same number of respondents do not attach such great importance to the notification of a delivered message, and whether they immediately read it depends primarily on the current situation they are in, and this happens rather irregularly or only sometimes.

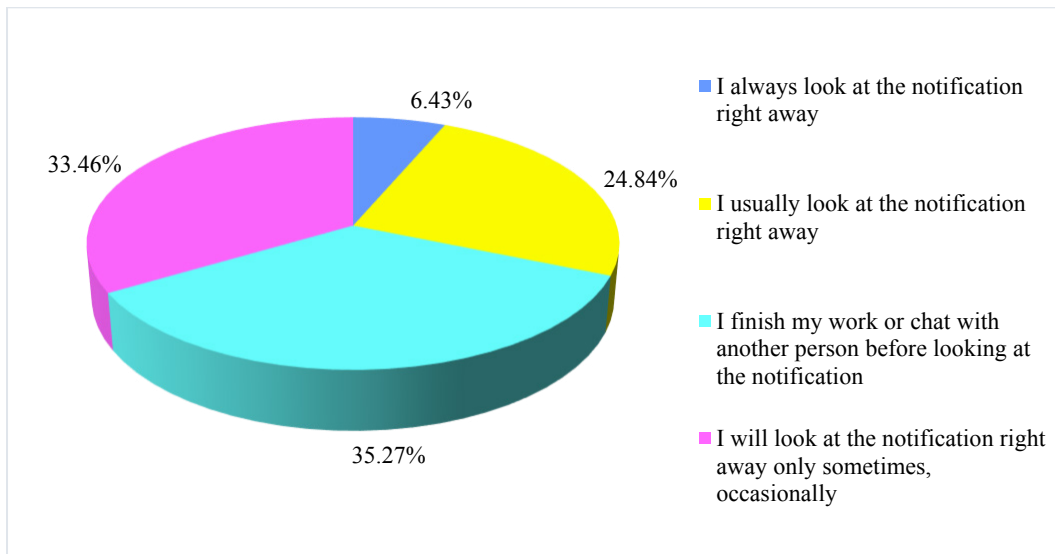


Figure 2: The reaction of the mobile device user to the received notification within the manifestations of technological interference
 Source: own processing, 2024

At the same time, we asked the respondents to try to define the time they spend on social media on average per day. To avoid misunderstandings that could be associated with a misinterpretation of the question asked, we asked them to distinguish between the amount of time they spend working on the internet in general during the day and the time spent exclusively in the social media environment. While 4.3% of respondents stated that they do not use social media at all or only very rarely, or exceptionally, others chose one of the offered time intervals corresponding to their behaviour on the internet. 31.9% of respondents spend no more than 60 minutes on social media every day. A similar number of respondents agree with the statement that working with social media takes them an average of 1 to 2 hours per day. However, we can confidently start talking about the need to consciously control the time spent in the digital environment in cases where the time spent on social media approaches 3 hours or even exceeds this imaginary limit (reached share of up to 39.2% of respondents). In practice, this means that the resulting time spent in virtual space could easily exceed twice the value measured only on social media during the day. If it is not about the fulfilment of assigned tasks as part of work duties, but rather about the repeated voluntary choice of such an option for spending one's free time, one can certainly point to a growing trend of digital addiction. At the same time, our survey showed that women spend more time on social media than men. While the daily average for men was 2 hours and 4 minutes, for women this number increased to 2 hours and 14 minutes. It is also true that while 19.5% of women are present on social media for more than 3 hours a day, in the case of men it is only 13.8% of them.

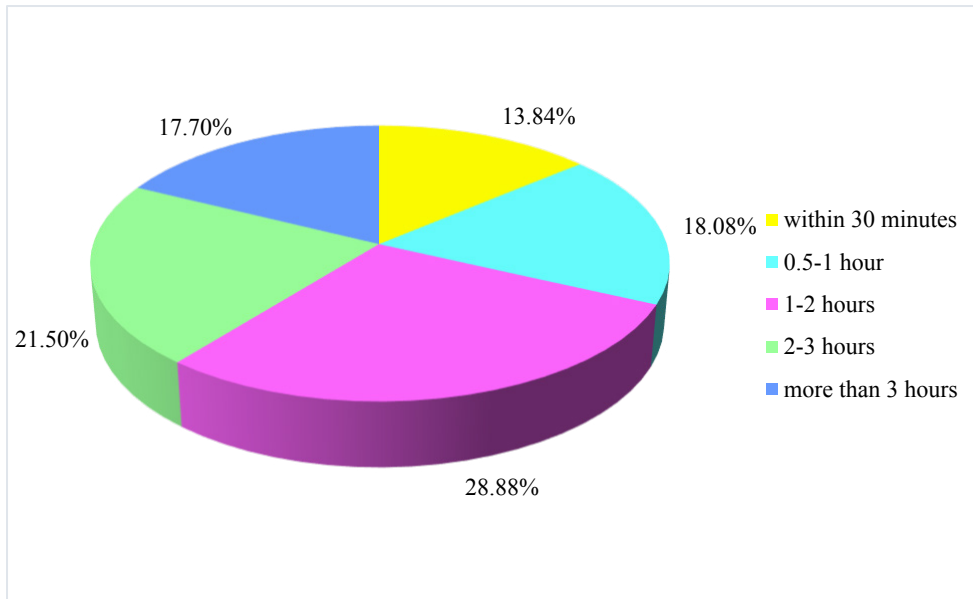


Figure 3: Average time spent daily by internet users on social media
 Source: own processing, 2024

Since it is now standard for people to use their mobile devices as access points to the internet, we were also interested in whether the respondents had installed software applications on their phones that, using artificial intelligence technologies, would continuously monitor their online activities and subsequently send them, for example, weekly summaries. We can state, however, that only 39.1% of respondents had at least one such application on their mobile devices. These could include software that is an integrated part of the mobile device’s default settings or the result of the user’s effort to regularly monitor their internet activity to regulate their use of digital technologies. Frequently mentioned programs designed to track time spent on social media included Digital Wellbeing, QualityTime, Čas pred obrazovkou, RescueTime and SocialFever.

4 Conclusion

With an attractive design and relatively simple operation, information available to the public through mobile software applications has become more accessible than ever before. As people began spending significantly more time online, it inevitably led to a shift in their habits to satisfy their needs by adopting the latest information and communication technologies. While artificial intelligence tools can, on the one hand, contribute to increased dependency on digital technologies, on the other hand, they can also help limit access to various notifications that an algorithm identifies as unnecessary or recognizes the appropriate or inappropriate timing for delivering them to a mobile device user and performs the programmed action accordingly. Progress in artificial intelligence can therefore be seen as a “double-edged sword”, and it ultimately depends on the software administrator and its user to determine what approach they choose when working with digital media.

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THE IMPACT OF ARTIFICIAL INTELLIGENCE ON CONSUMER DECISION-MAKING

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Abstract:

The rapid development of artificial intelligence (AI) is fundamentally changing the dynamics of consumer decision-making. AI is becoming an integral part of consumers' lives, influencing not only their preferences but also the ways they interact with brands and products. Through personalized recommendations, big data analytics and automated processes, AI can effectively predict customer needs and expectations, improving their overall experience. This post focuses on the various areas in which AI is influencing consumer decision-making – from predictive analytics to personalized marketing campaigns to the use of chatbots and virtual assistants. The aim of this paper is to provide a comprehensive view of the impact of AI on consumer behaviour and to outline future trends in this area. Drawing on available studies and case studies, including AI applications at companies such as Netflix, Spotify and Sephora, the paper shows how AI can optimise the consumer experience, but also reveals the challenges associated with its implementation.

Key words:

Artificial Intelligence. Consumer. Listener. Shopping Behaviour. Streaming Platforms. Viewer.

1 Introduction

The new phenomenon in computing is undoubtedly AI. Generating content through AI is revolutionizing many industries in a way that we work more efficiently and facilitates our decision making process (Ameen et al., 2021). Thus, we can teach our tasks to machines. Machine learning is a data analysis technique that teaches computers to do what comes naturally to humans, which is to learn from experience. Machine learning algorithms use computational methods to extract information directly from data without relying on a predetermined equation as a model (Štalmachová & Strenitzerová, 2020). Artificial intelligence is at the forefront of a revolution in business and society. Artificial intelligence provides companies with a number of ways to better understand, predict, and engage customers (Campbell et al., 2019). It has a significant role in the field of marketing as it can improve the communication and targeting of companies to a great extent. Agencies have realized the power of AI in various fields in generating texts, images but also analyzing consumer buying behavior. From a strategic perspective, AI is becoming increasingly important in marketing. Companies such as Google, Rare Carat, Spotify and Under Armour are among the growing list of companies that are improving their performance through the adoption of AI-based platforms (such as Microsoft Cognitive Services, Amazon Lex, Google Assistant or IBM Watson). This approach increases their interaction with customers across marketing channels and improves market forecasting and automation (Vlačić et al., 2021). AI-enhanced digital marketing has drastically reoriented the way companies create context, manage consumer experiences and expectations, and generate new revenue opportunities (Romic, 2024). Early reports point to promising benefits of AI in B2B marketing, such as offering important insights into customer behavior, identifying critical market insights, and streamlining operational inefficiencies (Mikalef et al., 2023). We also need some knowledge to master AI. We need to know which AI tools to use for specific marketing processes. Which tools will we use in inspiring the customer to buy our product? Inspiration is a psychological concept that influences customer actions (Khan & Khan, 2024).

Through creative content and good targeting, we lead better to inspire customers to buy. Machine learning, natural language processing, and other sophisticated applications such as predictive analytics are enabling companies to become true real-time consumer experience providers. Additionally, chatbots and recommendation systems enhance the consumer experience, leading to increased loyalty and revenue through AI systems that anticipate customer demands (Talha, 2024). The use of AI for consumer segmentation represents a remarkable advancement (Hu et al., 2023). Users feel comfortable and are more inclined to buy what is offered when AI is used to personalize their experience. AI tools can also be used to analyze the performance of competitors' campaigns and uncover their customers' expectations (Haleem et al., 2022).

2 Results

2.1 Netflix and the Impact on Consumer Decision-Making, Viewers

If we want information on how Netflix knows what we want to watch, we need to go to the help center of the sploceability where it states, that the subscription service offers personalized recommendations to help you find shows, movies and games you might like. To this end, we have created an innovative recommendation system (Netflix, n.d.a). Netflix uses machine learning through artificial intelligence for this analysis. At the core of Netflix's services are recommendation and search algorithms. They are key in providing personalized entertainment suggestions to members around the world that are in line with their preferences at any given moment (Netflix, n.d.b). Every time you open Netflix, the system will try to find a show, movie, or game that you enjoy without you having to search for it for a long time. The likelihood of whether you will like a show from the catalog is estimated based on a number of different factors, including (Netflix, n.d.a):

- Your use of our service (for example, your viewing history and ratings of other shows),
- the choices of other subscribers with similar tastes and preferences,
- information about shows, such as their genre, category, actors, year of release, etc.

In addition, the AI knows what you've watched on Netflix. Factors such as (Netflix, n.d.a) are also taken into account when tailoring recommendations:

- The time of day you watch Netflix,
- the languages you prefer,
- the devices you watch Netflix on,
- and how long you've been watching a particular show.



Figure 1: Netflix home screen

Source: Netflix (n.d.c)

Based on insights gleaned from user interactions, Netflix dynamically adjusts thumbnails to better suit the tastes of individual users.



Figure 2: Netflix miniatures
Source: Krysik (2024)

In the example above, we see how the movie Pulp Fiction can be offered to Netflix users with different thumbnails depending on whether the person has a lot of movies with Uma Thurman or John Travolta in their browsing history (Krysik, 2024). NetflixAI uses this tool to influence this behavior. The way it influences is not focused on how much the customer will watch, but on what they will watch. Their purchasing behavior is essentially in the behavior of the viewer. The viewer thinks that the choice of the movie is up to them, but the opposite is true. Netflix offers viewers an experience that they themselves choose based on the viewer’s preferences. A woman who watches romantic movies will have a different choice of movies than a man who watches action movies.

2.2 Sephora and the Involvement of AI in the Cosmetics Industry

Sephora has innovated the beauty space with AI. Sephora is a French multinational retailer of personal care products and cosmetics, offering nearly 340 brands along with its own Sephora Collection. Its product range includes cosmetics, skincare, fragrances, nail colours, beauty tools, body products and hair care products. Sephora has been actively incorporating technology, including AI and AR, to improve customer engagement and provide a personalized shopping experience. Virtually integrated AR technology into its mobile app to offer customers virtual trial experiences. This allows users to virtually test different makeup products, such as lipsticks, eyeshadows and foundations, using smartphone cameras. This feature helps customers imagine how products will look on their skin before making a purchase (Itechno Labs, 2023).

Sephora uses AI algorithms to provide personalized product recommendations to customers. By analyzing customer data, including purchase history and preferences, the AI system suggests products that match individual preferences. This improves the overall shopping experience and increases the likelihood of customer satisfaction (Itechno Labs, 2023). Sephora shared its plan to introduce Smart Skin Scan, a new skin diagnostic that would enable enhanced personalization. Much more advanced than its previous SkinIQ, the personal data collected from this, plus its existing ColorIQ diagnostics, will allow Sephora to personalize the entire in-store experience and improve the in-store experience to increase conversion across channels (Lombardo, 2023).

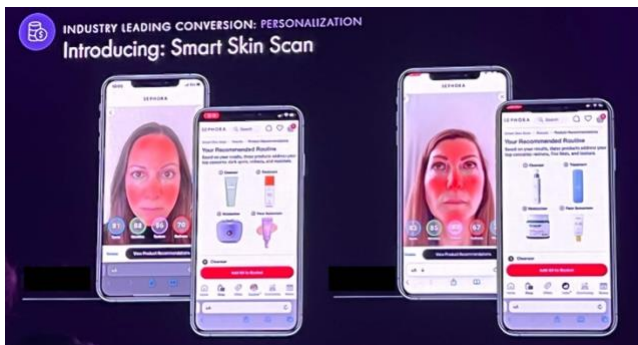


Figure 3: Smart Skin Scan
Source: Lombardo (2023)

The AI technology in the smartphone is based on skin diagnostics through the smartphone. It scans the skin via an app and recommends specific products that suit the customer's skin. In this way, we personalise shopping behaviour more than we do today. Today, shopping behaviour is personalised based on the data that the customer has revealed about themselves, but the new way delivers data based on the user's diagnostics – what they look like, what skin disorders they have, etc. Personalization is at the heart of Sephora's digital strategy. Sephora understands that beauty is a deeply personal experience – what works for one customer may not work for another. The brand recognizes this and uses technology to tailor the online shopping experience to each user's unique needs and preferences. Sephora's personalization efforts start with data collection. The company collects valuable information about customers' skin types, beauty concerns and product preferences through quizzes, purchase history and online behavior. This data is then used to recommend products, offer targeted promotions and create a more personalized shopping experience. AI-powered personalization impacts shopping behavior:

- The customer has a personalized product selection.
- The customer has personalized discounts that can influence the customer's purchase and behavior.
- Sephora's Beauty Insider program to increase revenue through loyalty.
- Customer-centric approach: Every digital innovation and strategy at Sephora is focused on improving the customer experience. Whether it's through personalized product recommendations, seamless omnichannel integration, or engaging community features, Sephora prioritizes what its customers want.
- Continuous innovation: Sephora doesn't rest on its laurels; the brand is constantly evolving. It stays ahead of digital trends by embracing new technologies like AI, AR, and virtual try-ons, ensuring it remains relevant to today's tech-savvy consumers.
- Creating a holistic ecosystem: Sephora doesn't treat its website, app, and stores as separate entities. Instead, it has created an integrated ecosystem where each channel complements the others, delivering a consistent and enjoyable customer experience no matter where the shopping journey begins.
- Loyalty as a relationship-building tool: Sephora's loyalty program is more than just a points system – it's a comprehensive engagement tool that builds lasting relationships with customers. By focusing on value, personalization, and experience, Sephora has created a loyalty program that is effective and beloved by its customers.

2.3 Spotify: Personalised Music Recommendations via AI

Spotify has dominated the music streaming industry for several years thanks to its cutting-edge artificial intelligence algorithms. Using AI, the platform analyses user behaviour, tastes and preferences to create curated playlists. Features like "Discover Weekly" and "Daily Mix" use AI to offer users new and relevant music that suits their tastes. A new feature is Spotify AI DJ. It is a feature that combines artificial intelligence and music curation to provide a tailored listening experience. By analyzing your listening habits, preferences and time of day, this feature creates a new and familiar playlist. In addition to algorithms and data, Spotify's AI DJ provides better recommendations the more you listen, offering the perfect balance of your favorite songs and discoveries. The playlist is refined according to your preferences, including global music trends, so you don't miss out on the latest hits (Sound Guys, 2024).



Figure 4: Spotify AI DJ
Source: Sound Guys (2024)

Spotify, like Netflix, is a streaming service that needs to retain subscribers. It is therefore essential for it to use new ways to keep as many members on the platform as possible and make it easier for them to choose their music. There is no doubt that it will invest more in the area of AI and incorporate it into its service.

3 Discussion

Today's world is alive with a revolution called artificial intelligence. Big companies have been quick to incorporate it into their products to attract more customers. There is no doubt that the further development of artificial intelligence will be faster than it has been so far, and companies are realising the necessity of using it if they want to succeed in the competitive battle and retain the favour of their customers. In the three case studies, we see just one example of how artificial intelligence is beginning to decide what we buy, what we watch and what we listen to.

4 Conclusion

Artificial intelligence is part of our lives even without our conscious use of it. It is safe to say that anyone who lives a modern social life and uses modern technology will not be able to avoid artificial intelligence. In doing so, he may not have used it consciously in his work, but he may have used it unconsciously while shopping or watching a TV show. On the other hand, there is the question of whether artificial intelligence will not decide for us what we buy, what cosmetics are suitable for us and what food we eat. Today, however, it is clear that artificial intelligence is advancing and becoming part of our electrical appliances, cars and so on. AI is fundamentally changing marketing practices. It gives companies the ability to better understand, predict, and engage customers (Campbell et al., 2019). This transformation includes personalized recommendations, consumer behavior analysis, and marketing process automation. The role of AI in marketing goes beyond recommendations – it allows companies to respond more quickly to dynamic customer needs and increase the effectiveness of their campaigns. For example, Spotify and Netflix use AI to predict user behavior and personalize content, thereby improving customer experience and loyalty (Netflix, n.d.a; Mikalef et al., 2023). Personalization is the cornerstone of modern AI. In the case of Netflix, we see how AI is used to tailor recommendations based on user preferences and behavior (Krysik, 2024).

Similarly, Sephora is using AI and AR technologies to provide personalized experiences to customers, leading to higher satisfaction and purchase likelihood (Itechno Labs, 2023). Such use of AI not only helps companies differentiate themselves in the market, but also enables deeper analysis of customer data, leading to more effective business decisions. AI is becoming a tool to inspire customers and improve their engagement. As Khan and Khan (2024) state, inspiration is a psychological process that can lead to positive customer actions. With machine learning and predictive analytics, companies can better identify what their customers need and tailor their offerings to inspire purchase.

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HOW DOES TODAY'S MODERN DIGITAL WORLD AFFECT FOOD PURCHASE?

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Abstract:

Today's digital world significantly influences the way people purchase food. The submitted paper aims to examine consumers' digital habits and the influence of digital marketing tools on their food purchasing decisions in Slovakia in the context of rationality and irrationality in creating consumer preferences. The paper analyses the current situation of online food purchasing in Slovakia and also focuses on the growing trend in digital marketing communication and digital personalization. For data collection, a questionnaire survey was used, involving 764 Slovak respondents who are food consumers and use digital technologies. Statistical methods and techniques were used to evaluate the established hypotheses, such as the Chi-square test of independence, the Share test with known constant, the Kolmogorov-Smirnov test, the Two-Proportion Z-Test, and the Chi-square test of good agreement. Based on the research findings, suggestions have been made for improving digital marketing communication in the food industry. Our research indicated that the rise in digitalization presents fresh opportunities and challenges, making it an essential aspect of everyday living. The Internet has become a determining factor in purchasing decisions and can influence consumer behaviour. We observed an increased interest in digital personalization and online food purchasing among consumers compared to the past.

Key words:

Digital Marketing. Marketing Communication. Online Food Purchasing. Personalization. Rationality and Irrationality of Consumer Behaviour.

1 Consumers in the Digital World

Today, a pressure factor stems from digital technologies that influence consumer behaviour. Certain aspects are beyond the consumer's control and can only happen if technology allows. Technological advancements, such as smartphones and tablets, significantly shape consumer attitudes. However, it's also true that no consumer can be labeled as completely digital or entirely non-digital, as we occupy a position somewhere along the digital spectrum. This suggests that a digital consumer can genuinely be anyone, and it would be incorrect to stereotype this term as only being applied to the younger generation. It is essential to understand each individual's unique nature and consider their desires and interests (Kingsnorth, 2022).

The digital revolution has undoubtedly had a tremendous impact on consumer behaviour. Today, consumers are much more informed and sophisticated as they gain a wealth of information from the Internet. Companies and marketers are adapting to this trend by re-evaluating the ways and processes through which they identify, communicate, and deliver value to their clients (Chadt, 2023).

In recent years, the customer journey has evolved and become more complex. Customers respond to different stimuli at each stage of the purchasing process, are interested in different product information, spend time on different channels, and have varied motivations for choosing a particular brand. This complex customer journey, which influences purchasing behavior, is described by the digital marketing framework SEE, THINK, DO, CARE – STDC framework (Karabová, 2021). The phases are characterized as follows:

1. SEE – people encounter a company or product for the first time; in this phase, it is essential to engage them, capture their interest and move them to the next stage,

2. THINK – people are deciding whether they really want to buy the product or can do without it; it is essential to get their awareness and remind them in appropriate ways, through relevant channels and with a frequency that is effective without being intrusive,
3. DO – customers know they want to buy the product but are deciding where to purchase it, this decision is influenced by numerous factors that the seller should appeal to (price, quality, service, website speed),
4. CARE – Customers have already made the purchase, and it is the seller’s responsibility to continue caring for their shopping activities (Lišaníková, 2022).

1.1 Online Food Purchasing

The availability of the Internet is driving the growth of e-commerce. E-commerce is a term that refers to the sale of goods and services over the Internet. The advantages of e-commerce include:

- the ability to shop anytime and anywhere,
- easier transactions,
- product selection through smartphones,
- flexible payment methods (Sigar et al., 2021).

The e-commerce market has undergone tremendous development over the years. The Covid-19 pandemic played a significant role in the growth of e-commerce. To meet customer needs and remain competitive, businesses had to digitalize their operations. The e-commerce phenomenon has impacted many industries, and the food market is no exception (Chadt, 2023). Food delivery is the most common way of utilizing e-commerce in the food sector. The restaurants or food stores deliver food to their customers. Orders are placed through their website or the mobile app (Sigar et al., 2021). Some stores in Slovakia where it is possible to order food online with home delivery are, for instance:

- iTesco,
- Fitmarket,
- Dopo.sk,
- Freshbox,
- Lunys,
- Sladučné ovocie,
- Gazdovia (Tandlich, 2020).

1.2 Digital Personalization

Personalization in marketing means tailoring content according to customer preferences. (Chandra et al., 2022). Online personalization is considered a key trend in retail. Effective personalization is a priority for many companies (Nobile & Kalbaska, 2020).

The most significant benefits of personalization include:

- improvement of the customer experience,
- enhancement of the conversion rate,
- increased customer interaction,
- better brand perception,
- greater customer loyalty (Májek, 2023).

One of the companies that has successfully used personalization and operates in the food market is Starbucks. This company developed a mobile app that remembers customers’ orders, allowing them to quickly and easily order their favorite drink. The app also provides recommendations based on past orders and preferences (Keskin, 2023).

Have consumers ever wondered how everything suddenly adapts to their preferences magically? No magic is involved – just something far more sophisticated: artificial intelligence (Strategic Marketing Consulting, 2024). One of the most significant changes in the field of personalization is the rapid development of AI and machine learning technologies. AI tools assist in gathering customer data, which is crucial for personalization, as well as in product recommendations and content creation on websites and e-shops (Hyvärinen, 2023).

2 Methodology

The submitted paper aims to examine consumers' digital habits and the influence of digital marketing tools on their food purchasing decisions in Slovakia in the context of rationality and irrationality in creating consumer preferences. The paper analyses the current situation of online food purchasing in Slovakia and also focuses on the growing trend in digital marketing communication and digital personalization.

In connection with the aim of the paper, we have established the following hypotheses: Hypothesis 1: We assume that a straightforward menu plays a significant role for respondents when browsing a website.

Hypothesis 2: We assume that 15% of respondents purchase food online.

Hypothesis 3: We assume that a higher proportion of women, compared to men, purchase food online.

Hypothesis 4: There is a dependency between the age categories of respondents and the perception of personalization as an essential digital trend.

Primary and secondary sources of information were collected and used to achieve the stated objective. Secondary data was obtained from studies and papers by domestic and foreign authors and WoS and SCOPUS databases.

Our research utilized a questionnaire survey conducted via Google Forms. Respondents were invited to participate through social networks like Facebook and Instagram and emails. The final sample included 764 respondents from the Slovak Republic who are food consumers and digital technology users.

Data from the questionnaire survey were processed into tables and graphs, and the results were interpreted. To achieve a more in-depth analysis, we tested the established hypotheses using the Chi-square test of independence, the Share test with known constant, the Kolmogorov-Smirnov test, and the Two-Proportion Z-Test. We also used the Chi-square test of good agreement to verify the representativeness of the sample.

The Chi-square test of good agreement tests nominal data within a single sample. It is used to determine whether empirical values are sufficiently different from theoretical ones that characterize the baseline dataset (Lyócsa et al., 2013).

The formulation of hypotheses looks as follows:

H₀: The sample is representative.

H₁: The sample is not representative.

We calculate the test statistic according to formula (1):

$$\chi^2 = \sum_{i=1}^k \frac{(E_i - T_i)^2}{T_i} \quad (1)$$

Where:

χ^2 – test statistic,

E_i – empirical frequencies,

T_i – theoretical frequencies.

In Microsoft Office Excel, using the CHIINV function at a significance level of $\alpha = 0.05$, we calculate the critical value and compare it with the test statistic. If the test statistic is less than the critical value, we do not reject H_0 . However, if the opposite occurs, we reject H_0 and accept H_1 . (Matejková et al., 2018).

To verify the representativeness of the sample by gender, we first had to obtain information about the current number of women and men in the Slovak Republic. We obtained this data from the Statistical Office of the Slovak Republic's website.

The chi-square test of independence is a test for nominal data. Using this test, we investigate whether the differences between empirical and theoretical frequencies are only random (variables are not dependent) or statistically significant (variables are dependent). We formulate the null and alternative hypotheses as follows:

H_0 : There are no differences (dependence) between qualitative characteristics.

H_1 : There are differences (dependence) between qualitative characteristics.

We calculate the test statistic according to the formula (2):

$$\chi^2 = \sum_{i=1}^m \sum_{j=1}^k \frac{(E_{ij} - T_{ij})^2}{T_{ij}} \quad (2)$$

Where:

χ^2 – test statistic,

m – number of rows,

k – number of columns,

E_{ij} – empirical frequencies,

T_{ij} – theoretical frequencies.

Using the CHIINV function at the significance level $\alpha = 0.05$ in Microsoft Office Excel, calculate the critical value and compare it with the test statistic. We accept the null hypothesis if the test statistic is less than the critical value. We accept the alternative hypothesis if the test statistic is greater than the critical value.

If statistical dependence is found among the examined characteristics, its strength must be determined using Cramer's V coefficient. We will use the formula for calculation (3):

$$V = \sqrt{\frac{\chi^2}{n \cdot h}} \quad (3)$$

Where:

χ^2 – test statistic,

n – number of observations (respondents),

h – interval range, calculated as $\min((m-1), (k-1))$.

The coefficient can take values in the range from 0 to 1. The closer the value is to 1, the stronger the examined dependence (Matejková et al., 2018).

In the Share test with a known constant, we assume that the proportion π is equal to the known constant π_0 . The formulation of the null and alternative hypotheses in this case is as follows:

$H_0: \pi = \pi_0$

$H_1: \pi \neq \pi_0$

The formula for calculating the test statistic (4):

$$u = \frac{p - \pi_0}{\sigma_p} \quad (4)$$

σ /sigma is calculated based on the formula (5):

$$\sigma_p = \sqrt{\frac{\pi(1-\pi)}{n-1}} \quad (5)$$

The evaluation of the test is as follows:

If $|u| < u_{1-\alpha/2}$, we do not reject H_0 .

If $|u| > u_{1-\alpha/2}$, we reject H_0 and accept H_1 (Matejková et al., 2018).

The Kolmogorov-Smirnov test is used as a test for ordinal data (measurable on an ordinal scale) and as a one-sample test. It compares empirical preferences with hypothetical or theoretical preferences. We determine the degree of agreement between the empirical and hypothetical or theoretical values corresponding to the null hypothesis. We formulate the null and alternative hypotheses as follows:

H_0 : There is no preference for the selected variable.

H_1 : There is a preference for the selected variable (Lyócsa et al., 2013).

The test statistic is calculated according to the formula (6):

$$D_{vyp} = \max[ABS(F_i - G_i)] \quad (6)$$

Where:

D_{vyp} – test statistic,

F_i – cumulative empirical frequencies,

G_i – cumulative theoretical frequencies (Matejková et al., 2018).

To calculate the critical value (significance level $\alpha = 0.05$), we apply the relation (7):

$$D_{tab} = \frac{1,36}{\sqrt{n}} \quad (7)$$

The conclusion of the test is determined by comparing the test statistic with the critical (tabulated) value. We accept the null hypothesis if the test statistic is smaller than the critical value. Otherwise, we accept the alternative hypothesis (Markechová et al., 2011).

The Two-proportion Z-test is used to conduct a hypothesis test about the difference between the proportions of two populations (Sakshi, n.d.). We can formulate the hypotheses as follows:

$H_0: \pi_1 = \pi_2$

$H_1: \pi_1 > \pi_2$ (Matejková et al., 2018).

The formula for the test statistic is (8):

$$z = \frac{p_1 - p_2}{\sqrt{p(1-p) \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \quad (8)$$

Where:

n_1 : sample size for sample proportion from population 1,

n_2 : sample size for sample proportion from population 2,

p_1 : sample proportion for population 1,

p_2 : sample proportion for population 2,

p : pooled sample proportion.

The pool sample proportion is calculated according to formula (9):

$$p = \frac{p_1n_1 - p_2n_2}{n_1 + n_2} \quad (9) \text{ (Sakshi, n.d.)}$$

We do not reject the null hypothesis if the calculated test statistic is less than the critical value. If the test statistic exceeds the critical value, we accept the alternative hypothesis (Matejková et al., 2018).

2 Results and Discussion

The behaviour of Slovak consumers is changing. They spend more time online, and due to the Covid-19 pandemic, they have been forced to adapt to the digital environment quickly. The pandemic accelerated digitalization and improved digital skills (Ležovičová, 2023). Slovaks are easily influenced by consumers. Many of their purchasing decisions are made impulsively and under the influence of emotions. The impact of digital technologies on purchasing is expected to grow in the coming years (Odkladal, 2022). In the context of these authors' statements, we interpret the results of our research.

To verify the representativeness of the sample by the gender of respondents, we used the Chi-square test of good agreement and established these hypotheses:

H₀: The sample is representative by the gender of respondents.

H₁: The sample is not representative by the gender of respondents.

Table 1: Chi-square test of good agreement

Gender	Baseline dataset	Empirical frequencies (Sample dataset)	Theoretical frequencies (Sample dataset)	(E-T) ² /T
Women	2 773 698	409	390.35	0.89
Men	2 655 094	355	373.65	0.93
Total	5 428 792	764	764	1.82

Source: own processing, 2024

Table 1 contains the calculation of the test. Based on empirical and theoretical frequencies, we calculated the test statistic, which has a value of 1.82. The critical value, determined using the CHIINV function, is 3.84. Since the test statistic is less than the critical value, we do not reject H₀, indicating that the sample is representative of the gender of respondents.

In the first part of the research, we focused on consumers' digital habits. We found that as many as 96% of respondents use the Internet and digital technologies daily, with only 1% spending less than one hour online daily. Since people today spend a significant amount of time online, we must determine whether they are aware of its impact on their consumer behaviour. It turned out that more than half of the respondents feel that the Internet and digital technologies influence their consumer behaviour (Figure 1).

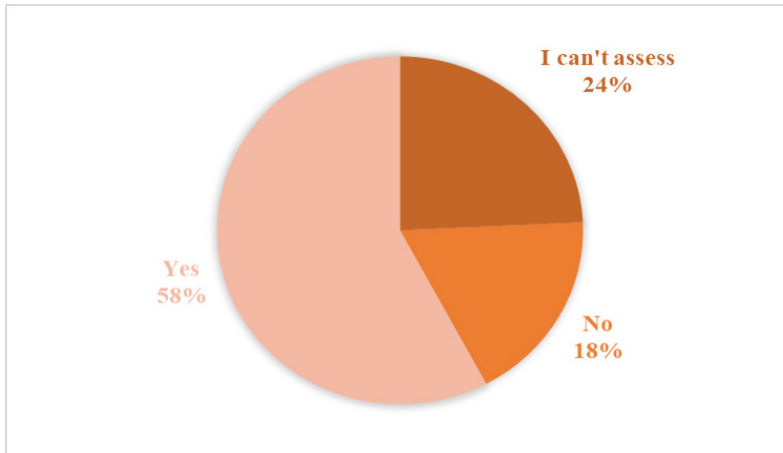


Figure 1: The influence of the internet and digital technologies on consumer behaviour
Source: own processing, 2024

We also found that browsing various websites is one of the most common online activities. We believe that for every website visitor, the most critical factor is navigating the site easily. In the first hypothesis, we verified whether a clear menu truly plays a significant role in browsing a website. The Kolmogorov-Smirnov test was used. We have established a null and alternative hypothesis:

H₀: A clear menu does not play a significant role for respondents when browsing a website.

H₁: A clear menu plays a significant role for respondents when browsing a website.

The calculation of the test statistic and the critical value is shown in Table 2.

Table 2: Kolmogorov-Smirnov test

Test statistic	>	Critical value
0.56	>	0.05

Source: own processing, 2024

The test statistic is greater than the critical value, so we accept the alternative hypothesis. The first established hypothesis has been confirmed. Respondents significantly value a clear menu when browsing a website. In Figure 2, 616 out of 764 respondents rated a clear menu as a very important component of a website.

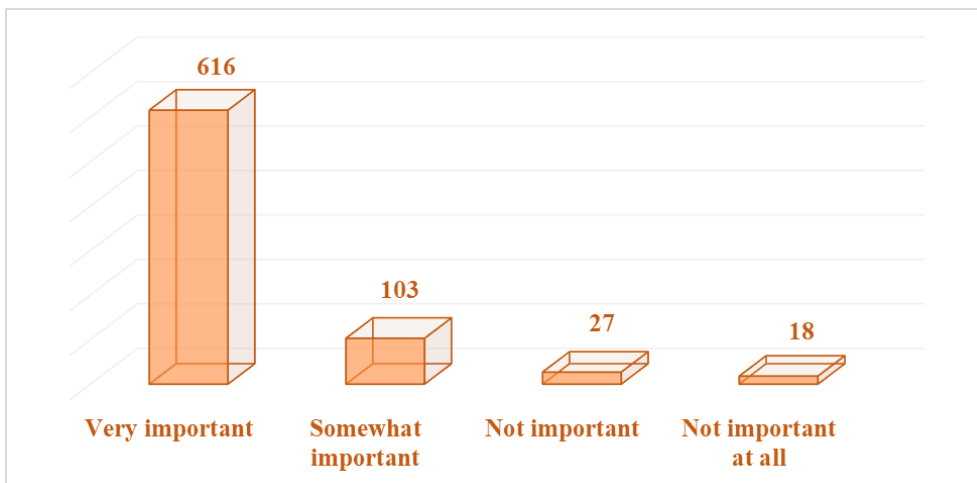


Figure 2: The importance of a clear menu as a website component
Source: own processing, 2024

In our opinion, purchasing food online is not as widespread in Slovakia as abroad. For this reason, in the second hypothesis, we assumed that only 15% of respondents purchase food online. We used the Share test with a known constant to test this hypothesis. We have established a null and alternative hypothesis:

H₀: 15% of respondents purchase food online.

H₁: 15% of respondents do not purchase food online.

The calculation of the test statistic and the critical value is in Table 3.

Table 3: The share test with known constant

Test statistic	>	Critical value
18,77	>	1.96

Source: own processing, 2024

The test statistic is greater than the critical value, so we accept the alternative hypothesis. The second established hypothesis has not been confirmed. 39% of respondents purchase food online, and 70% have had a positive experience with this type of food purchase.

Regarding online food purchasing, we also established a third hypothesis, in which we assumed that a higher proportion of women than men purchase food online. This time, we used the Two-proportion Z-test. We have established a null and alternative hypothesis:

H₀: A lower proportion of women compared to men purchase food online.

H₁: Higher proportion of women compared to men purchase food online.

The calculation of the test statistic and the critical value is in Table 4.

Table 4: Two-proportion Z-test

Test statistic	<	Critical value
-1.13	<	1.64

Source: own processing, 2024

The test statistic is smaller than the critical value, so we do not reject the null hypothesis. The third established hypothesis has not been confirmed. 37% of women and 41% of men purchase food online (Figure 3).

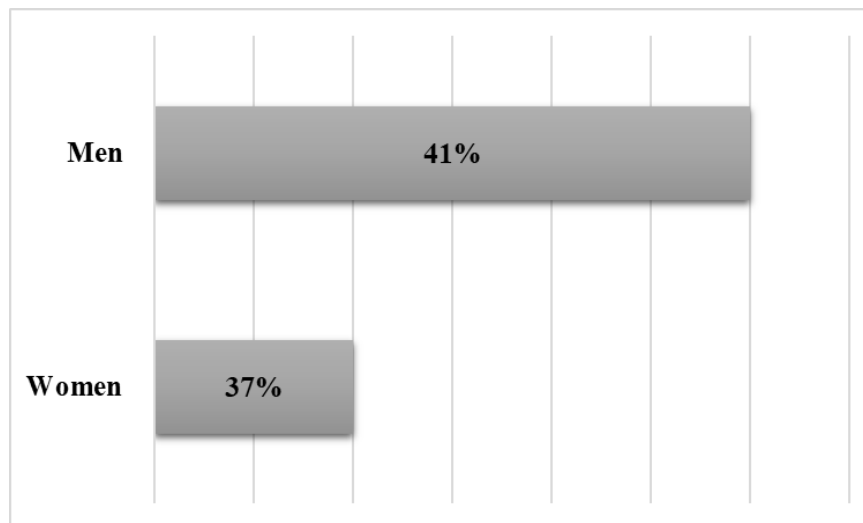


Figure 3: The proportion of men and women purchasing food online

Source: own processing, 2024

We consider product and service personalization to be an emerging priority, as modern consumers are more selective and desire a unique and customized approach. In the fourth hypothesis, we decided to verify the existence of a dependency between the respondents' age and their perception of personalization as an important digital trend in food purchasing. This hypothesis was analyzed using the Chi-square test of independence. We have established a null and alternative hypothesis:

H₀: There is no dependency between the age categories of respondents and the perception of personalization as an important digital trend.

H₁: There is a dependency between the age categories of respondents and the perception of personalization as an important digital trend.

The calculation of the test statistic and the critical value is in Table 5.

Table 5: Chi-square test of independence

Test statistic	>	Critical value
38.88	>	21.03

Source: own processing, 2024

The test statistic is greater than the critical value, so we accept the alternative hypothesis. The fourth established hypothesis has been confirmed. There is a dependency between the age group of respondents and the perception of personalization as an essential digital trend. Cramer's V coefficient was applied to measure the strength of this relationship. Its value is 0.13, indicating a very weak dependency between the examined variables.

The visual representation is shown in Figure 4. In general, we can say that digital personalization in food purchasing, which can be reflected, for example, in a mobile app by creating special offers based on the preferences of a loyal customer or previous purchases, is essential for Slovak consumers.

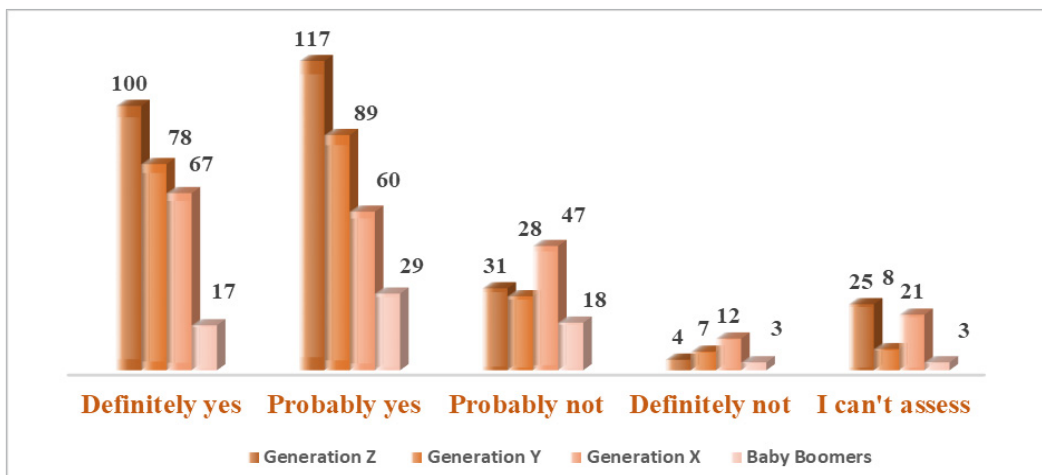


Figure 4: The importance of digital personalization in food purchasing according to the generations of respondents
Source: own processing, 2024

In the theoretical overview, we already mentioned the impact of artificial intelligence on personalization. The use of AI in the food market is genuinely diverse. In addition to streamlining personalized processes, it even creates unique food products. It has already created Coca-Cola from the year 3000 and ice cream with a bean flavor (Čiernik, 2023). Based on this fact, we asked the respondents in our research about their opinion on food creation by artificial intelligence. The results are almost evenly split. 51% of respondents have a favorable opinion about AI-created food, while 49% do not see any value in it.

A significant finding of our research is that more than half of the respondents perceive the impact of the internet and digital technologies on consumer behaviour. The influence of the Internet is also demonstrated by the digital survey Conzoomer, conducted by the agency Mark BBDO in 2018, based on a sample of 2,000 Slovak consumers. One of the key findings of this survey is that the Internet has become a decisive factor for more than a quarter of Slovak consumers when making decisions (“Digital conzoomer”, n.d.). Digital marketing influences purchasing decisions. Interestingly, the line between marketing and digital marketing is often blurred, as nowadays, every type of marketing effort incorporates some element of digital marketing (Dunakhe & Panse, 2022). Several studies show the improvement in customer experiences influenced by digital technologies and trends (Nöjd et al., 2020).

Another part of our research was focused on online food purchasing. We found that 39% of respondents have experience with this type of food purchasing. During the COVID-19 pandemic, Slovak consumers tested ordering food products online, but after its conclusion, a declining trend in online shopping in general (not just for food) was observed. This is evident from two surveys conducted by the NEUROPEA agency in collaboration with CreditCall, using a telephone format on a sample of 1,000 respondents. The first survey was conducted in August 2021, and the second in November 2023. The results show that while in 2021, 40.5% of Slovaks shopped online at least once a month, by 2023, the number had dropped to 35%. (Retail magazin.sk, 2024). Online food purchases are most common among young women, while men are 3.44% less likely to purchase food online (Dominici et al., 2021). Paradoxically, according to our research, 37% of women and 41% of men purchase food online.

Personalization is becoming increasingly important in digital marketing. Personalized products are most frequently purchased by consumers aged 19-25. Today’s customer is discerning, seeks uniqueness, and desires physical and emotional benefits from owning products that perfectly meet their needs (Saniuk et al., 2020). Findings from another study indicate that personalized services offer consumers a sense of convenience (Chen et al., 2021). AI plays a significant role in the implementation of successful digital personalization. AI tools are already enabling dynamic content customization based on customer behaviour. According to a McKinsey study, such dynamic content can increase conversions by up to 30%. But it’s not just about boosting conversions. It’s about making every customer feel the content was created specifically for them, enhancing satisfaction and long-term loyalty. A study by Forbes Insights shows that predictive personalization can increase return on investment (ROI) by up to 25%. This is because it’s not just about responding to current customer needs but about predicting their future interests. Here, AI takes on a role where marketers no longer have to react but can stay one step ahead (Strategic Marketing Consulting, 2024).

4 Conclusion

The aim of the submitted paper was to examine consumers’ digital habits and the influence of digital marketing tools on their food purchasing decisions in Slovakia in the context of rationality and irrationality in creating consumer preferences.

Our research indicated that the rise in digitalization presents fresh opportunities and challenges, making it an essential aspect of everyday living. The results also suggest that most Slovaks spend some time online each day. We observed an increased interest in digital personalization and online food purchasing among consumers compared to the past. For this reason, we recommend that food retailers focus more on digital marketing strategies than they have in the past. They should communicate with their customers in the online space and offer personalized services that make them feel special. Additionally, retailers should not hesitate to offer food products through e-shops. This step could help raise awareness about purchasing this type of food in Slovakia.

Based on all the findings, we can pose the final question: “How does today’s modern digital world affect food purchase?” Our answer is that it affects it significantly. The Internet has become a determining factor in purchasing decisions and can influence consumer behaviour. People think differently under the influence of the Internet than without it; they rely more on the information provided by digital technologies, and gradually, the way they purchase food is also changing. Today’s modern consumers are demanding and will not be satisfied if the chosen product only partially meets their requirements. They are perceptive and actively address their current needs. They seek products that satisfy them and enrich their lives, and it is the online space that enables them to find products that precisely match their expectations.

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AI IN SLOVAK JOURNALISM: A THREAT OR AN OPPORTUNITY?

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Abstract:

This study examines the role of artificial intelligence in Slovak journalism. It focuses on whether and to what extent journalists and middle management in media organizations utilize artificial intelligence tools. It also addresses the question of whether media employees perceive AI as an opportunity or rather as a threat to the future of the journalism profession. Answers to these and other questions were gathered through a survey distributed to editorial teams across all types of media – ranging from television, print, and radio to online platforms. Findings reveal cautious yet growing integration of AI, as journalists leverage its efficiency for operational tasks, but remain hesitant to employ it for creative or editorial purposes. Gender and experience-based differences highlight nuanced adoption patterns, as female journalists and mid-career professionals emerge as key adopters. The questionnaire had a broader scope, covering not only AI but also other challenges currently faced by Slovak media. The study thus offers a thought-provoking comparison of how contemporary issues are perceived in the Slovak media landscape.

Key words:

AI Adoption. Artificial Intelligence. Journalism Challenges. Media Innovation Slovak Journalism.

1 Introduction

Artificial intelligence (AI), once confined to academic research and niche technological applications, has rapidly evolved into a cornerstone of innovation across various sectors. The launch of accessible AI tools, such as ChatGPT by OpenAI in 2022, marked a significant turning point in the integration of AI technologies into everyday workflows. This transformation is particularly evident in journalism, where AI has revolutionized processes such as news gathering, editing, and distribution. By automating repetitive tasks such as transcription, data analysis, and content curation, AI allows journalists to focus on investigative reporting, creative storytelling, and strategic decision-making. However, alongside its benefits, the adoption of AI has introduced ethical, operational, and societal challenges.

Globally, the integration of AI in journalism has sparked debates on its potential to reshape news production and consumption. Persistent concerns include data and algorithmic biases, as systems trained on unrepresentative datasets risk perpetuating societal inequalities in news coverage (Jones et al., 2023; Cools & Diakopoulos, 2024). Furthermore, the lack of transparency in AI systems has raised accountability issues, particularly when AI-generated content influences public discourse. These challenges exacerbate existing concerns about declining trust in journalism, a profession already grappling with misinformation and eroding public confidence (Ali & Hassoun, 2019).

Another critical aspect of the discourse is the impact of AI on journalistic creativity and originality. While automation alleviates routine workloads, critics argue that over-reliance on AI may undermine the creative processes essential to quality journalism (Ali & Hassoun, 2019; Cools & Diakopoulos, 2024). Additionally, the introduction of AI has raised fears of job displacement, particularly in media environments with limited resources for AI training and oversight (Noain-Sánchez, 2022; Deuze & Witschge, 2018). Frey and Osborne's (2017)

study on job automation estimates that 45% of professions in the United States could become automated in the coming decades.

In Slovakia, the adoption of AI in journalism has been gradual and significantly lags behind global trends. A key milestone in this evolution was the advent of automated news writing systems, commonly referred to as *robot journalism*. In 2014, the Associated Press became the first organization to employ AI to generate corporate financial reports, signaling a new era of machine-generated content in journalism (Graefe, 2016). This breakthrough inspired similar implementations by organizations such as Reuters and *The Washington Post*. More recently, AI-driven innovations have expanded to creative applications, such as *Cosmopolitan* magazine's AI-generated cover story in July 2022 (Pavlik, 2023).

Slovak media have cautiously integrated AI into their workflows. For instance, in April 2023, *Denník N* introduced a feature allowing readers to listen to articles using neural voice technology, offering natural speech synthesis with emotional depth. Similarly, in 2024, the Slovak news channel TA3 incorporated AI-generated questions into its discussion program *Z druhej strany*. Fun rádio followed suit, integrating AI-generated music using OpenAI's Suno platform during the summer of 2024. While these innovations illustrate AI's potential, the broader landscape of AI adoption in Slovak newsrooms remains underexplored. Questions persist about the specific tasks supported by AI, its ethical implications, and whether media professionals perceive AI as a tool for enhancement or a disruptor of traditional journalism.

Despite some national data on AI adoption, insights specific to Slovak journalism remain limited. For example, the Institute for Public Affairs reports that 19% of Slovaks have direct experience with AI, yet 41% remain unaware of its existence (IVO, 2024). In the business sector, 40% of Slovak companies report using AI, with 21% planning adoption within the next year (Skačan, 2024). This study addresses these gaps, exploring the adoption and perception of AI in Slovak newsrooms. It examines the extent to which AI has been integrated into journalistic practices and aims to provide actionable insights for Slovak media and the broader global journalism community.

2 Literature Review

The conceptual foundation of artificial intelligence can be tracked back to 1955, when John McCarthy formalized the scientific principles underlying machine learning (de-Lima-Santos & Ceron, 2022). Over the decades, this transformative technology has fundamentally reshaped the ways intelligent systems are designed to perform complex human tasks. Gil de Zúñiga et al. (2024) define AI in Communication Research as the tangible capability of non-human machines or artificial entities to perform tasks, solve problems, communicate, and interact logically in ways that resemble human behavior. They argue that AI's operationalization is based on two key parameters: performance level and autonomy level. These parameters encompass actions such as performing tasks, making decisions, and generating predictions, with the degree of autonomy depending on the extent of human input, interaction, or supervision involved.

The increasing integration of artificial intelligence (AI) tools across various sectors has inevitably led to a heightened academic focus on this subject. In 2010, there were approximately 200,000 scientific articles on AI indexed in Web of Science (WoS) and Scopus; by 2021, this number had surged to 500,000. Since 2018, there has also been a continuous rise in scholarly interest in examining the role of AI in journalism, with a remarkable 2,000% increase in studies between 2014 and 2023. While much of the existing literature addresses themes such as the evolving role of journalists in the AI era, the practical applicability of AI in journalism, or public perceptions of its use, comparatively fewer studies

have focused on critical areas such as ethics, regulation, or the education of journalists in AI (Ioscote et al., 2024). From a perspective, the majority of studies originate from North America and Europe (Sonni et al., 2024).

The journalism industry has entered an era characterized by the extensive utilization of AI technologies, ranging from data collection and real-time source monitoring to data verification, large-scale data processing, and the creation of videos, infographics, or even complete articles (Gáliková Tolnaiová, 2023). AI automation has proven instrumental to journalism and investigative reporting (de-Lima-Santos & Ceron, 2022; Borchardt, 2022). On the other hand, as some have pointed out, the spread of pseudo-information and post-factual ideas has been partly driven by the emergence of AI tools that facilitate the creation of fake news, video, and the metaverse (Moon et al., 2023; Vaccari & Chadwick, 2020). Rössler et al. (2019) conducted a study demonstrating that individuals struggle to accurately identify deepfake videos, with a success rate of only approximately 50%, which is statistically equivalent to random guessing.

Generative AI platforms possess the capability to process information in a manner that appears highly human-like, which presents a potential threat to media professionals, particularly in an era of shrinking newsroom budgets and increasing pressure for economic efficiency (Pavlik, 2023; Montal & Reich, 2017). Some argue that instead of replacing journalists, AI may enable them to perform more meaningful and impactful work (Sonni et al., 2024).

Charlie Beckett, leader of the LSE JournalismAI Project, asserts that the advent of AI has fundamentally disrupted the media landscape. The project aims to map the ways in which news organizations utilize AI technologies. A survey conducted across more than 100 media organizations in 46 countries (excluding Slovakia) revealed significant disparities in the adoption of AI worldwide, particularly between small and large newsrooms as well as between countries in the Global South and Global North. The survey findings indicate that over 75% of respondents utilize AI in at least one domain of the news value chain – news gathering, production, or distribution. However, ethical concerns remain prevalent, with more than 60% of respondents expressing apprehension about the potential ethical implications of AI integration into journalistic practices (Beckett & Yaseen, 2023).

Critics, including journalists themselves, have raised numerous concerns regarding the credibility and potential biases of AI-generated content, often deeming it less reliable than articles written by human journalists (Waddell, 2018). The introduction of the first “robot journalist” by the Associated Press in 2014 immediately sparked debates, particularly regarding whether readers should be informed that the content was generated by AI or whether such information could remain undisclosed. Further questions arose regarding accountability for factual accuracy, especially in cases involving data errors (Montal & Reich, 2017). As highlighted by Sonni et al. transparency in the use of AI was demonstrated by the Associated Press, which explicitly labels AI-generated content stating: “This story was generated by Automated Insights using data from Zacks Investment Research” (2024, “Transparency and Accountability” section, para. 4).

Ethical considerations may constitute a significant barrier to the widespread adoption of AI applications in newsrooms (Al-Zoubi et al., 2024). A study conducted within the Jordanian television network Al Mamlaka identified three primary ethical challenges faced by journalists when adopting AI technologies: data bias, privacy violations, and the absence of legislation and international regulations. Regarding data bias, journalists highlighted the reliance of AI systems on datasets that may be biased or manipulated to favor specific agendas. Additionally, concerns were raised about AI’s inability to differentiate between biased and unbiased content, as well as the limited availability of non-English data compared to English-language datasets. Lutz and Tamó-Larrieux (2020) emphasize the importance of

understanding the distinction between public and private data when AI is integrated into user's social spaces. They argue that developers face critical ethical trade-offs in designing AI tools, particularly concerning the accumulation and use of private user data. The issue of accountability is critical, focusing on determining who bears responsibility for AI intrusions into user's private spaces (Sanguinetti & Palomo, 2023).

The aforementioned survey conducted by LSE further substantiates the claim that ethical concerns are one of the primary obstacles to AI adoption in newsrooms. Journalists have called for transparency measures, such as labeling AI-generated or co-generated content, yet significant ambiguity persists regarding the delineation between AI-assisted production processes that require disclosure and those that do not. Furthermore, the integration of "human" values into AI remains an unresolved issue, contributing to the complexity of developing and implementing robust ethical guidelines (Becket & Yaseen, 2023).

A study by British scholars explores whether journalists possess an adequate understanding of AI and algorithms. Based on empirical research conducted within the BBC, the findings reveal that a lack of technical knowledge significantly hinders journalists' ability to utilize AI effectively, influence its development, and adequately communicate about it to the public. These knowledge gaps may result in either excessive reliance on AI outputs or, conversely, a substantial underestimation of its potential. The study underscores the importance of targeted training programs for journalists and the development of AI tools that are both user-friendly and specifically designed to address the needs of journalistic practices (Jones et al., 2022).

The necessity for close collaboration between technological developers and editorial teams to ensure the successful implementation of AI is further emphasized in another study examining practices within two leading British media organizations, the BBC and The Times. The findings highlight the critical importance of preserving editorial values and ensuring that AI tools align with journalistic priorities. Through interviews with journalists, the study concludes that there is a strong preference for tools that enhance creativity and maintain editorial control while streamlining routine tasks. Rather than pursuing full automation, AI should be designed to complement journalistic workflows by providing relevant and actionable data that enables more informed decision-making. This reflects an inclusive approach to integrating AI into journalism (Gutierrez Lopez et al., 2023).

3 Methodology

This study explores the adoption and perception of artificial intelligence (AI) in Slovak journalism. It focuses on understanding how AI technologies are utilized, the tasks they support, and how journalists perceive AI as either a tool for enhancement or a disruptor of traditional practices. The research is guided by the following key research questions (RQ):

Research question 1 (RQ1): To what extent do Slovak journalists utilize AI tools in their work, and which specific tasks benefit from these tools?

Hypothesis 1: A majority of journalists use AI primarily for content-related tasks, such as information retrieval, transcription, and translation, which streamline their workflows.

Research question 2 (RQ2): What are the perceived benefits and challenges of integrating AI into Slovak journalism?

Hypothesis 2: While journalists recognize AI's potential to improve productivity, concerns over job security and ethical implications, such as the accuracy and reliability of AI-generated content, remain prevalent.

Primary data were collected through a national online survey conducted between June 17 and November 17, 2024. The survey targeted 75 journalists working across various capacities in Slovak news media, encompassing television, print, radio, and digital platforms. Participants were approached individually and through managerial contacts within newsrooms, ensuring representation from both national and regional media, as well as freelancers.

For sampling, journalists were defined as professionals engaged in producing, editing, or reporting original news content across various beats. In addition to general news reporters, the sample included middle-management staff such as chief editors and section leaders, allowing insights across hierarchical levels in media organizations.

The sample was diverse in terms of gender, professional roles, and experience levels. Of the respondents 61.3% were women, while 38.7% were men. The majority (76%) work for national media outlets, with 13.3% in online-only outlets without a print version, with 6.7% in regional media, 2.7% as freelancers contributing to multiple organizations and 1.3% in international media. In terms of job roles, 54.1% of respondents identified as journalists, making this the most represented position. Section leaders made up the second-largest group at 12.2%, followed by editors (10.8%), news program hosts (9.5%), and editors-in-chief (8.1%). A small portion of participants chose not to disclose their specific job roles. Regarding experience, the largest group of respondents, 41.3% reported 10 to 20 years in the media profession, followed by 24% with over 20 years of experience. Another 16% have between 5 to 10 years, 14.7% between 1 to 5 years, and 4% have less than a year of experience in journalism.

This research adopted a quantitative survey approach to collect data from a diverse sample. The survey covered topics beyond AI use, addressing broader challenges faced by journalists, such as press freedom limitations, online and offline harassment, workplace bullying, and disinformation management. Additional sensitive topics, such as workplace sexual harassment, were also addressed to capture the broader context of challenges in Slovak journalism. The inclusion of sensitive topics necessitated the use of an anonymous survey design. Anonymity was crucial to ensuring the participants felt safe to share honest responses, particularly regarding issues such as sexual harassment, which are often underreported due to stigma or fear of repercussions.

Data were analyzed using AI-based tools to identify patterns and trends across various variables, such as job roles, media sectors, and levels of experience. The AI-driven analysis included:

- **Categorization:** Grouping responses into thematic categories, such as tasks supported by AI (e.g., transcription, translation) or perceived challenges.
- **Trend Identification:** Detecting recurring patterns, such as differences in AI adoption between online-only media and traditional outlets.

While AI analysis offered efficiency and objectivity, manual verification was performed to ensure accuracy in interpreting results.

4 Results

Nearly two years after the public release of ChatGPT (November 2022), a majority of survey respondents reported minimal use of this tool in their work, with 39.2% indicating no use and 24.3% reporting almost no use, compared to 6.8% who frequently employ AI and 8.1% who use it regularly.

National data suggests that 19% of Slovaks have direct experience with AI, yet 41% remain unaware of its existence (IVO, 2024). These findings indicate that AI has yet to establish a strong presence in Slovak households, as well as in newsrooms across the country.

The data indicate specific demographic trends among respondents who reported frequent use of artificial intelligence in their journalistic work. Among respondents who frequently utilize AI tools, a slight predominance of female journalists was observed. This finding suggests a noteworthy inclination among female journalists toward leveraging AI in their professional tasks. Women in journalism appear to recognize the operational benefits of AI, particularly for automating repetitive or time-consuming activities, such as transcription translation, and data handling.

Frequent AI use is notably more common among journalists with 10 to 20 years of professional experience, positioning this group as key adopters within the media industry. These mid-career journalists exhibit a balanced approach, combining traditional journalistic techniques with the strategic integration of advanced technologies. In contrast, novice journalists (those with less than 5 years of experience) reported a lower frequency of AI use. This lower adoption rate among early-career journalists may reflect either a lesser reliance on complex editorial tasks or limited exposure to AI's full potential within their initial roles. The analysis also indicates that online-only media exhibit the highest level of artificial intelligence usage in their journalistic workflow. This trend can be attributed to the sector's focus on rapid content production and digital data processing, where AI offers significant efficiency gains and automation advantages. In contrast, traditional media outlets with national and regional reach – such as television and print – demonstrate a comparatively lower level of AI adoption. Within these organizations, AI tools are predominantly employed to support editorial processes or perform routine technical tasks rather than as primary tools for content.

The analysis also focused on the application purposes for AI usage among respondents. Our survey respondents were given predefined options for AI usage, including fact-checking, content transcription, foreign language translation, data analysis, and audience engagement enhancements. Those utilizing AI for additional purposes were invited to provide custom responses, allowing for a nuanced exploration of the breadth of AI integration in journalistic workflow. The adoption and application of AI in Slovak journalism vary significantly by job role. Although infrequent, journalists who do employ AI primarily use it for transcription and foreign language translation. These tools aid in streamlining routine tasks, such as converting audio interviews into text or translating non-Slovak sources. However, the data indicates that this usage remains limited, with only a small proportion of journalists incorporating AI regularly into these tasks. Editors and mid-level managers apply AI selectively, primarily for fact-checking and data analysis. This usage supports the editorial process by helping to verify information and process large datasets, though it remains relatively rare. Chief editors exhibit the least frequent use of AI, with a focus on content personalization and audience engagement.

The data reveals a slight gendered difference in AI application preferences. Female journalists, who constituted a larger share of frequent AI users, predominantly reported using AI for transcription, translation, and data handling, tasks typically seen as repetitive yet essential for operational efficiency. Male respondents, in contrast, more often utilized AI for fact-checking and data analysis.

Mid-career professionals, particularly those with 10 to 20 years of experience, showed higher levels of AI integration, primarily using it for data analysis and fact-checking. Conversely, journalists with less than five years of experience tended to use AI more conservatively, primarily for transcription and translation.

Online-only media outlets, driven by the demands of rapid digital content production, demonstrated the highest utilization of AI, favoring tools for data analysis, automated content customization, and, to a lesser extent, audience engagement. In contrast, traditional print, and broadcast media, particularly those with national and regional reach, showed lower levels of AI integration, using it primarily for routine tasks like transcription and translation.

Notably, tools intended for brainstorming and ideation content generation, and image creation are among the least frequently employed AI applications within the journalistic workflow. Brainstorming and ideations support through AI, while potentially valuable for generating story ideas or exploring new angles, is seldom used by respondents. This limited adoption may stem from a preference among media professionals for traditional, collaborative brainstorming methods, as well as concerns about AI's ability to produce contextually accurate and relevant ideas for complex journalistic topics. The creative process in journalism often requires nuanced understanding and insight, which journalists may feel is difficult to achieve through AI suggestions. Similarly, AI-driven content generation remains an infrequently used tool among journalists. Content generation tools, capable of producing preliminary drafts or structured article outlines, could theoretically streamline the writing process. However, the reluctance to use AI for content creation reflects ethical considerations regarding originality, authenticity, and the preservation of a unique editorial voice. Journalistic standards emphasize the importance of credibility and personal input in reporting, which may explain the hesitation to rely on AI for content that could impact narrative integrity. Image generation through AI, despite technological advancements, is also among the least utilized functions. The preference for original photography in traditional media likely plays a role in this cautious approach. Authentic, human-generated imagery holds significant value in maintaining credibility and visual integrity, and AI-generated images may not fully align with these values.

In sum, while Slovak media professionals are gradually integrating AI into certain routine editorial tasks, there remains a notable hesitancy to employ AI in creative, ideational, and content-generative functions. This selective adoption reflects a commitment to traditional journalistic practices and ethical standards, suggesting that while AI has a place in enhancing operational efficiency, its role in creative and editorially significant tasks is approached with caution, this trend indicates that traditional approaches to content creation and originality continue to hold significant weight in the professional standards upheld within Slovak journalism.

Given the innovative nature of artificial intelligence and its potential to transform traditional journalistic processes, this survey also sought to explore whether AI evokes feeling of fear or perceived threats among media professionals. The data indicate that most respondents do not view AI as an immediate threat. When asked whether AI induces feelings of fear or threat, 26.7% of respondents answered, *strongly disagree*, explicitly rejecting the idea that AI poses a risk. An additional 22.7% of respondents chose *disagree*, further supporting the conclusion that AI is generally not seen as a factor endangering their professional stability. Conversely, a segment of respondents did express concerns. A total of 8% answered *strongly agree*, indicating that they clearly perceive AI as a potential threat. Another 9.3% of respondents selected *agree*, suggesting that they feel a certain level of apprehension about the presence of AI in media. A notable portion of respondents – 33.3% – did not align themselves with either side on this question, indicating a degree of uncertainty or neutrality regarding AI. This significant group without a clear opinion reflects a cautious approach toward innovative technologies and suggests that media workers may view AI as a technological tool with an ambiguous impact that requires further experience and evaluation.

Given the comprehensive scope of our survey, we have the capacity to identify and compare several pressing challenges associated with media work. Many of these challenges were highlighted by respondents as more urgent and significant than the development of new technologies, including artificial intelligence. Among the foremost concerns are attacks on journalists by politicians, perceived as problematic by 94.7% of respondents, followed by public hostility, both online and offline, cited by 89.3%. Additionally, 80% of journalists expressed concerns about interference with journalistic independence. By comparison,

technological changes, including advancements in AI, were viewed positively by 30.6% of respondents, while an equal 30.6% perceived them as problematic.

It is essential to note that this research was conducted during a period of considerable turbulence in the Slovak media market, characterized by developments that many find troubling. Several of these are attributed to the fourth government led by Robert Fico, which took power in late October 2023. In its November 2023 report, Reporters without Borders stated that the ruling majority has attacked journalists, restricted access to information, and questioned the independence of public media. Within ten days of assuming office, Robert Fico accused public broadcaster RTVS of bias, signaling intentions to make changes in its leadership. He also sharply criticized the largest commercial broadcaster Markíza, as well as the dailies *SME* and *Denník N*, and the online news portal *Aktuality.sk*, where investigative journalist Ján Kuciak was employed before his murder. The Prime Minister labeled these outlets as “hostile media” and announced his decision to ignore their questions at press conferences. The current prime minister suggested – before and after the recent elections – that the journalists of *SME*, *Denník N*, and *Aktuality.sk*, who investigated corruption linked to Smer, should face criminal prosecution (RSF, 2023).

The non-governmental platform *Safe.Journalism.sk*, founded by the Ján Kuciak Investigative Centre (ICJK), has also highlighted an increase in attacks on journalists and media. During the first half of 2024, ICJK documented 48 incidents involving journalists, matching the number of incidents recorded over ten months in 2023 (Farská, 2024).

All the aforementioned events have contributed to Slovakia’s decline in the Press Freedom Index, dropping from 17th place in 2023 to 29th place in 2024. In this context, Reporters Without Borders (RSF) states:

After several administrations that sought to improve press freedom, the 2023 parliamentary elections brought Prime Minister Robert Fico back to power, signaling the end of efforts in this area. The instigator of Jan Kuciak’s murder in 2018 has yet to be convicted. Journalists work in hostile environment, and both public and privately owned media remain vulnerable to interests unrelated to journalism. (RSF, n.d., para. 1)

5 Discussion and Conclusion

This study reveals significant gaps in the adoption, understanding, and strategic implementation of artificial intelligence (AI) within Slovak journalism. While AI offers significant opportunities for streamlining workflows and enhancing storytelling globally, Slovak newsrooms remain underprepared to fully utilize this technology. A lack of familiarity among journalists, combined with limited training opportunities and an absence of institutional strategies, hinders AI’s transformative potential in the Slovak media landscape.

The findings reveal that many Slovak journalists are unfamiliar with AI tools. Respondents indicated minimal or no use of AI. Unlike global counterparts that are increasingly adopting AI strategies (Becker et al., 2023), Slovak newsrooms lack formalized policies to guide the adoption and integration of AI into their workflows. Current AI applications in Slovak journalism are limited to routine tasks, such as transcription and translation. Advanced uses like data-driven reporting, audience engagement, and automated content creations remain unexplored.

Education and strategy development emerge as central themes for addressing these barriers. Research underscores that AI adoption depends not only on access to technology but also on preparedness of individuals and organizations (Jones et al., 2022; Gil de Zúñiga et al., 2024). Becker et al. (2023) highlight the importance of parallel advancements in policy, training, and resource allocation to ensure sustainable AI adoption.

To address the challenges highlighted in this study, Slovak journalism must prioritize education and strategic planning to bridge the gap in AI adoption. AI literacy programs should be introduced to familiarize journalists with basic concepts of artificial intelligence, including its functionalities, applications, and limitations. This foundational knowledge will help dispel misconceptions and build confidence in integrating AI into journalistic workflow.

Newsroom leaders also have a crucial role in fostering AI adoption. They should focus on developing comprehensive strategies that align with editorial goals and long-term organizational priorities. Leaders should aim to create an environment where AI is viewed as a tool to enhance, rather than replace, journalistic creativity and integrity.

Finally, collaborative learning should be encouraged to facilitate shared expertise and resources. Partnership with AI developers, academic institutions, and global media organizations can help Slovak newsrooms access tailored solutions and benefit from international best practices. Such collaboration would not only support technical integration but also provide valuable insights into the ethical challenges and opportunities associated with AI in journalism.

Although Slovak journalism faces structural and economic challenges, including political interference and resource limitations, AI presents an opportunity to address some of these issues. For instance, tools for automating routine tasks can free journalists to focus on investigative reporting and audience engagement. AI can help Slovak media adapt to a digital-first environment, leveraging data-driven insights to create more impactful stories.

To avoid falling further behind, Slovak journalism must adopt a more initiative-taking stance.

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CHATBOTS AND CUSTOMER SERVICE: AI AS A KEY TOOL FOR CUSTOMER INTERACTION

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Abstract:

The democratisation of AI chatbot technology is transforming the manner in which organisations engage with customers and market their products. This paper examines the historical development of chatbots, tracing their origins in the mid-20th century to their current applications utilising large language models (LLM), natural language processing (NLP), and machine learning (ML). Particular emphasis is placed on no-code and low-code platforms, which facilitate the creation and training of bespoke chatbots for users without technical expertise. These tools represent a significant step in democratising technological innovation, lowering barriers to entry for companies of all sizes. Furthermore, the article emphasises the advantages of AI chatbots for personalising communications, lead generation and customer data collection. However, it also identifies potential limitations, including restricted flexibility, scaling issues and data protection concerns. The findings indicate that AI chatbots are not merely a technological advancement, but a pivotal component of a new era of marketing communications, where accessibility and efficiency are becoming paramount. The future of this technology will depend on the capacity of companies to adapt its capabilities to evolving customer expectations and market dynamics.

Key words:

AI Chatbots. Customer Support. Marketing Communication. Natural Language Processing. Personalized Communication.

1 Theoretical Background

The democratisation of AI chatbot technology is transforming the manner in which organisations engage with customers and market their products. This paper examines the historical development of chatbots, tracing their origins in the mid-20th century to their current applications utilising large language models (LLM), natural language processing (NLP), and machine learning (ML). Particular emphasis is placed on no-code and low-code platforms, which facilitate the creation and training of bespoke chatbots for users without technical expertise. These tools represent a significant step in democratising technological innovation, lowering barriers to entry for companies of all sizes. Furthermore, the article emphasises the advantages of AI chatbots for personalising communications, lead generation and customer data collection. However, it also identifies potential limitations, including restricted flexibility, scaling issues and data protection concerns. The findings indicate that AI chatbots are not merely a technological advancement, but a pivotal component of a new era of marketing communications, where accessibility and efficiency are becoming increasingly crucial factors. The future of this technology will depend on the capacity of companies to adapt its capabilities to evolving customer expectations and market dynamics.

1.1 A Historical Overview of Chatbots

The origins of chatbots can be traced back to the 1950s. In 1950, Alan Turing, a pioneering figure in the field of computing, proposed a test, now known as the Turing Test, which defined the concept of machine intelligence based on the ability to communicate. In doing so, he established the fundamental principles upon which conversational interfaces are based. The first chatbot was developed by Joseph Weizenbaum of MIT in 1966. The name he

gave it was Eliza. Brandtzaeg and Følstad elucidate that Eliza emulated the actions of a psychotherapist and responded to the user's utterances in an interrogative form. This chatbot employed a template-based response selection scheme, which involved comparing patterns (Brandtzaeg & Følstad, 2017). In 1972, the chatbot Parry was created with the objective of mimicking the behaviour of a patient suffering from schizophrenia. In 1979, it was incorporated into an experiment in which five psychiatrists, via remote transmission, investigated whether they were communicating with a genuine patient or a computer program. Another significant year was 1988, when Rollo Carpenter introduced Jabberwacky, which was capable of conducting conversations using pattern matching. It was the inaugural chatbot to utilise artificial intelligence ("Jabberwacky", n.d.). Subsequently, in 1995, Richard Wallace devised ALICE, a chatbot that employed natural language processing technologies (Wallace, 2009). The advent of SmarterChild in 2001 saw the introduction of interactive bots to platforms such as AOL Instant Messenger and MSN (Molnár & Szüts, 2018). Contemporary artificial intelligence chatbots combine advanced large language models (LLMs) with natural language processing (NLP), machine learning (ML), and deep learning technologies. These technological advances have gradually transformed chatbots from simple simulators to sophisticated tools capable of engaging in natural and meaningful conversations.

1.2 Chatbots vs. Conversational AI – Key Differences

It is important to distinguish between chatbots and conversational artificial intelligence (AI), as they are closely related concepts but should not be confused. The two concepts have only partial overlap. The term *conversational AI* is an umbrella designation that encompasses a range of AI-powered applications, including chatbots, virtual assistants, generative AI tools, and other systems that facilitate natural human-technology interaction. In contrast, chatbots represent a more specific category of tools and are not necessarily based on artificial intelligence. A significant proportion of chatbots are rule-based. Each such chatbot is programmed with a set of defined rules that enable it to respond to a predefined set of questions. The rules are constructed based on the identification of keywords or phrases within the text. The responses provided by these chatbots are contingent upon the specific words or phrases that are included in the user's query. The chatbots' fundamental limitation is their lack of flexibility. In the event that the user's question does not contain the requisite keywords or does not fall within the boundaries of the predefined rules, the chatbot is unable to provide an adequate answer. In such cases, it often resorts to generic responses such as "Sorry, I don't understand".

In contrast to rule-based chatbots, AI chatbots are equipped with sophisticated technologies, including deep learning, natural language processing (NLP) and machine learning. These technologies permit the analysis of the context of communication and the prediction of user intent, enabling the generation of responses that are contextually relevant and tailored to specific needs. This markedly enhances the quality and fluidity of the interaction, rendering AI chatbots an efficacious instrument in more intricate customer scenarios. The distinction between the two categories of chatbots illustrates the pivotal role of the technological foundation in determining the capabilities and potential applications of these tools in diverse contexts.

2 The Rise of Chatbots

Notwithstanding the aforementioned constraints, rule-based chatbots can prove to be highly efficacious and beneficial, particularly in the context of customer support. This is due to the fact that the Pareto Principle, which states that the majority of customer queries can be classified into a relatively small set of repetitive categories, is applicable in this context.

The majority of customer queries can be classified as belonging to a relatively small set of categories, which support centres are typically well-versed in. This enables the identification of the basic set of questions in different variations, thus facilitating the development of highly reliable chatbots. Furthermore, customer satisfaction can be enhanced by integrating the option to contact a live operator into the system, either on demand or automatically in case of misunderstanding of a question.

Nevertheless, this will not prevent the gradual decline of traditional webchat with human agents, as AI chatbots represent a technological innovation that is fundamentally changing the way customer service is delivered. The integration of machine learning and natural language processing enables chatbots to automate routine tasks and personalise communication, thereby further increasing efficiency (Kedi et al., 2024). These advanced solutions facilitate a near-total or even total reduction in staffing costs in support centres, which has a significant impact on the economics of operations.

3 The Utilisation of Chatbots in Marketing Practice

Chatbots have a wide range of applications, particularly in the fields of education, business, e-commerce and healthcare (Shawar & Atwell, 2007). Furthermore, they are becoming an integral component of contemporary marketing strategies. In addition to the aforementioned improvements in customer communication and support, they also play a pivotal role in optimising business processes. Their ability to handle multiple interactions simultaneously enhances scalability and reduces the necessity for additional human operators as demand increases (Khneyzer et al., 2024).

The integration of machine learning and natural language processing enables chatbots to automate routine tasks and personalise interactions, thereby increasing efficiency (Kedi et al., 2024). Furthermore, chatbots serve as a valuable tool for collecting data on customer behaviour and preferences, allowing companies to better tailor their strategies and increase the effectiveness of marketing activities. The benefits of AI chatbots and the possibilities of their use can be summarised as follows:

- **Personalised communication:** Chatbots provide responses that are precisely tailored to the needs of the customer, thereby improving the quality of the interaction.
- **Lead generation:** They efficiently collect customer contact details and preferences for subsequent use in marketing campaigns.
- **Data Collection and Analysis:** They collect data on customer behaviour, thereby enabling more effective campaign targeting and personalisation.
- **Continuous availability:** Chatbots are available 24/7, thereby enhancing the customer experience and guaranteeing immediate responses.
- **Increased efficiency:** They reduce wait times and expedite responses to customer inquiries.
- **Scalability:** They are capable of seamlessly handling an increasing number of requests without any additional cost.
- **Cost-effectiveness:** The automation of routine tasks enables the reduction of operational costs, thereby freeing up capacity for strategic activities.

4 The Development of AI Chatbots

The development of an AI chatbot is a complex and multidisciplinary process, comprising a series of interrelated phases. These range from the initial design stage, through to deployment and the subsequent maintenance phase. Each of these steps is essential to the development of a tool that is not only capable of understanding user questions but also of providing answers that are both relevant and accurate.

4.1 The Development Process

The process entails the implementation of sophisticated technologies, including natural language processing (NLP) and machine learning, with a particular focus on the integration of robust security measures to safeguard data. However, in addition to technical expertise, the development of chatbots also requires strategic planning, a profound comprehension of user requirements, and meticulous testing in authentic contexts. This is the sole means of guaranteeing that a chatbot not only fulfils expectations but also offers tangible value to the organisation. Zhang et al. (2020) delineate the following principal phases of development:

1. Design and comprehension of the user background

It is crucial for a chatbot to comprehend the needs and expectations of its target audience in order to communicate effectively and provide pertinent information.

2. The development of relational capacity

It is essential that a chatbot is capable of establishing connections with users through the utilisation of natural language, recognising and responding to their emotional states and requirements.

3. Construction of compelling conversational capacity

A chatbot should be capable of engaging in compelling and effective conversations that motivate users to undertake desired actions, such as modifying their health behaviours.

4. Evaluation mechanisms and outcomes

Following deployment, it is essential to conduct regular evaluations of the chatbot's performance and effectiveness. This should include monitoring user satisfaction, the success of interactions, and the achievement of pre-defined goals.

4.2 Low-code and no-code development

The advancement of AI chatbots has now reached a stage where their development is becoming accessible to a more technically knowledgeable public. While the initial development of AI chatbots necessitated a high level of expertise in artificial intelligence and programming, contemporary platforms have emerged that markedly streamline the process. Modern tools such as Google Dialogflow, Facebook Wit.AI, Chatfuel, Botsify and the like operate on the principle of “no-code” or “low-code”. The intuitive interfaces of these platforms facilitate the creation of AI chatbots by individuals without in-depth technical expertise. Users can train their chatbots on their own data, enabling the development of sophisticated responses tailored to their specific needs. This process guarantees that the chatbot provides accurate and pertinent responses, constrained by the limits of the information provided. This shift can be likened to the revolution in web development that occurred after 2000 with the advent of content management systems (CMS) such as WordPress and Joomla. Just as CMSs have enabled ordinary users to create websites without programming knowledge, modern chatbot creation tools bring a similar democratisation of technology. In this context, the different phases of development can be modified against the above sequence as follows:

1. defining the purpose and use scenario;
2. preparation of training data;
3. setting up a conversational structure;
4. branding;
5. testing and debugging;
6. deployment and monitoring;
7. ongoing updates and developments.

Defining the purpose and use scenario

At the outset of the process, it is of paramount importance to explicitly delineate the intended purpose of the chatbot. This may encompass customer support, responding to frequently asked questions, generating leads, or facilitating online purchases. During this initial phase, the creator determines the fundamental functionality and identifies the data or communication type that the chatbot will require.

Preparation of training data

The creator collates and organises the data that will serve as the source of information for the chatbot. This data may include frequently asked questions (FAQs), text documents, manuals, links to websites, or any other company-specific data. The objective is to guarantee that the chatbot responds accurately and relevantly, while being constrained to the scope of the information provided.

The setting up a conversational structure

The user-friendly interface allows the creator to design the conversational flows. These tools typically allow for a visual representation of the communication flow, whereby the creator determines how the chatbot responds to specific questions and what subsequent steps to offer the user.

Branding

Branding involves adjusting the tone of communication to match the values and communication style of the brand, as well as incorporating design elements such as a logo, colours or graphics. According to Galera Matúšová (2021), branding serves to increase brand recognition and credibility while promoting consistent brand communication across all channels. In the case of context, we also consider chatbot to be such a channel, through which the customer communicates with the brand in a much more direct way than through other channels. The chatbot is such a channel, so it is important that it is designed in line with the brand identity.

Testing and debugging

Prior to its release, the chatbot is subjected to rigorous testing to identify any potential issues and refine its responses. This process may entail simulating user queries, verifying the accuracy of its responses and assessing its conversational flow. This phase is of paramount importance to guarantee that the chatbot will communicate effectively and provide accurate information.

Deployment and monitoring

Following a successful testing phase, the chatbot is deployed to the selected communication channels (website, app, social networks). Once deployed, its performance is continuously monitored, with metrics such as user engagement rates, response success rates and feedback being tracked. Based on this data, the chatbot is further optimised.

Ongoing updates and developments

Once deployed, it is important to update the chatbot regularly, for example by adding new information or expanding functionality based on changes in customer or market needs. This cycle of iterative development ensures that the chatbot remains relevant and effective.

5 No-code, Low-code Limitations

The advent of “no-code” and “low-code” tools has brought about a paradigm shift in the development of simple AI chatbots, particularly due to their intuitive interfaces that facilitate rapid deployment without the necessity for programming expertise. The cost of these advantages is the limitation to the creation of single-architecture applications, precluding significant customisation. These platforms also encounter limitations with more advanced projects that require a high degree of customisation or integration with external systems. As Daniel et al. (2020) notes, the lack of flexibility can impede the development of a chatbot when the needs of the operating company change.

Lack of flexibility and customisation options

“No-code” and “low-code” platforms provide preconfigured templates and components that are optimised for straightforward and expeditious deployment. However, these solutions frequently encounter limitations when it comes to the creation of AI chatbots with distinctive or highly specific features. While visual tools eliminate the necessity for intricate programming, they can prove less efficacious when integrating with extensive APIs or implementing sophisticated technology solutions.

The limitations of advanced AI functions

No-code and low-code platforms are effective for developing basic chatbots that can respond to frequently asked questions, facilitate appointment booking, provide basic product information, or offer straightforward customer support. However, when implementing more advanced features, such as integrating custom machine models or natural language processing (NLP) technologies, these platforms encounter limitations. Such tasks necessitate intricate configuration and specialized settings that are beyond the scope of these tools.

Complicated for beginners

Despite the plethora of supplementary materials available for no-code and low-code platforms, novice users may encounter difficulties in navigating the vast array of features. A lack of comprehension regarding the steps necessary to achieve the desired outcome can result in prolonged work and complications when creating more intricate conversation flows. These challenges can impede the efficacy of development, particularly when the objective is to create sophisticated and contextually rich interactions.

Scaling and extensibility issues

The scalability of “no-code” and “low-code” platforms is often constrained. As the number of users or the complexity of the application increases, technical issues such as lower system performance or complications in maintenance and further development may arise. Consequently, these tools are less suitable for long-term projects that require continuous expansion of functionalities and high scalability.

6 Conclusion

The development of AI chatbots represents one of the most significant trends in customer communication and marketing. Having originated as experimental technologies, chatbots have evolved into sophisticated AI-based tools that are fundamentally changing the way companies interact with customers. The democratisation of this technology has enabled users or entities without a technical background to create interactive solutions, thereby expanding chatbots from a narrow environment of technology experts to practical tools

available to small businesses and global corporations alike. A notable consequence will be a shift in customer expectations. As reliable AI chatbots become a regular part of customer service, customers will gradually become accustomed to the availability and instant response that these tools provide 24/7. This change is reminiscent of developments in e-commerce, where next-day delivery has become the new norm, although it was once common to wait several weeks for ordered goods. Similarly, customer expectations of quality and availability of support are rising today. Companies that fail to keep up risk losing their competitive edge.

Concurrently, this transformation is engendering novel opportunities for marketing communications, including the possibility of personalised communications as a standard feature. By leveraging AI chatbots, businesses can simultaneously engage with existing customers in a cost-effective and efficient manner, while simultaneously reaching new target audiences, generating leads, and analysing user behaviour. Concurrently, there are obstacles to be overcome, including the constraints of no-code and low-code platforms, the necessity to guarantee data protection, and issues pertaining to scalability. An equally pivotal question remains how to effectively combine ease of use with the capacity to implement sophisticated features. The future of AI chatbots is contingent upon the continuous development of their capabilities, enabling them to respond to increasingly demanding customer needs. Success in this domain will depend not only on the technology itself, but also on the ability to adapt it to the specific needs of the market. Companies that can adapt to growing customer expectations will gain a significant competitive advantage and advance the boundaries of traditional customer communication.

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ARTIFICIAL INTELLIGENCE IN JOURNALISTIC PRODUCTION – THREAT OR CHALLENGE

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Abstract

The paper presents specifics in the use of GPT-4o as a journalistic content creator in the concept of trends and challenges of modern journalism. In study, we conduct a probe whose main purpose is to assess the capabilities of GPT-4o in generating adequate television news headlines, which we validate by involving a random group of mass media studies students. This group distinguishes, categorizes, and evaluates the adequacy of different types of news headlines – those created by editorial staff, human authors, and artificial intelligence. At the same time, in the next research part, the present research group distinguishes which headlines are created by editorial staff and which are created by GPT-4o, justifying its choice by defining certain features and characteristics. In the context of the contemporary discourse on the replacement of human authors, journalists by artificial intelligence, this study sets out to investigate whether the generative AI – chatbot ChatGPT-4o can produce adequate and practically usable news headlines based on the established criteria – neutrality, factuality, analyticity or tabloidisation, with the intention of grasping the broader context of the focus of each news item. The focus and results of this study offer a deeper insight into the potential of AI as a creator of journalistic content and its ability to adhere to professional standards in news reporting. The paper builds on the established concept of exploring the use of AI in contemporary journalism discussed in a previous study (see, Nagyová & Hudíková, 2023).

Key words:

Artificial Intelligence vs. Human. ChatGPT-4o in the Newsroom. Modern Journalism. News Headlines. Television News.

1 Introduction

Artificial intelligence (AI) is a branch of computer science whose main goal is to create intelligent machines with the capabilities to perform tasks that normally require human intelligence. AI tools, like humans, can learn from experience and improve their performance over time without being explicitly programmed (Dhiman, 2023). Their rapid development innovates and optimizes systematic processes in different areas of society (science, technology, marketing, media etc.). In particular, AI has made significant advances in machine learning, natural language processing, computer vision, and robotics. However, in addition to the fascination with AI, there is also an intense “flow” through society of discussion about concerns about job losses, the replacement of human performance by machine performance, etc. (Dhiman, 2023; Jones et al., 2022).¹ Machine learning is a key component of artificial intelligence and involves the use of algorithms that allow AI to learn from data without being constantly manually programmed.² It relies on computational models “trained” on real-world data that mimic human intelligence by transforming inputs into outputs based on mathematical relationships that are difficult to derive through deductive reasoning or simple statistical

¹ Authors’ note: Productivity gains of a few percentage points have been compared to labour market disruption, with Goldman Sachs estimating that generative AI could automate around 300 million of today’s jobs in the next few years. Already, initiatives such as TeachAI, the World Economic Forum, Code.org, UNESCO, and leading leaders and experts in artificial intelligence are reflecting on the indicated trend by integrating AI and computer science learning into educational processes to ensure the next generation is prepared for the impending changes in the job market (Rayner, 2023).

² Authors’ note: This is so-called deep learning, based on a model of the human nervous system. “Machine intelligence” uses artificial neural networks to analyze large amounts of data (Likeš, 2022).

analysis (Klās & Vollmer, 2018, in Dierickx et al., 2024). In media, AI tools are mainly applied in the processes of data acquisition, processing and analysis, but also in fact-checking or in personalization and interactive content creation.³ In the implementation of these activities, so-called generative platforms are prominently used – transforming media content by rapidly creating, generating text-based answers based on machine learning and access to the Internet (Pavlik, 2023). Many of the prestigious news organizations have adopted AI tools to perform various tasks.⁴ In addition to systematizing and facilitating work processes, journalists also use it in the actual creation of content, especially as inspiration in the creative process, because of AI’s ability to comprehensively assess the needs of the audience and create attractive media products, such as headlines for journalistic texts. Therefore, the aim of this paper is to investigate whether a popular generative AI tool, ChatGPT-4o, can create relevant (attractive, informative and introductory) and practically usable news headlines based on facts about the topic of a news story. The research dataset is the headlines of the main newscasts of the public broadcaster STVR and commercial TV JOJ and TV Markíza, as well as the headlines generated by the ChatGPT-4o chatbot. Through several variations of the prompts, in the empirical part of the paper we investigate its abilities to generate neutral, analytical (evaluative) and tabloid headlines, whose adequacy is verified based on expert knowledge about news headlines, and also by means of an exploratory probe. We conduct this testing using data – obtained from a group of mass media communication students who distinguish, categorize, and evaluate the adequacy of news headlines generated by TV news editors (human writers) and AI. In the paper, we also justify the various categorizations and interpret the correspondences and differences between the headlines of AI and TV newsrooms.

2 Artificial Intelligence Entering the World of Journalism

Automated writing through AI programs is a growing trend in journalism. One of the benefits of using AI in content creation is speed. Automated writing programs can generate complex articles in seconds or minutes, which is useful specifically for newsrooms that need to publish information quickly. AI algorithms can also create, analyse, and synthesize large-scale content (difficult for “human writers” to process), providing insights that editors might struggle to uncover. AI can also help with fact-checking and ensuring that articles do not contain significant grammatical or stylistic errors. However, automated content creation also brings challenges (Jones et al., 2022). A creative human approach is needed here e.g. when entering prompts, evaluating ethics or spelling, etc. Dierickx et al. (2024) base their assessment of data quality and pre-processing in machine learning on the three core principles of ethical journalism – accuracy, fairness and transparency – to reduce the generation and dissemination of data with errors, ensure consistent labelling of data, and better integrate journalistic knowledge. Thus, by applying the above criteria, it is possible to effectively collaborate with artificial intelligence, which extends human capabilities and creates a new form of “augmented journalism” (Lindén, 2020). The aforementioned processes increase the speed, accuracy, and “depth” of reporting, while improving the detection of hidden patterns and trends in event data

³ Authors’ note: Editorial offices also use AI in many other cases: translating texts, transcribing from audio to text and vice versa, generating headlines, tags or complex social media posts, analysing subscriber data, predicting behaviour, for audience segmentation, etc. (Struhárik, 2023).

⁴ Authors’ note: For example, AP has been using automated tools to generate text since 2015 (reports on companies’ economic results), the Czech agency ČTK in 2018 and the daily *SME* in 2020 started generating reports on election results, and many other media transformed structured data into simple texts, e.g. on weather, traffic, sports, etc. The Swedish media group NTM uses AI to generate news about the traffic situation (in 2021, articles by NTM’s most successful reporter had a readership of 4.9 million, with generated texts up to 9.4 million) (Struhárik, 2023).

(Truman, 2019, in Dierickx et al., 2024).⁵ Augmented reporting can also involve the use of virtual or augmented reality technologies, for example, to create interactive experiences for readers or viewers. Such methods can help to make even complex or abstract news concepts attractive and understandable and provide viewers or users with “experiential information” (infotainment).⁶

2.1 AI as a Journalistic Content Creator

AI tools are increasingly being used by newsrooms, especially when processing simple or data-driven data. They can create a piece of content, or even a complex news story, from imported data, or from pre-built templates. Importing high quality data therefore becomes essential here to avoid inaccurate analysis and unreliable decisions (Gupta et al., 2021). Based on the principle of “garbage in, garbage out” (generally applicable in data and computer science), machine learning requires high quality “input information” to ensure or increase the accuracy and reliability of the generated reports (Anderson, 2018; Dörr & Hollbuchner, 2017; Lowrey et al., 2019, in Dierickx et al., 2024). Until last year, AI failed to comprehensively grasp the sources of information, understand the nuances of language and culture, and recognize and incorporate the ethical or legal aspects inherent in journalism. In our previous research “Artificial Intelligence as a Creator of Journalistic Content” (Nagyová & Hudíková, 2023), our analysis of AI-generated texts (ChatGPT-3) highlighted the lack of adherence to journalistic standards, particularly factual accuracy of information and stylistic correctness in generated press releases. The results of the study showed that ChatGPT-3 generated tendentious content in which it permanently edited the wording and stylistics of statements. This in several cases caused a change in the meaning of the information in the generated texts, the news (Nagyová & Hudíková, 2023). However, nowadays, continuous “training and teaching” of generative AI have improved its outputs – besides the accuracy and correctness of the information, the ability to grasp the context of the input data and to further enrich the imported data with insights or other interpretations. Advances in AI promise even more advanced and automated data import solutions (Mašlanka, 2024).⁷

Current generative AI recognizes the (broader) context of the message, evaluates the specifics of the target audience, adds information from its own database, and its own interpretation. This brings creative and informative possibilities also in the creation of journalistic headlines. According to Tušer (2009), the headline is one of the most expressive cues of media expression. Since it is an essential part of a report or article, a generative AI program can greatly assist the editorial staff in their creation. Given relevant prompts, e.g.,

⁵ Authors’ note: For example, in reporting, this can help journalists identify new perspectives or sources of information and thus provide the public with clearer and more objective reporting. Natural language processing technology allows text to be rigorously analysed to provide journalists or researchers with insight into the sentiment, tone and context of the language used in a news article or report. This method allows for a better understanding of the audience’s attitudes and opinions and to tailor the (news) content to make it more engaging and relevant (Dhiman, 2023).

⁶ Authors’ note: In the context of these considerations, it is necessary to reflect on whether it is relevant to intensify the “experientiality” of news content and serious journalism in general, insofar as these aspects are characteristic of journalism. Thus, the tendencies that have been set up are expanding the trend of emotional reporting – which is opinionated, tabloid (dramatic, sensational, negative, etc.) and ultimately opinion-forming or even manipulative (see, e.g., Bourdieu, 2002; Ramonet, 2003; Haagerup, 2017; McCombs, 2009).

⁷ Authors’ note: In the future, dedicated AI models will be able to independently determine what data is needed and how to acquire and process it. Such a universal “importer” will only need to be configured appropriately, and the rest – how to retrieve the data and process it – will be created without human intervention (writing source code). AI algorithms will figure out how to get the required data from a given source, validate it, fill in any incomplete or incorrect data, and return it in the target format. With the development of machine learning techniques, AI systems will become increasingly intelligent and fully adaptive, allowing companies to efficiently extract and use data from almost any source (Mašlanka, 2024).

ChatGPT, Bard and LLaMA, Bloom, and others can generate an unlimited number of draft news headlines that can serve journalists as inspiration or prototype. They can also better understand audience attitudes and opinions and tailor (news) content and its headlines to be relevant and engaging in content and form (Struhárik, 2023).

3 Headlines of News Content

Headlines – contact folders, or also media alerts, are an integral part of journalism, as they play a crucial role in the process of selection and reception of information by readers. Their “ability” to captivate and motivate the recipient to read an article, or watch a TV report or digital content, is a prerequisite for effective information retention. Headlines also play a key role in how the audience is to perceive the complex content of the message (Tušer, 2009). Ruß-Mohl and Bačíková (2005) point out that readers consume or pay much more attention to headlines than to the media texts⁸ themselves, which has a major impact on the way they are conceived.⁹ In terms of subdivision and characterization of different types of headlines according to their genre application, Tušer (2009) distinguishes headlines into news and journalistic headlines – analytical (rational type, evaluative), fiction (emotional type, evaluative), as well as headlines that are used in specialized texts. A news headline is primarily intended to inform, with the secondary functions of engaging, orienting and updating (Findra, 2004). These are so-called neutral, factual headlines – they clearly and accurately convey the essence of the news, and do not express any attitude or evaluation. They do not contain emotive words or suggest how the message should be perceived by the recipient. A neutral, factual news headline reports the facts and leaves the reader to form his or her own opinion (Čurík, 2014). The nature of news headlines is, or should be, related to the thematic focus of the news, but this is disappearing in the current media struggle for attention, and hence news headlines are moving away from the informative and introductory function, much like journalistic ones. The attention-grabbing function of the headline is coming to the fore, and the informative function is sometimes even completely absent (Psárová, 2017).¹⁰ Therefore, to increase the interest in a story or reportage, e.g. evaluative (analytical) and tabloid headlines are used. Evaluative, analytical headlines often contain “opinion pieces” through which the medium, the editorial staff, indicates to the recipients its position on a given topic. An analytic headline follows a deeper analysis and focuses on a particular aspect – the impact on a smaller part of the whole (or timeframe) (Tušer, 2009). These headlines “promise” the reader a more detailed discussion of the topic and its broader context. They hint at “how” or “why” questions and often prompt the reader to think about the broader implications and contexts.¹¹

Contemporary news headlines, however, are more oriented to attract attention than to acquaint the recipient with the content, which is why they are often made up of emotional elements – e.g. negative, dramatic or sensational expressions, in the form of metaphors and other expressive expressions. This is a kind of trivialisation of serious journalism, emphasising the engaging conveyance of content, or even its tabloidisation (Klimeš, 2015, in Psárová,

⁸ Authors’ note: Especially in the current digital era, when social media overwhelms us with a variety of content, each carrying a caption – whether directly in a thumbnail image, a video or in the description of a post.

⁹ Authors’ note: Donsbach explains that in the first stage of deciding to continue the “consumption process”, the presence of familiar names and words, for example, is crucial for the audience, while interest in the whole content decreases with political thematic focus (Donsbach, 2005).

¹⁰ Authors’ note: The authors Lincényi & Kohutár (2009), Matthews (2023) and Postman (2010) talk about the tabloid thematization of contemporary news, which is also related to the form of its headlines.

¹¹ Authors’ note: According to Dor (2003), the functions of the headline can be reduced to one proxy, universal one. Thus, the role of any headline (tabloid and serious, composite and simple, news and journalistic, etc.) is to attract the recipient and to facilitate his or her choice of the content that the headline is trying to imply.

2017).¹² Thus, the author, the editorial staff can (through phraseologisms, metaphors, figurative names, winged expressions – characteristic of a given socio-cultural area) express any opinion on the presented topic (Kendra, 2008).¹³ Emotionally colored headlines can direct the audience to interpret the message, how to perceive the topic, the content of the paper, etc. (Mousoulidou et al., 2024).¹⁴ Creating compelling and meaningfully relevant headlines requires a sensitive journalistic approach that challenges generative AI – as a potential substitute for human authors. In the empirical part of this study, we therefore investigate ChatGPT-4o's ability to create newsworthy and audience-engaging post headlines – applying basic news headline criteria, with an emphasis on capturing the context and meaning of the news, as well as correctly categorizing headlines as news-“neutral”, evaluative, or analytical and tabloid-oriented.

4 Methodology

The aim of the scientific paper is to expand the knowledge about the characteristics and possibilities of using generative artificial intelligence, a language model, in journalistic practice. Through probing, we test the capabilities of ChatGPT-4o in the context of captioning television news stories in Slovakia. The research material is television news headlines, which we chose because of their important function in the perceptual process – attracting attention, motivating viewers to continue watching, introducing them to the topic of the story and “setting” their perception of its content (see more in subsection “Headlines of news content”).¹⁵ Based on the stated goal and object of investigation, we formulate two main research questions:

1. Can the generative artificial intelligence produce news headlines that meet the standards of neutrality, analyticity and tabloidisation, and are thus usable in practice?
2. What differences and characteristics distinguish news headlines created by human authors from those generated by ChatGPT-4o, and to what extent are these differences apparent to students of mass media communication?

These questions capture the key objectives of the study – to explore AI's ability to generate high-quality and professional headlines and to identify potential differences between AI-generated and human-authored headlines. The answers to the research questions are not explicitly stated, but indirectly interpreted in the “Results” and “Conclusion” chapters.

The research dataset is TV news headlines from public STVR and commercial TV JOJ and TV Markíza and their alternatives generated by ChatGPT-4o. The headlines were selected based on their representation of different journalistic styles and genres in order to test the variability of AI in producing the desired content. This is a random selection of news stories and their headlines from the broadcast weeks of 15-21 July and 2-24 September 2024.

In the online application of the chatbot ChatGPT-4o, basic information about news headlines, including their functions and distribution, categorization, were generated. Subsequently, the engine further defined the different types of news headlines – analytical

¹² Authors' note: Thus, the attention of viewers of news content is captured, and cognitive perception is shaped, by emotional elements. These include, for example, linguistic-compositional specifics, which, according to Psárová (2017), often border on the ungrammatical in contemporary news coverage (use of slang, colloquial words, etc.).

¹³ Authors' note: Proper understanding of such headlines requires a certain intellectual maturity on the part of the recipients. Thus, when implementing them in news content, authors should take into account the recipients' insight into the topic depicted and their knowledge of the vocabulary associated with it (Minářová, 2011).

¹⁴ Authors' note: Such indirect shaping of opinions and understandings of reality is dangerous and unethical, especially in the news media, which is seen as a credible source of information about a relatively authentic reality.

¹⁵ Authors' note: In an attempt to demonstrate the use of the AI language model in news reporting, the objects of investigation are headlines: analytical (evaluative), neutral (factual), and tabloidizing. We justify the given choice by the fact that these are the most frequently used categories of news headlines, the production of which requires a sensitive journalistic approach to properly capture linguistic and socio-cultural nuances.

(evaluative), neutral and tabloid. In the next step, headlines are generated by ChatGPT-4o for these through variations of prompts, which are textual transcripts of the content of individual news stories. The aim is to obtain a suitable sample of headlines in different forms (news-neutral, factual; analytical/evaluative and tabloidising). In this process, in a minimal amount (for each answer max 2 times) we used the possibility of so-called upgrading or improving the answer, and also in a minimal amount we applied a prompt to add additional information, or a command to add some direction to the answer. In about only three cases out of the total number (about eighty generated captions) did we “command” the program to adjust its stylistics, which involved the incorrectness of one or two expressions in a given caption. However, on several occasions we used the prompt to shorten the generated caption to make it more suitable for television news, which does not require extensive text teasers (since the introduction to the stories consists mainly of audio presenter and editorial announcements).

After obtaining the research data, we randomly assigned a survey sample consisting of 48 mass media communication students who evaluated selected headlines produced by TV newsrooms and generated by ChatGPT-4o based on categorization and subsequent interpretation of their subjective selections. In the first section of testing, the students categorized a set of headlines consisting of a randomly ordered set of 24 – news neutral headlines; analytical headlines; and tabloid headlines. The headlines were selected from the headlines broadcast by TV JOJ – 6 headlines (2 neutral, 2 analytical and 2 tabloid); the headlines of TV Markíza and STVR were selected in the same way. The list also included 6 headlines produced by ChatGPT-4o – 2 neutral, 2 analytical and 2 tabloid. In the second part, the students independently selected the 2 headlines they thought were the most relevant from each category and argued their subjective choice.

In the second task, the research group had to distinguish whether the headlines were created by human authors or AI, and then, using the selected 2x2 examples, again justify their choice and identify any distinguishing features. In this part of the survey, participants judged headlines from a given set of 18 (6 neutral, 6 analytical and 6 tabloid) headlines that did not match the headlines from the previous assignment. 9 of them were created by the news staff of TV Markíza, TV JOJ and STVR – one headline from each category (neutral, analytical, tabloid). The sample was completed by headlines created by ChatGPT-4o – to balance the sample ChatGPT-4o created 3 headlines from each category (neutral, analytical, tabloid) – 9 headlines in total. From the randomly ordered headlines, students were asked to determine which were created by humans and which were created by artificial intelligence. They then again chose two headlines each (2 created by the editors and 2 by GTP-4o) and justified their choice.

Data from the assessment in question are evaluated quantitatively – descriptive analysis of the frequency or percentage of assessments. For the first assignment – how many headlines produced by ChatGPT-4o were categorized correctly and how many were categorized incorrectly by the students. We choose a qualitative approach when interpreting the rationales for individual student selections. The goal is to identify potential differences in headline quality and recognizability between human-generated and AI-generated headlines, and to verify that ChatGPT-4o can produce appropriate news headlines.

5 Results and Discussion

The analysis, synthesis, comparison and generalization of the individual responses of the survey group, which consisted of 48 students of mass media communication (33 females and 15 males) aged 19 – 26 years of different educational backgrounds and journalistic experience, showed the following results.¹⁶

In the first assignment, students judged 24 headlines, 18 of which were created by TV newsrooms and 6 by ChatGPT-4o. We multiplied the selected headlines x 48, as each student evaluated each headline separately (i.e., 48 students commented on each headline separately).

In the first category – “Analytical, evaluative headlines” (8 headlines in total, 6 of which were created by human authors and 2 by Chat GPT-4o) we present the following evaluations.

Table 1: Categorization of analytical, evaluative headlines (TV newsrooms + GPT-4o)

Author		Correctly classified	Incorrect together	N-neut.	N-analyt.	N-bulv.	I can't judge
STVR	Curious motorway toll	19	27	3	-	24	2
STVR	SVLS: Audit of charges will not help patients	28	20	18	-	2	0
MARK	In America it was the worst	21	26	2	-	24	1
MARK	The catastrophic situation in the Gaza Strip	17	31	9	-	22	0
JOJ	Heated parliamentary debate	18	30	12	-	18	0
JOJ	Proper old underfloor heating	16	25	11	-	14	7
GPT-4o	Slovakia tops Europe: Almost half of the poor can't afford meat	30	18	8	-	10	0
GPT-4o	Freight train accident in Bratislava: Driver failed to control the braking distance, damage unknown	17	31	27	-	4	0
	Total	166	208	90	0	118	10

Source: own processing, 2024¹⁷

In terms of the statistics of the frequency of correct classifications, we report that a comprehensive categorization of the analytical headlines produced by TV newsrooms and ChatGPT-4o resulted in a total of 374 responses (with 10 cases where students were unable to judge the headline) – 166 (44.39%) correct and 208 (55.61%) incorrect classifications. Thus, there were 42 incorrect answers which were 11.22% more than the correct answers. In evaluating and categorizing the synthetic and editorial analysis headlines, we conclude that the nature and wording of these headlines were not sufficiently clear, identifiable to our audience. In most cases of miscategorized editorial headlines, these were labeled as tabloidizing.

Looking at the lowest and the highest success rate of rankings, it is interesting to note that in both cases these were headlines generated by ChatGPT-4o. As many as 31 incorrect classifications had the headline: “Freight train accident in Bratislava: Driver failed to brake, damage unknown”, which the research group identified as more of a neutral. As part of the justification for their choice, they mentioned e.g. – absence of expressive words; sufficient information saturation without the need for additional text; factualness; no hint of evaluation. We could agree with most of the arguments, but the fundamental fact is that the headline evaluates, analyses the situation, and it is in the expression: “the driver failed to master

¹⁶ Authors' note: We have always selected the 2 most frequently used headlines as examples – this procedure of giving examples is followed in every analysis and interpretation of the same assignment.

¹⁷ Explanatory notes: N-neutr. – headline incorrectly classified as neutral; N-analyt. – headline incorrectly classified as analytical; N-bulv. – headline incorrectly classified as tabloid.

the braking path” (opinion presented on the competence of the driver). Paradoxically, the headline generated by GPT – “Slovakia at the top of Europe” – also had the highest classification success rate (30 correct answers). Students argued this choice, e.g. that the headline assesses the current situation in Slovakia in relation to the rest of Europe; it suggests the implications of the report that almost half of the poor cannot afford a meat meal, etc.

5.1 Resolution of Editorial Analytical Headlines vs. ChatGPT-4o Generated Headlines

By separately assessing the categorization of **editorial analysis headlines** (6 headlines in total), we report that these were categorized correctly in 199 cases (55.59%) and were determined incorrectly in 159 cases (44.41%). Thus, there were 40 more cases (11.17%) of correct classifications of editorial analysis headlines than incorrect ones. This finding shows that editorial headlines (STVR, TV JOJ and TV Markíza) were relatively well distinguishable for the survey group.

In a separate evaluation of the categorization of **synthetic analytic headlines** (ChatGPT-4o), we report that the correct resolution and classification of headlines here was in 47 cases (48.96%) and incorrect in 49 cases (51.04%). Thus, there were 2 cases (2.08%) more (of the total 96 cases) of incorrect inclusion. From the above finding, it can be concluded that synthetic headlines of ChatGPT-4o were harder for the survey group to distinguish, however, only at a low numerical and percentage level. Thus, overall, the categorization of (human) editorial analysis headlines was more successful than synthetic (AI-generated) ones. Overall, however, both editorial and GPT-4o analytic headlines were relatively indistinguishable to the audience.

If we look at the types of headlines that students selected as sample analytical headlines – for editorial, they listed and justified the following: “SVLS: Fee audit won’t help patients” – headline chosen as exemplar 7 times (evaluation: includes an assessment; offers a viewpoint; focuses on a specific part of the topic; analyses and looks deeper at why the audit won’t help patients). 5 times each, students chose the following as sample editorial analysis headlines: “The curious highway charge” (explanation – presence of an adjective evaluating the situation), the “Heated parliamentary debate” (does not suggest direct content, rather introduces – clickbait; contains an evaluative term – heated). Also, the headline created by GPT-4o was selected by students as exemplary in 7 cases: “Slovakia at the top of Europe: Almost half of the poor cannot afford meat food” (rationale for selection – suggests that the article will carry deeper and more detailed information about the situation and assesses the current situation in Slovakia, suggests, assesses the consequences).

In another of the surveyed categories – **bulwarizing headlines**, the survey group again had to categorize a set of 8 headlines (of which 6 were created by TV newsrooms and 2 by Chat GPT-4o):

Table 2: Categorisation of tabloid headlines (TV newsrooms + GPT-4o)

Author		Correctly classified	Incorrect together	N-neut.	N-analyt.	N-bulv.	I can’t judge
STVR	Who tries hard, in Copenhagen will get fed up	34	9	4	5	-	5
STVR	London seeks reset in relations with the Union	5	41	21	20	-	2
MARK	With one hand they added, with the other they took away	36	11	4	7	-	1
MARK	Secrets of the Lemur Empire	7	39	32	7	-	2
JOJ	Global IT collapse “licked” Slovakia too	27	20	8	12	-	1
JOJ	Fashion Olympics?	28	19	6	13	-	1

GPT-4o	Trump, with his ear shot off, triumphantly dominated the Republican convention	28	19	4	15	-	1
GPT-4o	School panic: Bomb threats scare thousands of pupils	30	17	5	12	-	1
	Total	195	175	84	91	0	14

Source: own processing, 2024¹⁸

Of the total number of classifications of editorial and synthetic headlines = 370 (in 14 cases students could not judge the headlines), 195 = 52.7% were correct classifications, which is 20 (5.41%) more than the number of incorrect classifications, which was 175 = 47.3%. Thus, students were able to correctly judge the majority of the content under study – the tabloid headlines (man-made and GPT-4o). We also report that distinguishing the categories of synthetic and editorial tabloid headlines was more successful than distinguishing evaluative headlines.

A look at the lowest and highest success rates of inclusion – up to 36 correct answers were for the headline of TV Markíza – “With one hand they added, with the other they took away”, which students also justified their choice e.g. in the following way: metaphor; forces further viewing; stimulates curiosity; does not contain a lot of info; figurative naming; lacks factuality. The STVR headline – “London seeks reset in relations with the Union” had the lowest inclusion success rate (only 5 correct and 41 incorrect). Students considered this headline to be more analytical (20 cases), which they justified by, for example: it evaluates the topic of the article in more detail, interprets a particular aspect of... or as neutral (21 cases) – it gives information in a concise and factual way; it is neutral.

5.2 Resolution of Editorial Tabloid Headlines vs. ChatGPT-4o Generated Headlines

Next, we present a separate assessment of the categorization of **editorial tabloid headlines** (6 headlines in total), which were categorized in the ratio of 137 (49.64%) correct classifications and 139 (50.36%) incorrect classifications (out of a total of 276 editorial tabloid headlines assessed, while 12 headlines were not assessed by the students because they were unable to assess them). Thus, there were 2 more cases of incorrect classifications of editorial tabloid headlines (excluding GPT-4o headlines) (0.72%) than correct classifications.

In a separate analysis, by evaluating the categorization of **ChatGPT-4o’s tabloid headlines** (2 headlines and 96 responses in total), we report that these headlines were correctly categorized in 58 cases (29.74%) and incorrectly categorized in 36 cases (20.57%) – out of a total of 94 evaluations (while in 2 cases the headlines could not be judged). Thus, the number of correctly categorized entries is 22 (23.4%) more cases, which means that synthetically generated tabloidizing headlines were quite distinguishable to the survey group. We also add that it was these synthetic headlines that were more easily identifiable to the survey group than those generated by human authors – suggesting a good ability of this generative AI to generate appropriate tabloidizing headlines.

Looking at the types of headlines that students selected as sample tabloid headlines, the following were chosen from the GPT-4o production: “Trump, with his ear shot off, triumphantly dominates the Republican convention” – chosen a total of 7 times (explanation for choice – emotionally tinged, tries to evoke emotion; dynamically and expressively stylized + contains the expressive word ‘triumphant’; presence of emotional elements – dramatic, negative expressions. The second most frequently chosen tabloid headline by GPT-4o was this one: “Panic at schools: bomb threats terrified thousands of pupils” – chosen 12 times

¹⁸ Explanatory notes: N-neutr. – headline incorrectly classified as neutral; N-analyt. – headline incorrectly classified as analytical; N-bulv. – headline incorrectly classified as tabloid

(explanation for choice – appropriate headline, it is eye-catching; emphasises dramatic and emotional aspects of the situation; contains words such as ‘panic’, ‘terrified’; attempts to evoke shock and fear by focusing on negative and disturbing details of the event). Of the editorial headlines, the ones most frequently chosen by students as exemplary were: “Who tries, in Copenhagen gets fed up” – marked 11 times (explanation – use of rhyme; draws attention but does not give much information; emotionally coloured; contains metaphor). “One hand added, one hand taken away” – selected 10 times (frequent justification – does not contain information; forces to follow the next part of the post; metaphor; figurative naming; headline is not factual).

The third of the categories studied is – **neutral, factual headlines**. Within this category, the research group had to “sort” a set of 8 headlines (TV newsrooms – 6 headlines GPT-4o – 2 headlines).

Table 3: Categorisation of neutral, factual headlines (TV newsrooms + GPT-4o)

Author		Correctly classified	Incorrect together	N-neut.	N-analyt.	N-bulv.	I can't judge
STVR	Extraordinary meeting on the amendment of the Penal Codes	36	10	-	9	1	2
STVR	Green Households project launched	42	5	-	5	0	1
MARK	Households to start receiving green vouchers	37	10	-	10	0	1
MARK	Púchov has a new swimming pool	44	4	-	1	3	0
JOJ	Inflation at three-year low	33	14	-	13	1	1
JOJ	Trump talked about assassination, expects victory	19	27	-	19	8	2
GPT-4o	Voles overpopulation destroys crops: Farmers blame mild winter and politics	14	31	-	26	5	3
GPT-4o	Infectious disease wards are full, new outbreaks are added	26	22	-	19	3	0
	Total	251	123	0	102	21	10

Source: own processing, 2024¹⁹

Of the total responses = 374 in the categorization of editorial and synthetic neutral headlines (with 10 not assessed because students could not classify them), 251 (67.11%) were correctly categorized and only 123 (32.89%) were incorrectly categorized, or 128 fewer (34.22%). Thus, the differentiation and categorization of news, neutral headlines was the most successful when compared to the previous assessment of evaluative and tabloid headlines.

Within this categorisation, the headline of TV Markíza – “Púchov has a new swimming pool” – had the highest success rate (up to 44 correct classifications), the choice of which was justified by the participants of the survey, for example, as follows: emotionally unsymptomatic; without evaluative and expressive words; only gives information; factually, concisely informs about the new swimming pool; answers the questions of where and what, no symptomatic words or evaluative judgements. The headline generated by GPT-4o – “Voles overpopulation destroys crops: Farmers blame mild winter and politics” – had the lowest success rate of correct classification (only 14 correct and 31 incorrect classifications). 26 students considered this headline to be more analytical, evaluative – which they justified, e.g., by analysing what causes voles to overpopulate; the headline is more extended than factual – in addition to raising the main topic, it offers the opinion of a stakeholder; it includes an evaluation.

¹⁹ Explanatory notes: N-neutr. – headline incorrectly classified as neutral; N-analyt. – headline incorrectly classified as analytical; N-bulv. – headline incorrectly classified as tabloid

5.3 Resolution of Editorial Neutral Headlines vs. ChatGPT-4o Generated Headlines

Next, we provide a separate assessment of the categorization of **editorial neutral headlines** (6 headlines in total), which were categorized with a ratio of 211 (56.42%) correct classifications (out of a total of 374) and 70 (18.72%) incorrect responses. Thus, the instances of correct classifications of editorial neutral headlines (excluding GPT-4o headlines) were almost half – 50.18% (141) – more than the instances of incorrect classifications. Thus, these headlines were sufficiently identifiable to the survey group, were of a relatively clearly definable nature, and, in comparison to the other categories (analytical and tabloid) were the most distinguishable to the survey group.

In a separate analysis, evaluating the categorization of the **ChatGPT-4o** neutral headlines (2 headlines – 96 responses in total, with 3 headlines that students could not evaluate), we report that these headlines were correctly categorized in 40 cases (43.01%) – out of a total of 93 synthetic neutral headlines, and incorrectly categorized in 53 cases (56.99%). Interpreting these findings, we report that learners were more successful in categorizing editorial headlines compared to those created by artificial intelligence.

Looking at the types of headlines that students selected as sample neutral headlines, the following was chosen from the GPT-4o production – “Overpopulation of voles destroys crops: Farmers blame mild winter and politics” – chosen a total of 4 times (rationale – neutral words, not emotionally tinged in any way and is factual; only reports the information). Of the editorially neutral, factual headlines, the following were chosen most often by students as a model – “Púchov has a new swimming pool” – listed 26 times (explanation – no emotion, just a fact about what happened; emotionally unattributed; no evaluative or emotional words, just reporting information; factually and concisely reports on the new swimming pool, answering questions about where and what, no attributive words or value judgments).

5.4 Resolution and Categorization of Headlines Created by ChatGPT-4o and Human Authors

Survey participants were asked to identify whether the headlines were created by human authors (TV editors) or artificial intelligence (ChatGPT-4o). A set of 18 headlines was used in the survey, which was evenly split between headlines created by TV editors (9 headlines) and headlines created by GPT-4o (9 headlines). Each of the three categories of headlines – neutral/secondary, analytical/evaluative, and tabloid – was represented by three headlines from both types of authorship (TV newsrooms and GPT-4o). This methodological procedure aimed to investigate the extent to which the creator of the headlines could be distinguished.

Table 4: Categorisation of headlines created by TV editorial offices (STVR , TV Markíza and TV JOJ)

Author		Correct intended	Incorrectly determined	I can't judge
JOJ	The President dismissed two members of the Judicial Council of the Slovak Republic – neut.	38	9	1
JOJ	Marches without problems – analyte.	14	16	8
JOJ	Remembrance of the old “golden” times – bulv.	28	18	2
STVR	In Catalonia a bus overturned – neut.	32	12	4
STVR	SVLS: Audit of charges will not help patients – analyst.	38	8	2
STVR	Don't forget me in car – bulv.	19	23	6
MARK	Assassination through the eyes of a news photographer – bulv.	26	21	1

MARK	Tourists were not deterred by the fee – analyt.	31	12	5
MARK	One week until the start of the Olympic Games – neut.	23	22	3
	Total	249	141	32

Source: own processing, 2024²⁰

Table 5: Categorization of headlines created by ChatGPT-4o

Author		Correct intended	Incorrect intended	I can't judge
GPT-4o	The new law didn't work: Bear culling is skyrocketing – analyst.	17	31	0
GPT-4o	Housing prices are rising, construction is stagnant: Demand is increasing, supply is lagging behind – analyt.	35	13	0
GPT-4o	Russia expels six British diplomats over spying – analytica.	19	28	1
GPT-4o	The SD vote will support the removal of Šimečka from the post of deputy chairman of the National Assembly – neut.	8	39	1
GPT-4o	New rules for parental pensions: 2% of children's taxes will replace state contributions – neut.	20	28	0
GPT-4o	The 79th session of the UN General Assembly opens in New York, with military conflicts – neut.	19	25	4
GPT-4o	Critical floods in Záhorie: Cities under water, disaster looms! – bulv.	26	21	1
GPT-4o	Treasury in crisis: finance minister warns, coalition argues about savings! – bulv.	24	22	2
GPT-4o	Cultural strike in Slovakia: Artists demand the resignation of the Minister! – bulv.	18	30	0
	Total	186	237	9

Source: own processing, 2024²¹

The results showed that students were able to correctly categorize (all editorial and synthetic) headlines together at a rate of **53.13% correct** (612 correct answers) and **43.92%** (506) incorrect (out of a total of 854). In **2.95%**, or 34 cases, they could not judge the headlines (both editorial and synthetic). The data above show that the student survey group correctly understood and identified the author of the greater half of the material surveyed.

Based on the provided data, it is possible to analyse whether the headlines generated by human authors are more distinguishable from those generated by GPT-4o. Key indicators are the proportion of correctly classified headlines and the occurrence of incorrect answers or indecision (“can’t judge”).

In a separate evaluation, we report that **human-generated headlines** are correctly ranked at a higher rate 249 (29.16%) than **GPT-4o-generated headlines** – 186 (21.78%). Thus, the incorrect classification of headlines is higher for GPT-4o (237 – 27.75%) compared to editorial headlines (141 – 16.51%) out of a total of 854, indicating that the test participants labelled the AI-generated headlines as human-generated. Paradoxically, however, the response

²⁰ Explanatory notes: neut. – neutral headline; analyt. – analytical headline; bulv. – tabloid headline

²¹ Explanatory notes: neut. – neutral headline; analyt. – analytical headline; bulv. – tabloid headline

“can’t judge” was more frequent for TV newsroom headlines (32) than for GPT-4o headlines (9). Thus, headlines generated by human authors were better identifiable than headlines generated by GPT-4o. The difference in correctness suggests that GPT-4o headlines are less distinguishable from human headlines, causing more misclassifications.

Test participants then evaluated and identified any differences between headlines by human authors and those created by AI to show how accurately these types of authorship can be distinguished. Students selected two headlines that they considered to be created **by AI** (GPT-4o) and justified their decision, and they also selected two headlines that they believed to be from human authors, also justifying their selection. Along with the explanations, we list the ones that occurred the most: “Housing prices are rising, construction is stagnant: demand is increasing, supply is lagging” – 11 times (the most common rationale for the choice – complicated and uninvolved – an editor would not write it that way; many verbs that are also similar; unclear). “Treasury in crisis: finance minister warns, coalition is arguing about savings!” – 8 times (explanation – the verbiage and phrase “treasury” doesn’t sound natural; GPT tends to give colons; the headline is too long and not very original/engaging; the phrase “is arguing” is not writerly and appropriate).

Regarding the “sample” headlines that students selected as **man-made**, the following (we give 2 examples + justifications for the ones that students marked most often): “In Catalonia, a bus overturned” – 5 times (justifications – vapid headline – GPT wouldn’t create one; simple factual headline; just informs about what happened and where). “President recalled two members of the Judicial Council” – 5 times (explanations – clear, factually presented, we know what the article is about; informative and accurate; classic news headlines, factual, concise, that I normally see on TV; headline makes sense is grammatically and stylistically correct written).

In terms of the specifics of each type of headlines, we present comparisons across categorizations:

- a) **neutral/external headlines**: editorial – high accuracy (e.g., “In Catalonia a bus overturned” – 32 correct) vs. GPT-4o – lower accuracy (“Housing prices are rising, construction is stagnant” – 35 correct). Neutral headlines can be harder to identify because their language is often factual and can be similar to both types of “writers”. Participants had a relatively high success rate in recognizing human neutral captions, however, the GPT-4o generated captions that were not easily distinguishable;
- b) **analytical/evaluation headlines**: higher accuracy in editorial headlines, e.g., “SVLS: Audit of charges will not help patients” – 38 correct; GPT-4o – lower accuracy (e.g., “New rules for parental pensions” – 20 correct). Analytical headlines may be better recognised as they require contextual understanding and critical evaluation. For analytic titles, participants were more likely to correctly identify “human authorship”, possibly due to the more specific vocabulary and evaluative nature;
- c) **bulwarizing headlines**: may be more easily identified if GPT-4o generates less dramatic or less biased wording. Editorial headline e.g., “Don’t forget me in the car” (19 correct); GPT-4o: “Treasury in crisis: Finance minister warns” (24 correct). GPT-4o headlines were fairly well identifiable in this category, probably due to specific stylistics, expressive elements, etc.

Neutral headlines had the highest error rate for authorship identification, especially when it came to GPT-4o. Analytical headlines were better identified within editorial headlines, and tabloid GPT-4o headlines could be classified fairly well by students. Overall – GPT-4o can generate headlines that are difficult to distinguish from human ones, which is important for the discussion about its use in the media, especially in serious journalism. The high rate of incorrect responses for GPT-4o headlines suggests that they can be as persuasive as headlines produced

by professionals, which has implications for the credibility and perception of news content. These results suggest the need for further research to improve people's ability to recognize automatically generated content, which is crucial in an era of increasing use of AI in journalism.

6 Conclusion

The results suggest that Chat GPT-4o can generate headlines that are comparable to those of human authors. However, differences in categorization accuracy showed that it is problematic to unambiguously distinguish the authorship of headlines, which may indicate a high degree of adaptation of AI to journalistic standards. The investigation also revealed that AI occasionally deviates from brevity and clarity (in the context of television captioning). These findings point to the need for its further optimization for the purpose of news content creation.

The findings support the idea that AI can effectively contribute to the generation of news headlines, with GPT-4o proving to be particularly successful in generating tabloid-style headlines. The study also highlights the need for further development of AI tools and their ethical implementation to minimise the risk of manipulation and loss of journalistic standards. Although AI can simulate human production, its outputs should be subjected to rigorous scrutiny to ensure that journalism maintains public trust and professional integrity.

The paper presents partial insights into the possibilities and limitations of using artificial intelligence in journalism. The research suggests the potential of GPT-4o Chat as a tool for generating news headlines, but the authors also emphasize the need for a critical approach to its use. The findings give rise to a discussion about the future of AI in the media and its role in maintaining ethical standards and journalistic integrity. We see sense in the growing consensus that artificial intelligence will augment human performance rather than replace it entirely. Only information gathering and simple decision-making are likely to be fully automated, and AI will largely not affect "leadership skills" or imagination, sensitivity, etc. Dhiman (2023), along with other authors and experts on the use of AI (Šebo, 2024; Pavlik, 2023; Mašlanka, 2024; or Likeš, 2022), add to our assumptions that robots and AI will complement – rather than replace – human journalists (e.g., to perform more routine tasks, etc.), which should give them more scope for the complex and nuanced aspects of news reporting.

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PARTICIPATIVE CULTURE IN AI MODELS: CASE STUDY OF STABLE DIFFUSION

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Abstract:

Until recently, participatory culture was an area that was mainly manifested in media products, fandom products and, logically, in culture. However, with the advent of AI models, especially text-to-image, this statement is no longer valid. Of all the models for generating imagery, the best example is Stability AI's Stable Diffusion, which, unlike others, is open-source. This means that it is possible to train custom datasets in each base model to generate only specific content. These datasets are created and trained by users, who then aggregate them on selected platforms, where they make their creations available for other users to work with, try out, and share their images. They evaluate each other, advise each other on how they arrived at a given result, etc. Effectively creating a participatory culture based on knowledge and experience sharing. Given this characteristic, it is possible to produce creative and imaginative products, but the result can also be harmful content, e.g. not suitable for minors or for sensitive audiences, such as sexually explicit content or violent and gore content. In this article I try to cover as many aspects of participatory culture in AI models as possible, with detailed consideration of Stable Diffusion and its positive and negative attributes.

Key words:

AI. Participation. Participative Culture. Stability AI. Stable Diffusion. Text-to-image Models.

1 Introduction

Participatory culture is not a new concept that needs a long introduction. It is based on the premise of ordinary people participating in the creation of something new, not only taking into account their opinions and preferences, but giving them real power to decide and create on the basis of their consciousness and conscience. In this way, people become not only observers of changes in culture, but change-makers themselves. Jenkins, in one of his groundbreaking works on participatory culture, states:

A participatory culture is a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one's creations, and some type of informal mentorship whereby what is known by the most experienced is passed along to novices. (Jenkins et al., 2009, p. 3)

Delwiche and Henderson (2013) argue that participatory culture changes the world through the collective classifying, organizing, and building of information. A few years back, I addressed the issue of participatory culture in community media, which is an essential building block of these media (Škripcová, 2017). The principle of participation has proven to be key in their functioning, but years of societal development have shown that participation is now present almost everywhere. It is therefore not surprising that it has also become a part in the implementation of AI models in our everyday lives, although to a different extent than it would seem at first glance.

The gradual popularisation of AI among ordinary users has not been a surprise, mainly due to its ease of use through a chat user interface that resembles normal online communication. However, I have noticed an interesting fact that I want to share with you – the participatory culture in AI models, specifically looking at the area of generating visual

material – graphics, images and more.¹ This is because in AI generation, this is one of the areas that is heavily subject to the dataset on which a particular AI has been trained (along with AIs focused on video creation), and is thus more specific than text-to-text. Let me explain. The most popular AI models at the moment are probably ChatGPT from Open AI, Gemini (formerly Bard) from Google, Copilot from Microsoft, and several other companies that offer similar functionality in their AI models. In text-to-image models, some of the strongest players in the market include Adobe, which has incorporated AI into its flagship Photoshop and Lightroom, but has also created a few more specific services, such as Firefly. In the early days of image generation, other notable players included Open AI’s Dall·E and MidJourney, which ran on the Discord server. Almost all of the above belong to large corporations or have gradually become corporations themselves. I have deliberately not mentioned the AI model that is the focus of this article – Stable Diffusion by Stability AI – until this point. Unlike most of those mentioned above, this model is precisely based on a participatory culture, as it is open source. Of course, this carries with it both positives and negatives and potential risks, but we’ll get to those later.

2 Stable Diffusion

Text-to-image generation works on a similar principle to any other text-to-text level. It assumes what the user might want to see as a result, based on a given prompt (text input/command of what the AI should do). The result is therefore imagery that is based on the generic dataset that the model has been trained on, applying filters to prevent inappropriate or dangerous content. However, since the image dataset in closed-source AI models is generic or too broad, the result is generic images that may not show what the user wanted. Such a process is fast, user-friendly and based on a simple user interface that the user is already familiar with, mostly in the form of an AI chat interface. User-friendliness and simplicity are generally qualities that popular AI models possess. Ultimately, if they were difficult to use, they would be very difficult to monetize through subscription.

Stable Diffusion, which is the subject of this article, works on a different principle. The open-source model is just a certain, let’s call it, interface or technology that allows to work on the output in several levels. In addition to positive prompts (what the model should do), it also works with: negative prompts (what should not be in the image), checkpoint (the specific dataset the model is trained on), LoRA (the rendering of details such as fingers, face, etc.), VAE (depth of rendering and color work), poses (what body pose the figure should be in, given the natural anatomy of the body), embedding (level of realism and style), and many more². And it is at this point that we come to our issue of participatory culture. All of the above are created by users who share them on with other users. Stable Diffusion in this case plays the role of just a kind of “path” or logic of language model that tells how these categories are interconnected with each other (and what the model is capable of). Stability AI releases base models, which we could simplistically describe as the technology on which Stable Diffusion, or its various versions, runs (the most popular ones would be SD 1.5, SD XL 1.0, Stable Cascade, and others). However, it does not interfere with users’ content and thus provides a space for the development of participatory culture and knowledge. However, let me also mention the fact that, unlike other text-to-image AI models, Stable Diffusion is more challenging to install and use. It is not enough for a user to just enter a web page and start typing a prompt. The process to get to that point requires a certain level of computer

¹ Author’s note: I deliberately don’t use the term “photographs” as I feel that these are explicitly just content that reflects reality captured via the camera, not a text-to-image generated image via AI.

² Author’s note: For the sake of simplicity of the issues in media studies, I am simplifying many of the above and trying not to go into technical details that would take the text from media studies to computer science.

knowledge and a willingness to study resources on how to work with this area. One could argue whether this process and consequently the user interface (whether the classic A1111 or the currently popular ComfyUI) is deliberately made complex, but the important point is that it “discourages” ordinary users who are looking for simple solutions and easy generation. Although this probably sounds like a negative at first hearing, the opposite is true. It ensures that anyone without knowledge will not be able to access the model. At the same time, since unlike other AI models, Stable Diffusion does not use the company’s server to generate, but generates directly on the user’s computer via a graphics card, the service is free for users.

3 Participative Culture

As I wrote above, almost all model types and checkpoints in base models are created by users (the base model is the technology, the others are the content that runs on top of the technology). In practice, the way this works is that a user trains his own e.g. checkpoint and then makes it available to other users on various forums or websites that act as aggregators of such content. Other users download and interact with this content, rate it, add their own generated content along with instructions on how they generated it, etc. They thus create a certain knowledge base and understanding through their own participation, improve others’ models and much more. Of course, as is natural in human nature, shared models exhibit different interests, preferences, visual cues, etc. Along with models that are trained, for example, to realistically depict people, animals, architecture, and natural scenery, there are models that are trained to create episodic animated characters, manga, and anime. Of course, there are also models available with explicit sexual content or that are trained to depict various fetishes or sexual preferences. For example, in a search of the all-time most popular checkpoints on the CivitAI web aggregator for the SD 1.5 model, 10 of the 10 most popular checkpoints have the ability to generate explicit sexual content (as a secondary intent of the dataset) or have been directly trained to do so. For the newer SDXL Turbo model, this is 6 out of 10 checkpoints (CivitAI, n.d.). But I will also add that most checkpoints are trained on a huge datasets, and the naked human body is thus a natural part of it, among other things to “learn” the anatomy. Combined with LoRa and other settings, it is therefore safe to say that almost any model can generate explicit content, even if its primary intention is something else.

Participatory culture in this case helps with the development of the AI model in question, or pushes the possibilities of generation through new checkpoints, LoRAs, etc. Also interesting is the concept from authors Li and Pang, who say that participation changes from a human-community concept to a human-community-machine concept due to the influence of AI, as AI significantly enters into the creation of fandom outputs (Li & Pang, 2024), thus taking participatory culture to a new level.

4 Positives and Negatives

The positives and opportunities of image generation are many. With the development of technology, a new stream of art, creativity and design has emerged, which is generated with the help of AI models, which some authors call co-creativity (Davis, 2021; Rezwana & Maher, 2023; Muller et al., 2023). The use in marketing communication and advertising is unquestionable, as it makes the creation of visual material faster and easier, and with that reduces its cost, but it can also be used as in the educational process of designers (Derevyanko & Zalevska, 2023) or architects (Mirra & Pugnale, 2022). In the field of photography, it helps with the creative process, as photographers can test whether a given photographic vision will work at all before taking the picture, or they can model the light beforehand (Škripcová, 2023). In the learning process, it can help students develop creativity and imagination

(Dehouche, & Dehouche, 2023; Vrabec & Zubková, 2023). More than enough positives could be found. Moreover, in our particular case of Stable Diffusion, they are all based on a participatory culture in which users help each other, share their creations and learn from each other. However, I think enough has already been described about the positives and uses of AI models, so I will turn to the other side, which is the negatives and threats.

Of course, generating imagery that is as “free” as Stable Diffusion carries some risks. Stability AI’s documentation for using Stable Diffusion says: “You can’t use the model to deliberately produce nor share illegal or harmful outputs or content” (Patil et al., 2022, “License” section, para. 3). Given the open-source nature of the model, compliance with these rules is rather questionable. Of course, the question is equally what we can consider harmful content. For more proficient users, it is not a problem to create a LoRA that is trained to portray specific people or personalities, which in itself is not dangerous, but placed in an inappropriate context can become misinformation. For example, CivitAI currently contains three LoRAs of former Slovak president Zuzana Čaputová, politicians Robert Fico and Igor Matovič have 1 LoRA each, and model Lucia Javorčková has one. For foreign celebrities, these numbers are several times higher, and that’s just on one web portal. Simply put, this means that it is possible to generate realistic depictions of these people in any situation. This, of course, raises the question of the misuse of such generation for disinformation or manipulative purposes, and also the question of how far it is possible to trust anything that looks at first sight like a real photograph. Until recently, it was possible for the more experienced eye of the user to distinguish what was generated by AI and what was a real photograph, as the generation had its limits and could be distinguished by certain features (hair, fingers, light). However, the latest models like Stable Cascade or Flux blur these limits and can generate realistic images that are indistinguishable from real photos. In the hands of people with malicious intent, they thus become potentially dangerous. The ability to generate violent or gore content can also be considered a risk. In their text, Buhmann and Fieseler take a responsible innovation approach to AI and introduce the dimensions of responsiveness and the principles of ethical AI, which are non-maleficence, protect autonomy and ability to make good decisions, respect for human autonomy, prevention of harm, robustness, security and safety, awareness and mitigation of negative impacts, ensure data security and AI safety, minimizing discrimination and bias (Buhmann & Fieseler, 2021). This of course raises the question of so-called safety filters that could at least partially filter out harmful content.

Let me present a parallel that explains the issue of filters well. In the early days of ChatGPT and during its first wave of popularization among ordinary users, ChatGPT was able to answer every question it had an answer to. Realistically, this meant that it was able to provide instructions for making bombs, instructions for making computer malwares, and many others that can be evaluated as a security risk to society or individuals. The logical step, therefore, was to put filters in place to prevent a given AI model from providing certain information to the user. I would venture to say that all closed-source AI models contain filters designed to protect the user, and equally to protect the model from being misused to create inappropriate content. Stable Diffusion, as an open-source model, has had problems with the effective use of filters since its release in 2022, or the filters could be bypassed and anything could be generated, as described by Rando et al. (2022). With the popularization of the model and the advent of participatory culture, this boundary has blurred even more. As I described above, a huge number of checkpoints and LoRAs are trained to display sexually explicit content. Gore and violent content is less common, but it does occur. The issue of bias, i.e. embedded stereotypes in text-to-image AI models (see, Luccioni et al., 2023; Wu et al., 2024; Ghosh et al., 2024), or the issue of misuse of artworks without the author’s consent to train, e.g., a particular painting technique (An et al., 2024), also falls into the realm of ethical issues and filters.

5 Conclusion

Stable Diffusion as an open-source text-to-image model has brought a new field of creativity. It provided wider possibilities for image generation, but most importantly, through its function, it enabled the emergence of a participatory culture. This consists of active users of the model who train their own checkpoints, LoRAs, VAEs and more, and share them with other users. They exchange experiences with each other, provide tutorials on how to create the same image, and evaluate each other's work. In the field of AI models, such a participatory culture is rather rare, as most models are closed systems that don't encourage participation to such an extent. The topic of participatory culture in an open system brings with it many opportunities and risks. Among the opportunities and positives, we clearly rank the educational and creative potential, but also the feeling of coherence with other creators and the creation of a knowledge base. Logically, however, there is also the question of negatives and threats, which include in particular the ability of the model to generate sexually explicit content, violent and gore content. It is also possible to create realistic-looking images with faces and bodies of any human being, which can then be exploited. Since such training on datasets takes place at the user level, it cannot be effectively prevented. It could be said that any participatory culture, however good and positive its intentions, carries with it these negatives and risks. Ultimately, just as the population as a whole represents different interests, preferences, and opinions, so too are these areas represented in a participatory culture that uses AI models.

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THE CURRENT DEVELOPMENT OF ROBOTIC JOURNALISM AND ITS IMPACT ON MEDIA REPORTING

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Abstract:

The rapid advancement of AI and automation has turned robotic journalism into a fundamental aspect of modern media methods. This article explores the latest technological advances in robotic and automated journalism and highlights how it can improve the efficiency and speed of news content production by leveraging AI algorithms and generative systems such as GPT-4 and many others. The integration of these technologies enables the exploration of complex data collections and the tailoring of messages to different audiences. However, this change brings moral and social issues such as transparency, accountability and maintaining high standards of journalism. This article shows how AI tools are used in various ways in Slovak and Czech media, from automated reporting in ČTK to creative audience engagement projects in Rádio Slovensko. At the same time, the contribution, based on the international research Worlds of Journalism Study, publishes a completely new and interesting partial research on whether Slovak media workers currently already use robotic and automated journalism in their editorial practice.

Key words:

AI. Artificial Intelligence. Journalism. Media Reporting. Robotic Journalism.

1 Introduction

Fueled by progress in artificial intelligence (AI) and machine learning, robotic journalism is seen as a major technological advancement in today's media industry. This phenomenon involves using algorithms to automate news production and data analysis, helping media organizations improve the efficiency and speed of news processes. According to Haim and Graefe (2017), robotic journalism technologies are currently being used to create news articles with very little human involvement, changing the way news is typically produced. Due to advancements in technology, artificial intelligence can analyze vast amounts of data from different sources and generate customized content for specific audiences. News organizations have started utilizing these systems for more than just regular news creation, also for examining intricate datasets like financial markets or sports event outcomes (Thurman et al., 2017). This pattern is also recognizable in the introduction of generative AI systems like GPT-4 or other language models that are able to generate natural text accurately (Diakopoulos et al., 2024).

Although robotic journalism brings many benefits such as time and cost savings, it also raises many debates about its ethical and societal implications. One of the main challenges is the issue of transparency and accountability. According to Tolnai (2020), media outlets must clearly communicate when and how content was generated using AI in order to maintain credibility. Zier and Diakopoulos (2024) add that public perception of AI-generated content is ambiguous and often depends on the degree of transparency with which these processes are presented.

Another area of debate is the impact of robotic journalism on the quality of news content. Automated processes can lead to a uniformity in the style and content of news, which can undermine its diversity and creative potential (Ufarte-Ruiz et al., 2023). On the other hand, these technologies allow newsrooms to devote more time to analytical and investigative work, which can improve the overall quality of journalism (Pavlik, 2023).

Automated journalism is increasingly valuable for both big media companies and smaller news outlets with limited resources for large reporting teams. This pattern, according to Hudíková and Pravdová (2020), allows more users to access technology, leading to the democratization of the media space. However, it is still uncertain how these technologies will develop in the future and what their lasting effects on the media industry will be. Despite offering groundbreaking chances for creativity and productivity, it necessitates thoughtful examination of its ethical, social, and professional impacts.

1.1 Development and Technological Foundations of Robotic Journalism

The development of robotic journalism is closely linked to advances in artificial intelligence, machine learning and natural language processing (NLP). Technologies such as algorithmic models and generative AI have made it possible to automate the production of news content to a level that was previously unthinkable. According to Haim and Graefe (2017), the advancement of robotic journalism is motivated by the aim to enhance editorial processes' productivity and cut down expenses linked to news creation. Language models are a crucial technological component that utilizes algorithms to produce text by analyzing vast amounts of data. In the study by Diakopoulos et al. (2024), it was shown that models like GPT-4 are capable of generating content that is identical to human-written texts. These advancements in technology have changed the media landscape and created new opportunities for customizing news content. Thurman et al. (2017) highlight that news organizations are employing these technologies for both content creation and analysis of extensive data sets. This approach allows newsrooms to identify trends and respond quickly to current events. Additionally, technologies such as generative AI allow content to be tailored to specific target audiences, increasing its relevance.

On the other hand, the development of these technologies has also brought new challenges. Ufarte-Ruiz et al. (2023) warn of the possible consequences of content unification and loss of creativity that may result from the automation of editorial processes. Despite these risks, technological developments represent a cornerstone of the transformation of journalism. Last but not least, technologies such as automated data analysis and news generation provide smaller newsrooms with a competitive advantage by allowing them to work more efficiently with limited resources (Hudíková & Pravdová, 2020). This technological shift is not only a question of efficiency, but also of democratising access to journalism as these tools become more accessible. Thus, the development and technological underpinnings of robotic journalism represent not only an innovation, but also a fundamental paradigm shift in how media create and disseminate content.

1.2 Current Use of Robotic Journalism in the Media

Robotic journalism is now being used in a wide range of media organisations, with its implementation taking place at multiple levels of editorial practice. One of the most prominent examples is the automation of news processes, where AI systems generate short reports from datasets such as sports scores, financial markets or weather forecasts. According to Thurman et al. (2017), technologies such as automated data analytics systems enable the production of content with minimal delays, allowing newsrooms to quickly adapt to current events.

In the context of news personalisation, Hudíková and Pravdová (2020) state that AI enables the creation of content tailored to readers' preferences. Such an approach increases relevance and interaction with the audience, which is particularly important in the digital environment where competition for reader attention is high. For example, systems such as Natural Language Processing (NLP) can identify patterns in reader behaviour and generate tailored content. According to Pavlik (2023), one of the main advantages of robotic

journalism is the ability to process large amounts of data in real time. This allows newsrooms to focus on more strategic tasks such as investigative journalism or producing analysis. In newsrooms, this means a change in workflows, where journalists are increasingly focused on tasks related to checking and interpreting results, focusing on the accuracy and relevance of the outputs generated by AI systems. This transformation highlights the need for traditional professions to adapt to new technologies (Greguš & Mičová, 2019).

Although the current use of robotic journalism is primarily associated with the automation of simpler tasks, there are examples where these technologies also play a key role in more complex journalistic processes. Zier and Diakopoulos (2024) analyze situations where AI helps in the processing of investigative materials, such as large databases of financial data or real-time document analysis. Other practical applications include the use of robotic journalism in news agencies such as the Associated Press, where AI technologies are used to produce thousands of articles per year (Nagyová & Hudíková, 2023). This approach not only reduces costs, but also allows journalists to pursue more creative and analytical tasks. Similar principles of automation and natural language processing are used in the field of radio broadcasting. Furtáková and Janáčková (2023) point out that artificial intelligence technologies such as speech recognition and audio message generation represent a significant shift in how media products are created and personalised for audiences.

These innovations also demonstrate the versatility of AI technologies more broadly, and robotic journalism more narrowly, and show how they are already transforming media production in significant ways. Media organisations are gradually adopting these technologies not only to automate simple processes, but also to support more complex journalistic activities, contributing to the development of the entire media ecosystem.

1.3 Ethical Challenges and the Credibility of AI-generated Content

While the current use of robotic journalism in the media shows its potential for streamlining production and increasing the personalisation of content, this technological advancement also brings with it new ethical issues. Transparency, accountability and credibility of AI-generated content are key challenges that require deeper reflection and discussion. One of the biggest ethical issues associated with robotic journalism is precisely the question of transparency in the creation of news content. As Gálíková Tolnaiová (2023) argues, the public has a right to know when and how content was created using AI. Transparent labeling of AI-generated content can improve media credibility and minimize the risk of misinformation. Diakopoulos et al. (2024) also highlight the need for clear accountability rules for content created by AI systems. In the case of erroneous or misleading information, it is not always clear who bears responsibility – whether it is the algorithm, the developer or the media organization. These issues are particularly important in the context of the global information crisis and the increasing amount of fake news.

Another issue is how the audience views content created by artificial intelligence. According to Zier and Diakopoulos (2024), AI-generated news may be seen as less reliable by the public, particularly when they are told that it was not written by human reporters. This occurrence can impact both the reception of content and the overall credibility of the media. Hudíková and Pravdová (2020) stress the importance of implementing clear ethical standards when using AI for content creation, which should consider values like accuracy, impartiality, and privacy. Furthermore, it is crucial for newsrooms to ensure a balance between the efficiency of AI systems and upholding journalistic values.

On the other hand, Nagyová and Hudíková (2023) point to the positive potential of AI technologies in enhancing the quality of journalism when implemented responsibly. For example, AI can help eliminate potential bias in journalists' content and increase the factual

accuracy of news. However, for these benefits to prevail, organizations need to continuously monitor the performance of AI systems and their impact on content quality.

1.4 Impacts on Media Reporting and Content Quality

The use of robotics in journalism is greatly influencing how news is produced, shared, and understood by the public. One major shift is the conversion of conventional newsroom procedures to systems that prioritize efficiency and automation. Li and Diakopoulos (2024) stated that media companies are depending more on AI technology to handle extensive data, guaranteeing quicker and more precise content creation. This movement enables journalists to concentrate on analytical and investigative duties that provide added value. Nevertheless, the issue of AI-generated content quality continues to be a significant concern. Haim and Graefe (2017) point to the risk of content uniformity, where algorithms can produce texts with structure and style that lack creative variability. This problem is particularly evident in the news sector, where simple and standardized formats are often preferred. Nevertheless, some newsrooms are using AI systems to experiment with multimedia formats, which can yield innovative ways of presenting information (Dunham, 2020). AI technologies also have the potential to influence audience content preferences. Neilson (2021) suggests that automated systems can identify patterns of reader behaviour and tailor content to their individual needs. However, this personalised approach raises questions about ethical boundaries as it can lead to the reinforcement of information bubbles and polarisation (Bradshaw, 2024).

One positive impact is the ability of AI to detect and eliminate errors in news content. Hudíková and Pravdová (2020) point out that automated systems can increase the factual accuracy of articles and reduce the incidence of misinformation. This feature is particularly valuable at a time when trust in the media is facing significant challenges. On the other hand, Višňovský and Kubíková (2019) warn of the risks that come with over-reliance on technology. Over-reliance on AI can lead to a weakening of traditional editorial principles and a loss of human insight into complex topics. Hence the need to maintain a balance between technological innovation and traditional journalism values.

The impact of robotic journalism on media reporting and content quality is not clear. While it brings new opportunities for efficient news production and dissemination, it also raises questions about its long-term implications for the media landscape, ethical principles and the overall quality of journalism.

1.5 Use of Robotic Journalism and Artificial Intelligence in Czech and Slovak Media

Artificial intelligence is beginning to play an increasingly important role in the Czech media in particular, but also to some extent in the Slovak media, and is finding wider application, especially thanks to advanced projects aimed at automating news processes. In this subsection, however, for the sake of brevity, we will give only a few examples of its current use in the Czech and Slovak media space.

Among the pioneers in the Czech Republic is Česká tisková kancelář (ČTK), which received a grant from Google to develop artificial intelligence technologies for text generation in 2018 (Wolf, 2019). This project enabled ČTK to efficiently process large volumes of data and deliver news faster and more accurately. For example, during election campaigns, the system enabled the rapid production of election results (Topinková, 2018). Among other things, ČTK regularly uses AI technologies to process sports results and financial reports, demonstrating that these technologies already form an integral part of editorial processes (Šolcová, 2020). Academic institutions also play a role in the development of robotic journalism in the Czech Republic. The Centre for Artificial Intelligence Journalism at the Faculty of Social Sciences of Charles University is exploring the possibilities of applying AI in the media, especially in the field of automated data processing and personalised content

(“Středisko žurnalistiky umělé intelligence”, n.d.). It also conducts research on the ethical aspects of robotic journalism, with an emphasis on the responsible use of AI tools to ensure the credibility and transparency of media outputs. The Centre also fosters collaborations with media organisations, creating room for further innovation in journalism (MediaGuru, 2021). AI has also found its application in regional media. Seznam Zprávy, for example, has deployed robotic presenters to produce regional news. This project demonstrates the ability of AI to generate content tailored to the specific needs of individual regions, which increases the relevance and reach of news (Blatný, 2024). In the Czech media sphere, however, robotic journalism is not just a question of efficiency. In addition to automated processes for data processing, AI is increasingly being used for creative purposes, bringing new possibilities for interaction between media and their audience. Several experimental projects are exploring how AI can support not only content production but also the creation of customised multimedia formats. These innovations include, for example, the generation of visual elements and interactive elements in online news, allowing content to be better tailored to specific target audiences (Šimková, 2019).

From the aforementioned creative point of view, AI has also been used in the field of television broadcasting in the Czech Republic. In September this year, Prima Television aired spots for the first time in which live actors were completely replaced by artificial intelligence through Dream Machine and RunwayML tools available online. According to the creator of the spots, Ondřej Svoboda, the TV channel has achieved significant savings and at the same time increased the efficiency of production and creative processes. This approach shows that AI tools can play an important role in the media sphere beyond news (Hrnčárová, 2024).

In Slovakia, for example, compared to the neighbouring Czech Republic, the use of AI tools and robotic journalism in the media is still in its early stages. However, there are a number of innovative projects that show the potential of their use in a local – Slovak environment. One example of media outlets that have implemented the so-called “AI moderator” in the broadcast of real-time news content is Trnavské Rádio. The project of this regional radio shows the possibilities of improving the dynamics of broadcasting and, above all, reducing production costs (Trnavské rádio, 2024). Rádio Slovensko in September this year again presented a project called “Endless Stories”, where AI, through Chat GPT, created a full two-minute short story based on ten words sent by listeners (Rádio Slovensko, 2024). Rádio Slovensko approach demonstrates how AI can extend the possibilities of interactive audience engagement in the creation of media content (Žofčín, 2024). During this year’s summer campaign, the third most listened to Slovak radio station, Fun Radio, also used AI in its broadcasts. In an image campaign called “We All Need More FUN”, AI tools simulated the voices of the radio’s key presenters, through which they created personalised messages for listeners (RED, 2024). The examples mentioned above demonstrate that AI can be not only a tool for content production, but also a means for entertainment and brand identity building.

Slovak media are gradually following the Czech example, using artificial intelligence not only to process data, but also to experiment with new creative formats that provide more intensive interaction with the audience.

2 Methodology

The theoretical background of the current development of robotic journalism and its impact on media reporting, described in detail in the first chapter, will be supported by research conducted through an in-depth structured questionnaire, the aim of which is to find out to what extent automated or robotic journalism is used in the process of creating news content in Slovak media organisations.

The research, partial results of which are presented in this paper, was conducted as part of an international, worldwide project based at Ludwig Maximilian University in Munich called the Worlds of Journalism Study (WJS). A pilot study was established in 2010 and a third iteration, called Worlds of Journalism Study 3 (WJS 3), is currently underway to understand the worldviews and changes taking place in journalists' professional views, the conditions and constraints under which journalists operate, and the social functions of journalism in a changing world. The research data for WJS for the Slovak Republic were collected and processed by the Faculty of Mass Media Communication of UCM in Trnava and the author of this paper was one of the leading implementers of this research.

The research sample of WJS 3 were active employees of media organisations with operations in the Slovak Republic, whose content is more or less made up of news. Therefore, we removed from the research sample all media institutions whose content is not even to a lesser extent made up of news. These were, for example, some lifestyle magazines, hobby magazines, professional periodicals and media specifically focused on a particular field of work (health, education, construction), quarterly magazines, semi-annual magazines, periodicals, media showing signs of publishing disinformation or propaganda, media focusing exclusively on PR, advertising and advertising communication, etc.

The primary and challenging task was to find out the total number of media organisations and media professionals operating in Slovakia. Due to the huge amount of data to be collected, we involved 138 students of the FMK UCM in Trnava in the research. We divided them into 79 teams representing all 79 Slovak districts. The size of the research student teams depended on the population of each district. We assumed that there is a correlation between the number of inhabitants of a district and the number of media organisations operating in it. The task of all 79 student research teams was to find out the exact numbers of all media institutions and the media professionals working in them within each district by means of an internet search and subsequent telephone, email or face-to-face communication with the editorial offices.

In the next phase, without the participation of the students, a detailed review and selection of the collected research data took place. We checked the relevance of the collected research data and selected media institutions based on the set parameters. This phase of the research lasted until the end of June 2021 due to the enormous amount of data collected and the need to determine as accurately and objectively as possible a base set of professional media workers operating in Slovakia. We finally managed to determine the base set to the final number of 1508 actively operating media workers of media organisations operating in the Slovak Republic, whose content is more or less made up of news (Oprala, 2022). The implementation of the research in the form of distribution of an in-depth structured questionnaire to media institutions and their employees took place from 27 September 2021 to 8 December 2023, by means of e-mail communication. The total sample of the research is 365 media practitioners.

2.1 Research Questions

Based on data from the extensive WJS research described in the previous section, we formulate one research question relevant to the topic of this paper.

RQ1: What is the level of use of automated or robotic journalism in the process of news content creation in Slovak media organizations?

3 Results

The aim of this chapter is to answer the research question based on the results of the international WJS research for the Slovak Republic: “What is the extent of the use of automated or robotic journalism in the process of news content creation in Slovak media organizations?”

In the research of WJS, respondents were asked one simple question on this topic, with a possible choice of three unambiguous answers: “Yes”, “No” or “I don’t know”. The following graph shows the results with the total number of individual answers and also their percentage.

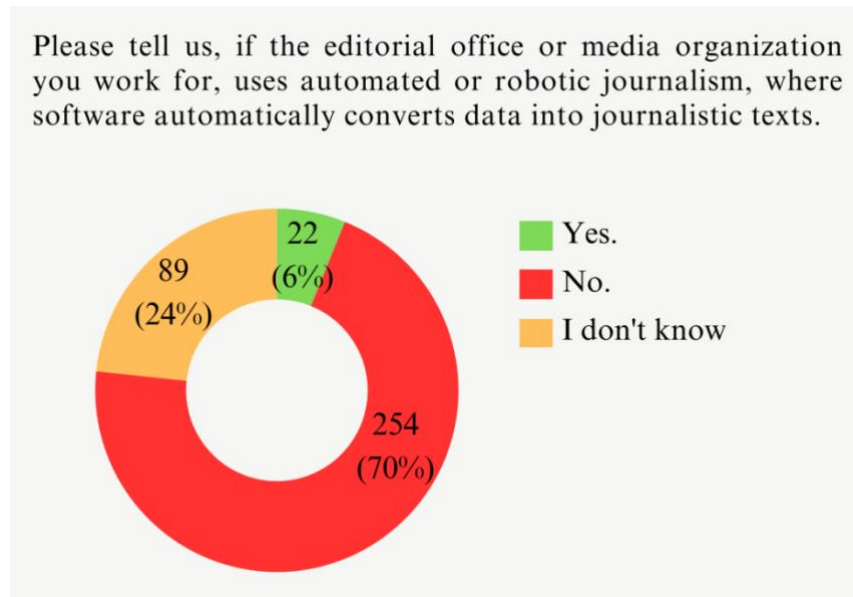


Figure 1: Graph showing the rate of use of automated and robotic journalism in Slovak media organizations. Source: own processing, 2024

Out of 365 employees of media organisations operating in the Slovak Republic, whose content is more or less made up of news, 22 (6 %) chose the answer “Yes”, 254 (70 %) the answer “No” and 89 (24 %) the answer “I don’t know” to the selected question: “Please tell us, if the editorial office or media organization you work for, uses automated or robotic journalism, where software automatically converts data into journalistic texts”.

4 Discussion and Conclusion

The results show quite clearly the limited use of automated and robotic journalism in Slovak media organisations. Only 6% of the 365 respondents said that their newsroom actively uses automated processes in the production of news content, while up to 70% declared that they do not use such technology. A further 24% of respondents were not aware of the existence of similar systems in their organisations, based on the answer “I don’t know”. Despite the fact that some changes may have occurred in Slovak media organisations since the research in question was carried out, we dare to state on the basis of the statistics that, despite the global trends of automation and digitisation of media, robotic journalism in Slovakia is still in its infancy. The reason for the low rate of its use may be the lack of financial and technological resources needed to implement advanced algorithms and software. Small and medium-sized newsrooms, which make up a significant part of the media scene in Slovakia, often do not have the capacity to adapt similar systems. Moreover, the lack of

automation and AI specialists can further complicate the process. The results also suggest that even the staff themselves do not have sufficient knowledge of the possibilities of robotic journalism. As many as 24% of respondents said that they did not know whether their newsroom uses these technologies at all, which may indicate a lack of communication between technology departments (if such exist in Slovak media) and newsrooms, or a low priority given to robotic journalism in general in Slovakia. These shortcomings may thus negatively affect the adoption and integration of robotic journalism in the editorial practice of Slovak media.

We believe that Slovak media can benefit from robotic journalism if they are able to overcome these barriers and find ways to use the potential of automation to their advantage. Raising awareness of the possibilities of robotic journalism, the availability of open-source technologies and improving technological infrastructure can be key steps towards its wider implementation.

In conclusion, robotic journalism is not only a technological trend, but also a strategic tool that is now significantly transforming media practice across the globe. From the research conducted, it is evident that this trend is still in its infancy in Slovak media organisations. Future research should focus primarily on uncovering the reasons for its lack of implementation to date, as well as on identifying concrete and necessary steps for its effective introduction into editorial practice in Slovakia.

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DOES DIGITAL MARKETING INFLUENCE CUSTOMER PURCHASING DECISIONS IN THE AREA OF CSR?

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Abstract:

Corporate social responsibility (CSR) plays a vital role in corporate profits, corporate reputation, and consumer attitudes. Current issues related to corporate social responsibility and digital marketing are some of the most emerging topics. In this way, this study focused on the impact of digital marketing on consumer perception of CSR activities and examined the differences between different generational groups. This engagement helps companies improve customer relationships by reducing acquisition costs while increasing the trust and loyalty of their consumers. The paper also states that perceived CSR activities of food companies increase social value and encourage consumers to adopt sustainable behaviour and change purchasing behaviour. At the threshold of the 3rd millennium, social responsibility is also associated with rationality and irrationality in creating preferences in consumer purchasing behaviour. To achieve the goal, we used a quantitative method of data collection, where a questionnaire survey was used, in which a total of 808 respondents of Generation X, Y, and Z took part. The Pearson Chi-square test and Mann-Whitney Test were used to evaluate the obtained primary data. However, the study is limited to the geographical borders of Slovakia; thus, it has some scope for future research in CSR and the practice of food businesses.

Key words:

Consumer Behaviour. Corporate Social Responsibility. Digital Marketing. Food Companies. Marketing Communication.

1 Introduction

In the current competitive environment, customers are looking for quality products and services and businesses that actively contribute to sustainable development, environmental protection, and support of social values. This shift highlights the importance of Corporate Social Responsibility (CSR) as a tool that influences brand image and consumer decision-making (Igarová et al., 2023).

In combination with digital marketing, CSR acquires a novelty – it enables more effective communication with customers and an increasingly important dimension of ties. In this dynamic business environment, the synergy between digital marketing and CSR becomes crucial for building a company's reputation. In this environment, competition is increasing, and consumer preferences are evolving increasingly. For this reason, companies currently have to orient themselves to digital marketing and CSR crises to increase awareness and relevance and support sustainable growth (Curley & Noormohamed, 2013).

1.1 Corporate Social Responsibility and Digital Marketing Strategies

Corporate social responsibility has become one of the most popular strategies in the business world in recent years. Corporate social responsibility refers to the idea that companies, in addition to pursuing profitability and growth, also take into account the interests of society and the environment. This involves assuming responsibility for the impact of their activities on stakeholders, the environment, and other members of the public sphere (Srivastava et al., 2017). Recently, the concept of CSR has also been associated with foresight and appears as the “new normal” for modern businesses (Jose & Ramakrishna, 2021), in which sustainable practices are

not only concerned with the philanthropic orientation of the organization but also from a marketing point of view. Modern consumers are increasingly aware of the importance of sustainability for a better and sustainable future and consider it when making purchasing decisions (Li et al., 2021). Businesses must incorporate sustainability and CSR activities into marketing communications because green advertising increases consumer purchase intentions (Nyilasy et al., 2014). Marketing, in general, must appeal to and enhance the values of stakeholders and society, which may mean that CSR is an integral part of marketing's nature (Igarová et al., 2023).

Companies are increasingly devoting their CSR initiatives to public relations and strengthening their company's CSR communication efforts. Companies and their marketers have many media channels to communicate their CSR activities (Du et al., 2010). Corporate sustainability, corporate citizenship, social enterprise, sustainable development, triple-bottom line, corporate ethics, and, in some cases, corporate governance are often interchanged with CSR (Anuradha & Bagali, 2015). All these terms embody common factors, such as social, economic, and environmental commitment to society.

Four types of corporate social responsibility have been suggested: economic, legal, ethical, and discretionary (Carroll, 1979). However, statistics have shown that consumers have different attitudes towards the natural environment (Babiak & Trendafilová, 2011). So, CSR changed from the original concept to CSRE, where the "E" stands for environment (Fig. 1).

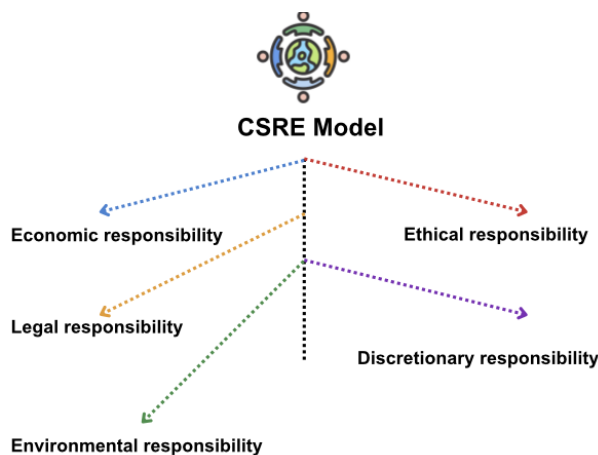


Figure 1: CSRE Model

Source: own processing, 2024

The conceptual use of new digital marketing forms and tools leads to the transformation of CSRE. Regarding economic responsibility, digital marketing represents a set of tools that increase the visibility and attractiveness of a product or service (Saura et al., 2019).

Since its inception, traditional marketing has undergone significant transformations with the development of social behavior and technological progress, especially in digital marketing. Businesses were forced to adapt their strategies to the demands of consumers, where creation and promotion became key aspects (Mishra, 2019). Digital marketing provides a collection of channels, including websites, social media, email, and mobile applications, which play a vital role in this current marketing environment. Digital marketing platforms expand communication and collaboration and support information's rapid spread. Companies can develop new ideas and use them to improve the organizational approach to building a sustainable environment (Reilly & Hynan, 2014). Social media are considered the dawn of a new horizon in marketing communication (Schivinski & Dąbrowski, 2016). In particular, social media can be categorized into two categories: expressive and collaborative. Expressive social media includes sites such as blogs, Twitter, YouTube, Facebook, and Instagram. Because of low costs and an interactive

environment, social networks have changed the future of companies, which encourages them to make more use of various types of marketing communication, including digital channels. Consumers' attachment to the brand on social networks positively affects the value of the brand. Social media is a powerful communication tool for disseminating information about CSR activities, bridging strong ties between businesses and consumers through in-depth insights into product performance (Nyilasy et al., 2014). In summary, social media is among the modern tools for informing consumers about an organization's CSR initiatives.

Consumer behavior is decisive in initiating socially responsible corporate activities. Many businesses present socially responsible activities, assuming that consumers will reward them for their support with purchases (Fatma et al., 2020). Consumers are particularly sensitive and cautiously react to companies' socially responsible activities and perceive these activities as basic components of communication between consumers and businesses (Lee et al., 2016).

The incorporation of CSR into digital marketing strategies serves as an effective means to utilize digital platforms for showcasing and conveying a company's CSR efforts and principles. This approach creates a mutually beneficial relationship, advancing corporate goals and societal well-being (Kádeková et al., 2021). Through digital marketing, businesses can significantly enhance the visibility of their CSR activities, connecting with a wide range of audiences via social media, email campaigns, and content-based outreach. This strategy increases awareness of their social initiatives, strengthens consumer engagement, bolsters brand credibility, and fosters trust. Moreover, digital tools offer real-time insights, allowing companies to evaluate the impact and reach of their CSR campaigns efficiently (Srivastava et al., 2017).

Digital platforms provide companies with ideal tools for disseminating information about CSR activities to the general public. CSR-focused content is often visually attractive and emotionally powerful, which increases its ability to engage and inspire customers (Igarová et al., 2022). An essential aspect of this business communication is the authenticity created, which is key in building trust between customers and the brand. Research indicates that consumers increasingly prefer transparent businesses that openly share information about their CSR initiatives and appear trustworthy (Brown et al., 2019). Consumers are increasingly demanding and expect companies to be transparent and provide concrete evidence of the positive impact of their activities (Lee et al., 2016). Companies that publish credible and verifiable data about their CSR initiatives are generally perceived as more trustworthy. At the same time, transparency minimizes the risk of accusations of "greenwashing", i.e., situations where companies pretend to be responsible without accurate results (Szabo & Webster, 2021).

Using digital marketing allows businesses to communicate CSR through creative and interactive content. In addition, digital channels offer the possibility of two-way communication, which means that customers can respond to content, share their opinions, and actively participate in the discussion, strengthening the emotional connection with the brand and promoting consumer loyalty (Lee et al., 2016). Digital marketing doesn't just provide a platform for businesses to communicate; it's an essential tool for enhancing consumer engagement. This participation, for example, through content sharing or commenting, leads to a deeper emotional connection between the brand and the consumer (Wang, 2022).

Content marketing also plays a crucial role in communicating CSR activities, increasing information and educational value, thereby raising awareness of the company's social and environmental challenges (Szabo & Webster, 2021). The advantage of using digital marketing when presenting CSR activities is the analysis and collection of data about consumers. Through various analytical tools, food businesses can measure the effectiveness of their CSR campaigns, monitor customer engagement and reactions, and adjust their other strategies for communicating CSR activities. Another advantage of this data is the evaluation of the effectiveness of campaigns and identifying new opportunities for digital channels (Kim, 2022).

2 Methodology

This research used a quantitative methodology to collect primary data through a structured questionnaire survey. The primary goal was to investigate the influence of digital marketing on consumer behaviour within the context of corporate social responsibility (CSR) activities.

The questionnaire was carefully designed to explore three key dimensions: the perception of CSR initiatives, their impact on consumer attitudes, and the resulting changes in consumer behaviour. Particular attention was given to whether CSR-related social media posts influence consumers to purchase food products and adopt sustainable practices.

The survey was conducted online using Google Forms and distributed to a sample of 808 respondents segmented into three generational groups: Generation X, Y, and Z (Table 1). The sample included a broad spectrum of age groups, educational levels, income brackets, and geographic regions, ensuring its representativeness. The collected primary data was analyzed using the Chi-square test and the Mann-Whitney U test. These statistical methods were chosen to examine relationships and differences within the dataset, providing robust insights into the research hypotheses.

Table 1: Number of respondents

Generation	Male	Female
X	121	100
Y	140	129
Z	171	147

Source: own processing, 2024

To further enhance the diversity of the sample, the questionnaire was disseminated among various interest groups across these demographic categories. Participation in the survey was entirely voluntary and anonymous, safeguarding respondent privacy and fostering openness in responses. The formulation of three hypotheses guided the research, each addressing specific aspects of the study’s objectives. These hypotheses were rigorously tested using statistical methods, providing a structured framework for analyzing the collected data and drawing actionable insights.

3 Results

3.1 Hypothesis 1

Hypothesis 1: We assume that there are differences between generations and what form of online marketing communication influences them to buy food.

Based on the implementation survey, we divided the respondents into three generations. We assume there are differences in marketing communication that affect purchasing socially responsible food. They had six types of marketing communication to choose from: email marketing, influencer marketing, social networks, video marketing, viral marketing, and company websites (Table 2).

Viral marketing has the most significant influence on food purchases, with 151 respondents out of 808. Respondents of Generation X chose this option by 45 of respondents and Generation Y by a total of 52. The second most significant influence is email marketing, which 142 respondents chose. Generation Y has the most significant influence, with 41 respondents. Viral marketing significantly influences food purchases, with 151 respondents out of 808 (Fig. 2).

Table 2: What kind of marketing communication influences you to buy food?

			What is your age?			Total
			Z	Y	X	
What online form of marketing communication influences you to buy food?	Email marketing	Count	55	46	41	142
		% within What is your age?	17.3%	17.1%	18.6%	17.6%
	Influencer marketing	Count	50	50	33	133
		% within What is your age?	15.7%	18.6%	14.9%	16.5%
	Social media	Count	54	36	35	125
		% within What is your age?	17.0%	13.4%	15.8%	15.5%
	Video marketing	Count	44	42	38	124
		% within What is your age?	13.8%	15.6%	17.2%	15.3%
	Viral marketing	Count	54	52	45	151
		% within What is your age?	17.0%	19.3%	20.4%	18.7%
	Websites	Count	61	43	29	133
		% within What is your age?	19.2%	16.0%	13.1%	16.5%
	Total	Count	318	269	221	808
		% within What is your age?	100.0%	100.0%	100.0%	100.0%

Source: own processing, 2024

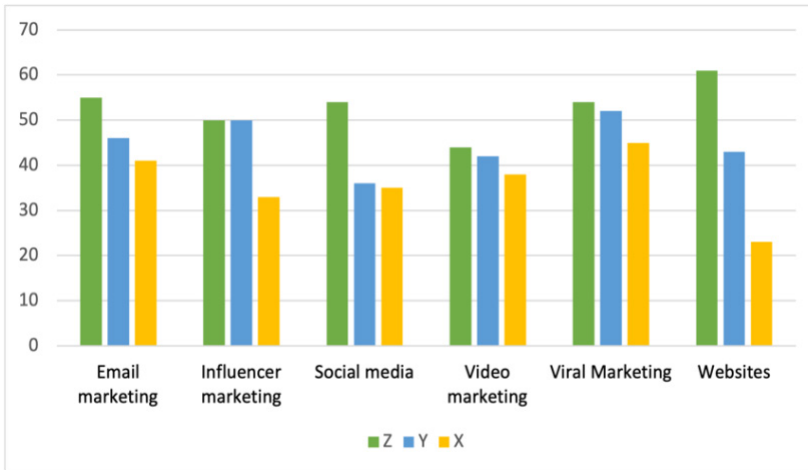


Figure 2: Repondents' answers

Source: own processing, 2024

The second biggest influence is email marketing, which 142 respondents chose. The most significant influence is in Generation Y, with 41 respondents. Email marketing comprised 55 respondents out of 318 in Generation Z. In Generation Y, 46 out of 269 respondents. More significant differences between age groups are, for example, in the case of company websites and influence marketing. Websites mainly influence the youngest Generation Z. Influencer marketing has an impact mainly on Generation Y. The least influence is on Generation X. Email marketing has 55 respondents out of 318. More significant differences between age groups are, for example, in the case of company websites and influence marketing. Websites mainly influence the youngest generation, Z.

The P value of the Chi-square test is 0.687 (Table 3). We accept the null hypothesis. There are no differences between generations, and what form of online marketing communication influences them to buy food from a socially responsible company?

Table 3: Chi-Square tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7,400 ^a	10	,687
Likelihood Ratio	7,446	10	,683
N of Valid Cases	808		

a. 0 cells (0,0%) have an expected count of less than 5. The minimum expected count is 33.92.
Source: own processing, 2024

3.2 Hypothesis 2

Hypothesis 2: We assume that there is a difference between Generation Z and Y and whether they obtain information about CSR activities through digital marketing.

In the second hypothesis, we focused on generations Z and Y. We were interested in whether there is a difference between individual generations and whether they obtain information about food companies’ CSR activities through digital marketing. Respondents had three options to choose from (Fig. 3).

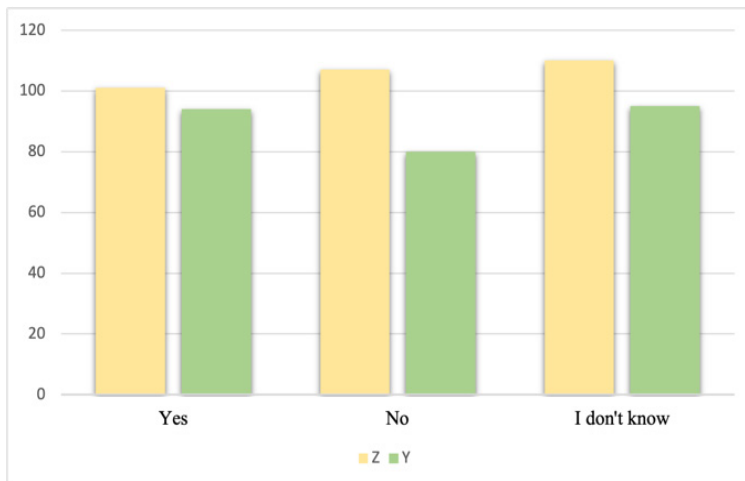


Figure 3: Respondents’ answers
Source: own processing, 2024

In Table 4, we can see that 101 respondents of Generation Z answered “yes” to whether they obtained information through digital marketing. In Generation Y, 94 respondents answered “yes”, almost the same as in Generation Z.

Table 4: Do you get information about CSR activities through digital marketing?

		What is your age?			
		Z	Y	Total	
Do you get information about CSR activities through digital marketing?	Yes	Count	101	94	195
		% within What is your age?	31.8%	34.9%	33.2%
	I don't know	Count	110	95	205
		% within What is your age?	34.6%	35.3%	34.9%
	No	Count	107	80	187
		% within What is your age?	33.6%	29.7%	31.9%
Total		Count	318	269	587
		% within What is your age?	100.0%	100.0%	100.0%

Source: own processing, 2024

The P value is 0.558 (Table 5). We cannot reject the null hypothesis. There is no difference between age groups and where they get information about CSR activities.

Table 5: Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1,165 ^a	2	,558
Likelihood Ratio	1,167	2	,558
N of Valid Cases	587		

a. 0 cells (0,0%) have an expected count of less than 5. The minimum expected count is 85.7
Source: own processing, 2024

3.3 Hypothesis 3

Hypothesis 3: We assume Generation Z prefers presenting CSR activities through digital marketing more than Generation X.

In the last hypothesis, we focused on the differences between Generation Z and X. We were interested in which generation prefers the presentation of CSR activities of food companies through digital marketing. Respondents of both generations had the option of choosing from 5 scaling options:

- ⇒ 1-definitely not,
- ⇒ 2-rather not,
- ⇒ 3-I do not know,
- ⇒ 4-rather yes,
- ⇒ 5-definitely yes.

Independent-Samples Mann-Whitney U Test

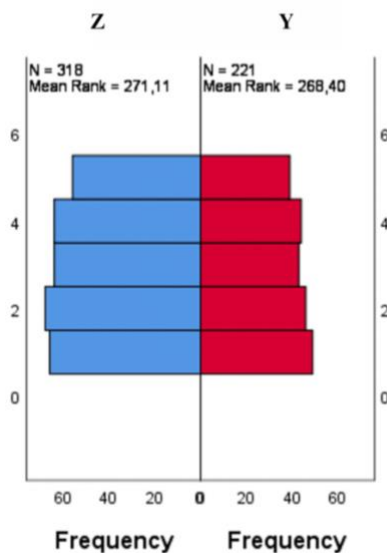


Figure 4: Independent-damples Mann-Whitney U test
Source: own processing, 2024

The dependent variable is ordinal, so we used the Mann-Whitney U test (Fig.4), an alternative to the T-test for independent samples. The p-value is 0.839 (Table 6). We cannot reject the null hypothesis. There are no differences between age categories.

Table 6: Mann-Whitney U test

Independent-Samples Mann-Whitney U Test Summary	
Total N	539
Mann-Whitney U	34785,000
Wilcoxon W	59316,000
Test Statistic	34785,000
Standard Error	1741,949
Standardized Test Statistic	-,203
Asymptotic Sig. (2-sided test)	,839

Source: own processing, 2024

4 Discussion

According to Bowen & Aragon-Correa (2014), effectively implementing CSR activities improves a company’s reputation and stimulates consumer preferences if communicated authentically and transparently. The range of digital marketing communication tools is increasing as new technologies bring new opportunities. Rapid progress in modern communication technologies is causing remarkable changes in how companies and customers communicate (Igarová et al., 2022). Digital platforms such as social networks enable the direct involvement of consumers in CSR discussions, thereby strengthening their emotional connection with the brand (Wang et al., 2024). This trend is also supported by a study by Carroll et al. (2017), which claims that consistent and transparent communication of CSR activities through digital channels increases public awareness and understanding of corporate commitments to society. Video marketing can create a strong emotional connection and increase brand credibility. According to Kádeková & Holienčinová (2018), more companies are focusing on their marketing activities in order to find new opportunities to present their activities. Fatma et al. (2020) point out that digital marketing campaigns focused on CSR lead to increased consumer loyalty if they are personalized and reflect the target group’s values. According to Szabo & Webster (2021), however, there is a risk of “greenwashing” – situations where companies communicate CSR activities without tangible results, which can lead to a loss of customer trust.

5 Conclusion

Integrating corporate social responsibility (CSR) into digital marketing effectively strengthens the relationship between companies and consumers. The use of digital platforms allows companies not only to communicate their CSR initiatives to a broad audience but also to involve customers in the discussion of social and environmental issues. A transparent and authentic presentation of CSR activities promotes customer trust and loyalty while contributing to building a positive brand image. However, CSR initiatives must be linked to actual business values and demonstrable results to maintain customer trust. This is the only way to minimize the risk of accusations of “greenwashing” and strengthen the authenticity of communication. Digital marketing, if implemented effectively and strategically, can be an essential tool for building long-term relationships with customers and for achieving a positive impact on society. The questionnaire survey results confirm that practical digital marketing tools, such as social networks, content marketing, email campaigns, or video content, can significantly influence consumer behavior. Respondents of Generation X and Y notice CSR activities of food companies and Z. Today’s consumers want to be informed about such activities because it helps

them make purchasing decisions and form a good relationship with the brand when buying food from a socially responsible company. Ultimately, digital marketing provides unlimited opportunities to communicate social responsibility. At the same time, its correct use can contribute to the company's success and a positive impact on society as a whole.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE PURCHASING DECISIONS OF GREEN CONSUMERS: COOPERATION OR COMPETITION WITH HUMAN INTELLIGENCE

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Abstract:

In the context of growing interest in sustainability and green products, artificial intelligence (AI) is playing an increasingly important role in shaping the decision-making processes of green consumers. When making purchasing decisions, green consumers are influenced by various factors such as their level of knowledge about sustainability and product certification. Education and environmental awareness play a key role in this process, encouraging preferences for products that minimise negative impacts on nature. These consumers focus on ethical consumption and sustainability, placing emphasis on products and services that contribute to environmental protection. This paper focuses on analysing how AI influences the purchasing behaviour of these consumers, highlighting its ability to personalise recommendations, automate decision-making processes and increase transparency in supply chains. By providing personalized information and improving the availability of data on green products, AI is helping consumers make more informed and environmentally responsible decisions. While AI brings many benefits to the customer experience and promotes sustainable purchasing practices, ethical and privacy issues point to the need for critical evaluation of its implementation. Paper explores the synergies between AI and human intelligence, considering whether AI represents collaboration or competition in the decision-making processes of eco-conscious consumers.

Key words:

AI in Marketing. Artificial Intelligence. Consumer Behaviour. Green Consumers. Green Products. Human Intelligence. Sustainability.

1 Introduction

In today's dynamic digital marketing environment, artificial intelligence (AI) is playing an increasingly important role, with its impact also being felt in the context of organic consumers. Green consumers, whose purchasing behaviour is influenced by growing environmental concerns and a desire to shop responsibly, are becoming a key market segment. The extent to which AI can influence the decision-making of eco-conscious consumers is an important area of investigation. From personalizing recommendations to automating processes to increasing transparency in supply chains, AI is proving to be a powerful tool that can improve the customer experience and encourage sustainable purchasing practices. On the other hand, ethical challenges and privacy concerns require us to think about how to ensure that technology serves to support, rather than replace, human intelligence in decision-making processes. In this paper, we will look at how AI is influencing the decision-making of these consumers, and consider whether it represents a collaboration or competition to traditional human intelligence and the possible future direction of this dynamic.

2 Methodology

The main theme of the paper was the analysis of the impact of AI on the behaviour of environmentally conscious consumers and its use in marketing and sustainable decision making. Currently, AI plays a key role in optimizing processes, personalizing communication and increasing transparency, which is essential to gain the trust of eco-conscious customers. The article summarizes the current state of AI development and its use in marketing strategies through case studies such as the Clarity AI platform, promoting transparency and trust, and the Axe AI deodorant, leveraging big data and experiential technologies. The study highlights how AI supports sustainable decision-making through green product recommendations and transparency in supply chains.

In the theoretical part, we reviewed the available literature, drawing on secondary foreign sources to identify the main trends and approaches to the application of AI in marketing and green decision-making. Using methods of induction and deduction, we systematically analysed these findings. In the application part, we analyzed selected case studies and compared them with traditional marketing strategies. In this analysis, we used a comparative approach to better understand the differences and benefits of modern AI-enabled strategies versus conventional approaches. We paid particular attention to assessing their contribution to sustainability and ethical considerations. The results highlight the potential of AI in shaping consumers' green behaviour and offer recommendations for companies to use these technologies effectively, emphasising the need for transparency and ethical approaches in their implementation.

3 The Essence of Artificial Intelligence

Artificial intelligence is the ability of computers to mimic human thought and behaviour. This term refers to any computer that can exhibit human traits such as the ability to learn and solve problems (Nagendraswamy & Salis, 2021). It refers to any technology that can reason and act as humans do (Leyer et al., 2020). De Bruyn et al. (2020) define artificial intelligence as machines that simulate human intelligence in activities such as learning, planning, and problem solving, while achieving a higher level of autonomous knowledge generation. Although AI research has been ongoing for more than half a century, in recent years AI has become a central topic across a variety of fields (Jarek & Mazurek, 2019). It is constantly evolving and improving, with applications ranging from healthcare to transportation to marketing, where it enables the automation of tasks and increases the efficiency of decision-making processes. Advances in technology have led to the development of artificial intelligence in various domains such as voice, text and image recognition, decision making and autonomous robots. Technological innovations in AI have streamlined processes and opened up new avenues for the use of AI, which has led to a growing interest in AI in marketing. This interest is spurred by practical applications of AI that increase efficiency, enable personalization, and support the automation of marketing processes (Jarek & Mazurek, 2019). In the next section, we will take a closer look at how artificial intelligence is used in marketing and explore its specific applications that contribute to efficiency, personalization, and automation of marketing processes.

3.1 The Use of Artificial Intelligence in Marketing

Nowadays, artificial intelligence is becoming an integral part in marketing, opening up new possibilities for companies to communicate and interact with customers. The integration of AI technologies into marketing strategies has fundamentally changed the way companies communicate with their customers and navigate the competitive landscape (Anjorin et al.,

2024). With the use of AI, companies can provide continuous customer support, personalized service, and a more convenient shopping experience, which reduces the risk of making the wrong decisions (Jarek & Mazurek, 2019). Technological advancements suggest that the effective use of AI in marketing can be a critical factor in increasing competitiveness and optimizing customer experience. In particular, thinking AI is being used in the creation of marketing strategy. This type of AI plays a key role in improving user experience, identifying and predicting trends, which also helps to reduce advertising costs (Haleem et al., 2022). One of the main benefits of AI in marketing is the ability to automate processes such as customer segmentation. Segmentation is the division of a market into smaller parts, where customers in each part have unique needs and desires. Today, customers use digital channels and devices such as smartphones and social networks on a daily basis, which generate a lot of valuable data about their behavior and preferences. This data allows us to segment customers effectively and better tailor our strategies (Bhattacharya & Saxema, 2023).

Through data analysis and clustering techniques, AI can effectively identify patterns and segments that might be difficult for human marketers to see. Target audience selection is also a possible way of using AI in marketing, which involves selecting the right market segments to target for marketing activities. While market segmentation can be done automatically by mechanical AI, target group selection requires expertise and judgment. Technologies such as search engines, which target based on keywords and browsing history, and social media, which leverage interests and content, are used (Huang & Rust, 2021). AI can effectively analyze this data and use it to create better marketing strategies. It also simplifies customer profiling and customer journey analysis, allowing companies to effectively tailor content for different stages of the buying process (Haleem et al., 2022).

Feeling AI is also a frequent use in marketing and is used to personalize customer relationships. Its main advantage is the ability to recognize and respond to individuals' emotions, allowing deeper connections to be made. In practice, this can be social bots that greet customers, personalized recommendation systems or conversational AI that provides customer service. Recommender systems provide recommendations to users based on their preferences and behaviors. This could be movie recommendations on the Netflix platform, or sales recommendations on an online store where customers receive suggestions for products they might be interested in based on their previous behaviors and preferences (Huang & Rust, 2021). Technology analyzes emotional responses and adapts communication based on customers' feelings. In this way, AI provides customers with a sense of being understood, increasing customer satisfaction and loyalty (Huang & Rust, 2021). Examples of AI interacting with consumers are commercial chatbots such as Woebot, Wysa, Vivibot, and Tess, which focus on alleviating mental health issues and have demonstrated effectiveness in reducing anxiety and stress (Chin et al., 2023). Feeling AI, is also very useful in brand positioning, as it enables a better understanding of the emotions and preferences of target customers. In this way, marketers can develop compelling slogans and campaigns that effectively resonate with their audience (Huang & Rust, 2021). AI's ability to recognize and respond to individuals' emotions opens up new possibilities for personalizing and strengthening customer relationships, thereby increasing customer satisfaction and loyalty. In this way, AI becomes a key tool for adapting to dynamic consumer needs and preferences.

Analytics in marketing decision-making is another form of using AI, as it combines advanced algorithms and machine learning to process vast amounts of data. AI algorithms reduce the risk of errors, increase reliability, and enable accurate analysis of large volumes of data (Clarity AI, 2024). In their article, Anjorin et al. (2024) explore three types of analytics that are used in marketing. The first is descriptive analytics, which examines past performance and reveals patterns of behavior, allowing companies to understand customer interactions and market trends (Ibeh et al., 2024). The second is predictive analytics, which uses statistical

models and forecasts to anticipate trends and consumer behavior. In this way, it allows companies to adapt their strategies to the current market needs (Adegoke et al., 2024). Based on historical data, predictive analytics can reduce waste in product distribution by forecasting future demand. This allows companies to better manage inventory, thereby minimizing product surplus. The predictive power of AI is revolutionizing the way products are recommended and improving customer interaction (Oke et al., 2024). These technologies provide personalized services that increase consumer utility and satisfaction, which in turn influences purchasing decisions (AIBoost, 2024). The last is prescriptive analytics, which, in addition to predicting future results, also offers specific recommendations for achieving desired marketing goals through advanced algorithms and machine learning techniques. Thus, analytics can fundamentally influence product development and innovation by helping firms identify gaps in their product portfolios and uncover new opportunities for innovation (Anjorin et al., 2024).

Despite the many advantages that AI technologies bring, they are still in the process of development and have some shortcomings. For example, although current mechanical AI has a strong ability to independently collect and integrate multiple data sources, the context of this data that is needed to correctly interpret emotional data is often lost, which can make it difficult to engage customers (Huang & Rust, 2021). At the same time, there are privacy concerns as more personal data increases the risk of leakage (Oke et al., 2024). The ethical use of AI requires transparency, securing consent, and removing potential biases in data analysis (Anjorin et al., 2024). Automated AI interactions also limit the possibility of forming personal relationships with customers. As AI cannot fully understand emotional needs, customers may feel misunderstood or ignored, leading to brand alienation (Huang & Rust, 2021). However, it is imperative that companies emphasize privacy, transparency, and communication when implementing AI to build trust and maintain the human dimension in customer relationships.

Ultimately, artificial intelligence is fundamentally changing the way marketing works. Thanks to advanced algorithms, AI processes large amounts of data, making it possible to predict consumer behavior and optimize marketing campaigns, increasing their effectiveness. It helps to retain existing customers and convert leads through intelligent chatbots, personalized email marketing, and interactive design (Haleem et al., 2022). However, it is imperative that companies emphasize privacy, transparency, and communication when implementing AI to build trust and maintain the human dimension in customer relationships. The result is an improved customer experience and higher ROI.

4 Profile of Green Consumers

As a result of rapid economic growth and overconsumption, there is significant environmental degradation, raising growing concerns about the ecological problems associated with consumption (Taufique et al., 2018). Zaremohzzabieh et al. (2021) also agree with this assertion, highlighting that environmental degradation, including global warming and overexploitation of resources, increases consumers' sensitivity to ecological problems. Also, the trend towards sustainable consumption is manifested in various aspects, one of the most prominent being the growing consumer interest in eco-friendly products (Wojciechowska-Solis & Barska, 2024). Nowadays, more and more consumers take environmental, social and economic factors into account when making their purchases (Horani, 2020). These consumers are often labelled as green consumers, with their purchasing behaviour motivated by a desire to contribute to environmental protection and promote sustainable development.

Green consumers are characterised by their strong orientation towards sustainability and ethical consumption. They emphasise products and services that minimise negative impact on nature, promote fair working conditions and use renewable resources. According to Horani (2020), green consumers are characterized as individuals who have sufficient knowledge about

environmental issues, which leads them to behave in an environmentally friendly manner. They believe that they can actively contribute to positive changes in environmental protection through their behaviour. They are aware of the benefits of sustainable products, weighing economic and social values in their purchasing decisions to minimise negative impacts on the planet. In communicating with environmentally oriented consumers, it is necessary not only to adapt products and services, but also to change the approach to marketing. It is important to emphasise values such as sustainability, ethical production and transparency, which contribute to strengthening customer loyalty and creating a strong emotional connection with brands. By adapting to the preferences of these consumers, brands can contribute to environmental protection while achieving long-term commercial success in an increasingly competitive environment.

4.1 Purchasing Behaviour and Decision-Making of Green Consumers

The purchasing behavior of environmentally conscious consumers is shaped by a variety of factors, including internal beliefs, demographic characteristics, and social norms (Zaremohzzabieh et al., 2021). The age of consumers greatly influences consumers' green behaviour. Various studies suggest that older consumers tend to be more environmentally conscious, but younger consumers, especially those from Generation Y and Z, are often more open to new concepts and prefer sustainable products (Horani, 2020; White et al., 2019). Umut (2023) found in his study that supporters of green products not only belong to the younger generation, but also possess higher incomes. Younger and more educated consumers tend to invest in upgrades that promote environmental protection. Higher education also plays an important role, as these consumers are more likely to be open to new, energy-efficient technologies (Sobocińska et al., 2022). Horani (2020) confirms that the behaviour of sustainable consumers is influenced not only by demographic factors and environmental attitudes, but also by the level of knowledge about sustainable design. A high level of environmental awareness correlates with an increase in eco-friendly behaviours such as recycling and purchasing eco-friendly products, underlining the importance of education and awareness in promoting sustainable consumerism. Green product certification is also another important factor in purchasing decisions. Product certification ensures that products comply with certain standards, with an eco-label being awarded if a product meets sustainability criteria (Wurster & Ladu, 2020). Knowledge of energy efficiency certification increases the likelihood of investing in green and sustainable products, which households perceive as a long-term benefit (Sobocińska et al., 2022). According to research by Morone et al. (2021), certification has been confirmed to play a crucial role in purchasing decisions, especially in product categories such as food and personal care. This factor can significantly influence consumers' willingness to invest in sustainable products and overcome economic barriers.

Based on the above, we can conclude that the purchasing decisions of environmentally conscious consumers are a complex process influenced by various factors such as demographic characteristics, level of knowledge about sustainability and product certification, while education and environmental awareness play a key role in promoting sustainable consumption and investment in environmentally friendly products.

4.2 The Role of AI in Supporting Green Consumer Decision-Making

We are seeing artificial intelligence play an increasingly important part in our daily lives, and its opportunities are constantly developing. Consumers are increasingly adopting artificial intelligence to help them make decisions about their personal purchasing decisions. This trend is particularly evident in the rise of e-commerce and online shopping, which are heavily influenced by how AI is shaping consumer behaviour (Oke et al., 2024). For this reason, marketing is increasingly focusing on decision-making that is performed by AI instead of

humans. AI can not only recommend products, but also predict our desires, make purchasing decisions, negotiate and transact (Leyer et al., 2020). The application of AI in marketing is bringing about fundamental changes in the way companies approach decision-making in various areas, including sustainability. Many businesses are pursuing innovative approaches to minimize their environmental impact and implement sustainable practices. AI technologies are emerging as one of the effective tools to support these sustainable marketing strategies (AIBoost, 2024).

Oke et al. (2024) analyze the role of AI in the decision-making processes of green consumers. According to their findings, the implementation of AI is divided into three key aspects namely personalized recommendations, availability of information and trust in AI. These factors have a major impact on consumer behaviour, as personalised recommendations enable the efficient discovery and selection of green products, while information availability helps consumers to better understand their options. As one of the most effective AI tools in the context of sustainability, chatbots directly influence eco-conscious consumers' decision-making by providing them with personalized recommendations based on their preferences and previous purchases. These systems interact directly with consumers, providing personalized recommendations and instant answers to questions, reducing the need for additional human resources and improving customer support (AIBoost, 2024). Research shows that AI-based personalized recommendations significantly influence consumer preferences and decisions, while also playing a key role in areas such as sustainability (Hosta & Zabkar, 2021).

Today, as we face the threats of climate change, the lack of reliable data and availability of information is a significant barrier to consumers trying to adopt sustainable practices (Clarity AI, 2024). When purchasing organic products, consumers often compare different offers and spend a lot of time choosing them. However, they face challenges in this process, such as lack of clear information, complex terminology, uncertainty in product quality, and price differences (Sobocińska et al., 2022). Access to detailed information on the environmental impact of products could help them better align purchasing decisions with sustainability goals (Clarity AI, 2024). With the ability to process large amounts of data, AI enables consumers to make informed decisions that support not only their consumption preferences, but also their environmental goals. AI can transform data into strategic recommendations for consumer behavior, contributing to more informed choices and higher customer satisfaction (Oke et al., 2024). According to research from Clarity AI, more than half (52%) of major brands believe that sustainability information is critical to their customers' product choices. Artificial intelligence is a key function in addressing the information barrier because it can quickly analyse large volumes of data, enabling it to provide consumers with the information they need to make environmentally responsible decisions (Clarity AI, 2024). In this context, in our view, artificial intelligence, especially through chatbots, could help optimise the decision-making process by providing consumers with accurate and rapid information, which would reduce uncertainty and contribute to a better understanding of the issue of green products.

Trust in AI plays an important role in consumers' willingness to adopt and use these technologies in their purchasing decisions. Consumers are becoming increasingly aware of the importance of AI and machine learning and are showing growing confidence in their applications. Up to 39% of consumers worldwide are ready to trust AI systems (Gillespie et al., 2023). Further research confirms that more than half of consumers (55%) in 31 countries trust AI to gather product information (Statista Research Department, 2024). Consumer awareness and trust in AI mediate the relationship between AI implementation and sustainable behaviour (Oke et al., 2024). In this way, sustainable consumer behavior, which focuses on purchasing green products and adopting sustainable practices, becomes a tangible outcome of AI's impact on environmentally conscious consumers. Understanding organic consumer behaviour and effective market segmentation are key to creating personalised marketing messages.

With machine learning, companies can segment eco-consumers into smaller groups based on their individual characteristics and purchasing behaviour, allowing them to tailor marketing campaigns and offers specifically targeted to their eco-preferences.

5 Results

In this section, we focus on the results of research on the impact of AI on environmentally conscious consumer behaviour. AI has been shown to help reach eco-conscious consumers through personalized communication, transparency in supply chains, and the recommendation of sustainable products, which increases trust and strengthens the relationship between brands and customers.

To support these findings, we analyzed case studies of Clarity AI and Axe AI deodorant to show how AI contributes to sustainable decision-making, personalized communication, and transparency. These examples also reveal challenges such as data protection and information accuracy. The results suggest that AI can improve marketing approaches and promote environmentally responsible consumer behavior.

5.1 Case Studies

One example of the use of artificial intelligence in eco-conscious consumer decision-making is Unilever's Axe A.I. deodorant (Figure 1). This product was developed by analysing 64 terabytes of data, 6,000 ingredients and 3.5 million potential fragrance combinations, enabling it to accurately identify customer preferences. For example, it was found that for many consumers it is important that the deodorant does not contain aluminium salts, which is part of a trend towards natural and eco-friendly alternatives (Packaging Europe, 2022). Generation Z consumers, who appreciated the interactive elements, responded most to the product. Through augmented reality (AR) technology, each Axe A.I. package contained a QR code that triggered an interactive experience. This reinforced consumer engagement and interest. At the same time, it provided transparency of information about the ingredients and production processes, which increased consumer confidence, which emphasised sustainability and environmental responsibility (Unilever, 2023). In this way, it increased consumer confidence, which emphasises sustainability and environmental responsibility.



Figure 1: Unilever's Axe A.I. deodorant
Source: Packaging Europe (2022)

Another interesting finding is that the use of eco-design is not limited to the textile and cosmetics industries but is also expanding into the food sector and other areas, with clear examples of sustainable packaging emerging (McKinsey & Company, 2024). The Ocean Disclosure Initiative framework confirms that generative artificial intelligence can significantly enhance decision-making for environmentally conscious consumers. By analyzing big data, AI can identify customer preferences, enabling companies to develop products that precisely meet their sustainability requirements. This framework, which uses AI to monitor and report on ecological projects, contributes to transparency and increases consumer trust in companies. Such an approach not only supports ecological innovations but also strengthens consumer engagement in sustainability, making AI an essential tool for improving market behavior.

Scalability of technologies also plays a key role in the field of sustainability. Transitioning to eco-friendly solutions in global supply chains, covering all stages from raw material sourcing to product disposal, often proves to be complex. Artificial intelligence can play a critical role in increasing transparency and traceability of these processes, which is essential for building consumer trust in companies' sustainability claims. For example, the Clarity AI platform helps consumers identify businesses that are genuinely striving to be sustainable. This platform leverages artificial intelligence and big data to provide sustainability insights for investors and organizations. It analyzes over 50,000 companies and 300,000 funds, aiding in the evaluation of their ecological and social impacts. It enables customized reports, greenhouse gas emissions monitoring, and compliance with regulatory requirements. Clarity AI serves as a global tool helping companies make informed decisions in sustainability. Current data shows that only 19.2% of merchants on the Klarna platform publicly disclose these figures, and merely 9.6% have specific commitments to reducing emissions in line with climate action goals. Additionally, only 8.4% of merchants use renewable energy on a large scale, indicating significant room for improvement. In this way, artificial intelligence helps consumers access accurate information and strengthens their trust in the environmental initiatives of various companies.

We conclude that artificial intelligence is an important milestone in the context of the topic of sustainable consumption. AI is helping businesses to better understand customer preferences but also to create a product that meets customers' sustainability and value needs. We presented two examples – the Clarity A.I. platform and the Axe A.I. deodorant – as actionable definitions of how A.I. improves consumer engagement, transparency and interaction. In addition to delivering new product options, offering new information and encouraging customer initiative, A.I. is also fueling a growing interest in customer sustainability and helping customers make responsible choices in their personal daily lives.

6 Discussion

The development of Artificial Intelligence is having a profound impact on our daily lives, including consumer behaviour and environmental decisions. AI can assist consumers through personalized recommendations, easier access to information, and building trust in technological solutions (Oke et al., 2024). These innovations not only facilitate the adoption of green products, but can also promote their wider availability by allowing manufacturers to communicate the benefits of their products in a more targeted way. For green consumers, however, significant barriers remain, such as a lack of reliable and clear information about green products, or complex technical terminology that may discourage mainstream consumers from purchasing them (Clarity AI, 2024). AI can overcome these barriers by analysing large volumes of data and providing relevant and comprehensible information about the environmental impact of products. In this way, AI can make it easier for consumers to compare products, verify eco-certifications, or understand the true environmental impact of their decisions. As a result,

consumers are empowered to make better-informed decisions that are aligned with their values and sustainability goals.

Despite these positives, the issue of the credibility and ethical use of AI remains a significant challenge. There is a risk that inaccurate or manipulative data could mislead consumers, undermining its effectiveness as a tool to promote sustainability. Overcoming this barrier requires rigorous research to validate data, reduce algorithm bias and ensure transparency. At the same time, it is crucial to create a regulatory framework that guarantees the responsible use of AI in line with environmental and societal goals. In order to realise the full potential of AI for sustainability, ethical and regulatory issues need to be addressed so that the technology becomes a true catalyst for sustainable change, not just a means to promote consumerism. Clearly defined rules and control mechanisms can ensure that AI is used to promote environmental values and responsible decisions. If these challenges can be overcome, AI can empower eco-conscious consumers and contribute to building long-term solutions for a sustainable future.

7 Conclusion

Artificial intelligence is increasingly being integrated into marketing strategies and is strongly influencing the decision-making of green consumers. Thanks to AI, tools are available to personalise and enhance the customer experience, helping to increase engagement and drive sustainable purchases. In addition, AI enables efficient data processing and analysis, helping consumers to overcome the information barrier and make informed decisions about green products. Without artificial intelligence and machine learning, it would be almost impossible to analyze and compare data to the extent that these technologies enable. Despite these benefits, it is also necessary to consider the ethical issues associated with the use of AI. Privacy and security of personal data remain key topics, and companies must comply with legislative standards and communicate transparently with clients about the management of their data. Automation of interactions can lead to alienation, which is why it is important to maintain the human dimension in customer relationships. The future of AI in marketing, especially in relation to green consumers, will depend on the ability of companies to adapt their strategies to respect ethical standards and promote sustainability. Collaboration between AI and human intelligence appears essential to create a meaningful and responsible consumer environment. Consumer trust in technologies, as well as in their providers, will be crucial for the successful implementation of AI in marketing practices focused on green values and sustainable development.

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DEVELOPMENT OF ADAPTATION OF MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE INTO FACEBOOK ALGORITHM

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Abstract:

This paper provides an overview of the evolution of the Facebook algorithm, one of the largest global social platforms, focusing on its major milestones and their impact on the functioning of this platform. The algorithm not only plays a key role in personalizing content and optimizing user interactions, but also fundamentally influences the approach of entities that use this platform for communication as part of their marketing strategy. The paper analyses the evolution from simple chronological display of posts, through the EdgeRank algorithm, which introduced personalization based on affinity, format weight and time decay, to modern algorithms based on machine learning and artificial intelligence. Significant changes such as the integration of meaningful interactions or the introduction of AI for content moderation underline Facebook's efforts to improve the quality of the user experience and limit the spread of misinformation. The paper highlights that understanding the principles of how the algorithm works is essential for commercial entities that want to effectively use this platform to optimize their communication and marketing strategy, and its results are a boon for any entity communicating in this environment.

Key words:

Algorithm. Artificial Intelligence. Facebook. Marketing. Marketing Communication. Social Media.

1 Algorithm in the Context of Social Media

An algorithm can be defined as a well-defined sequence of procedures or guidelines that are specifically designed to solve a particular problem or accomplish a specified task (Papayannopoulos, 2023). In the field of computer science, algorithms form the basic framework of programs that autonomously perform specified tasks with the greatest efficiency. In the context of social media platforms, algorithms assume an indispensable function in organizing and customizing the content presented to users, thereby significantly affecting their overall user experience (Metzler & Garcia, 2023). These algorithms, which are often realized through complex machine learning techniques and the implementation of artificial intelligence principles, carefully examine large volumes of data regarding user interactions and preferences in order to optimize the relevance of the material presented (Jain, 2022). This strategic approach not only increases user engagement but also contributes to increasing the time users spend in the platform environment. By harnessing the power of algorithms, social media companies are able to create a more personalized experience that resonates with individual users, fostering a deeper connection and loyalty to the platform. Ultimately, the interplay between algorithms and user behaviour is a key element in the evolution of digital content consumption in social media environments.

As we have already mentioned, algorithms are already an integral part of social media platforms, where they perform a number of different functions. Based on Shah (2023), some of the key ones could include the following:

1. Personalisation of content

Algorithms analyse user behaviour, preferences and previous interactions to create a personalised environment. This includes, but is not limited to, tracking likes, shares, comments

and types of accounts followed. For example, if a user frequently engages with photo content, the algorithm will prioritize similar posts in their feed.

2. Content Management

To handle the vast amount of content that is created on a daily basis, algorithms function as content managers that filter posts based on relevance and appropriateness. They sort through millions of new posts and provide only those they deem interesting or valuable to the user, effectively reducing content noise. They are also involved in facilitating the discovery of new content by, for example, recommending posts from accounts that users don't follow but may find interesting based on shared interests or the behaviour of similar users. This helps expand user connections and keep content fresh, ultimately building user engagement and satisfaction.

3. Maximising interaction

The algorithms are designed to maximize user engagement by displaying content that encourages interaction. They take into account factors such as post popularity, recency and user interactions to determine which posts will keep users on the platform longer. For example, if a post receives high engagement shortly after publication, the algorithm is likely to promote it further.

4. Business dimension

Social media platforms also use algorithms to effectively promote paid content or advertising. Commercial entities can use the principles of these algorithms to optimise their content, which can lead to increased reach among target audiences. The data collected about the user behaviour of social media platform environments is also translated into ad algorithms and contributes to the effectiveness of paid content, thereby increasing the value of the advertising space on that platform.

5. Adaptation and learning

Many social media algorithms use machine learning and artificial intelligence techniques to continuously improve their performance. They adapt based on new input from user interactions, allowing them to refine content recommendations over time. This dynamic adaptation helps ensure that content remains relevant as user preferences evolve over time.

2 Aim of the Contribution

The present paper is a theoretical study, and its main objective is to provide a comprehensive view of the major milestones in the development of the algorithm of the largest global social network Facebook. It is the knowledge of the principles of the algorithm that plays a key role for commercial entities whose marketing strategy involves communication by determining what content is displayed to individual users, and therefore its functioning significantly influences the way communication and interaction on the platform. We address this topic because for commercial entities whose marketing strategy involves communicating through social networks, it is the functioning of the algorithm that they need to adapt to the way they communicate in the platform environment of a given social network. As a result, this paper provides an overview of the key milestones in the development of the algorithm that have shaped and contribute to its current form. Knowledge of these milestones can be beneficial for any entity seeking to optimize its communications and better leverage the potential of the Facebook platform to achieve marketing goals.

3 Evolution of the Facebook Social Network Algorithm

Facebook, owned by Meta Platforms, is a dominant force in social media. Launched on February 4, 2004 by Mark Zuckerberg and his roommates at Harvard University as "TheFacebook", this platform quickly expanded to other universities and eventually to

the general public in 2006 (Hall, 2024). Since then, it has evolved into a global platform for creating social interactions, sharing content and news. Facebook has approximately 3.07 billion monthly active users, making it the most used social platform globally, accounting for approximately 37.7% of the world's population and 56.76% of all Internet users. Users spend an average of 19 hours and 47 minutes per month in its environment (Nyst, 2024). It allows users to create their own profiles or interest pages, share multimedia content, join community groups according to interests, and communicate through Messenger. Of course, it also offers the same possibilities to commercial entities, which can build awareness and relationships with target audiences in its environment, or even sell their products directly. In addition to the aforementioned, this platform offers advertising space and a wide variety of paid advertising formats, along with sophisticated targeting options.

Understanding some of the principles of how Facebook's algorithm works is essential for commercial entities to be able to effectively reach target audiences on this platform. The algorithm controls what content is displayed to users, forcing brands to adapt their communication strategy to the actual workings of the algorithm. Due to the dynamic evolution of the algorithm, commercial entities need to respond flexibly to changes in the algorithm in order to use the platform effectively to achieve their stated communication and marketing objectives. The following section therefore discusses in more detail the evolution of the Facebook algorithm over time, its principles and the changes that have shaped the current algorithm and the functioning of this platform.

The initial algorithm in the Facebook platform environment after its commercialization in 2006 was to display all user and page posts in chronological order as they were published. It was thus a very simple approach that was unsustainable as the number of users and content grew.

The first more sophisticated algorithm used on this platform can be considered "EdgeRank", which was introduced in 2009. Its task was to determine the content that appears in a user's "News Feed" feed. This model built the foundation for content personalization, but as the volume of data, the quantity of content and the complexity of interactions grew, it proved to be insufficient and was therefore abandoned around 2011 in favor of more complex algorithms using machine learning principles. Even though Facebook's platform has transitioned from EdgeRank to much more sophisticated algorithms that take into account a multitude of factors, its core principles continue to influence the way content is prioritized on social media platforms today. Understanding the EdgeRank algorithm, then, allows you to understand how content prioritization works on Facebook.

EdgeRank was based on three key factors:

1. Affinity – measures the relationship between the user and the content creator. If a user interacts frequently with posts from a particular friend or page, their affinity score increases, making them more likely to see posts from that source in the future.
2. Weighting of formats – Different types of content have different weights based on their engagement potential. For example, videos and photos typically have more weight than text-only status updates. Actions taken by users (likes, comments, shares) also contribute to the weight of a post.
3. Time Decay – This factor reflects the time since the content was created. Newer posts are preferred over older ones because they are considered more relevant and engaging (Cooper, 2013).

Then, by 2013, Facebook switched from EdgeRank to a more complex algorithm using machine learning that took into account more than a hundred thousand factors when rating and ranking content. The goal of this change was to improve the user experience by delivering more relevant posts based on individual user preferences and behaviours. This period also included a phase during which Facebook began to downgrade posts that were overly promotional

or misleading. It also saw the introduction of important features such as ‘See First’, which allowed users to prioritise certain content in their feed, thereby promoting user control over the content they viewed. The principles of this feature are part of the algorithms of several social networks even today.

In January 2018, Facebook announced a significant change to its News Feed algorithm that aimed to promote “Meaningful Social Interactions” among users. The move was in response to concerns about passive content consumption and the spread of misinformation in the platform’s environment. The primary goals of this change were:

1. Prioritization of content from friends and family – the algorithm started prioritizing posts from close contacts to encourage social interactions between users.
2. Fostering discussions – posts that generated longer comments and discussions gained more visibility, encouraging deeper engagement.
3. Reducing passive content – content that led to passive viewing without interaction was reduced in priority to increase the quality of time spent on the platform (Peters, 2018).

This change has had a significant impact on the reach of posts from brand and media sites, which have seen a significant decline in organic reach. As a result, commercial entities have had to adapt their strategies by creating content that encourages discussion and interaction in order to stay in users’ News Feeds. Although the goal of this algorithm was to improve the quality of interactions, it also resulted in a number of undesirable effects, such as an increase in the spread of misinformation and polarizing content that often just generated high levels of interaction and conversations.

The 2018 algorithm change represented a significant shift in Facebook’s approach to content management, with an emphasis on the quality of interactions and social connections between users.

In 2020, Facebook significantly expanded its incorporation of artificial intelligence (AI) for the purposes of moderating content and identifying inappropriate posts. Given the increasing amount of content and the complexity of user interactions, it has become necessary to deploy sophisticated AI systems that are capable of recognizing hate speech, misinformation, and other malicious content. These systems have been trained to evaluate textual, visual, and audiovisual content, facilitating more efficient and faster detection of community violations (Vincent, 2020). By 2024, Facebook continued to improve its algorithm in order to provide the most relevant content to its users. The existing algorithm operates based on a process of four steps:

1. Inventory – the first step is to create a set of all potential content that could appear in the user’s feed. This includes posts from friends, followed pages, groups, and relevant ads. Basically, everything that could be of interest to the user based on their social connections and previous interactions is compiled.
2. Signals – The algorithm then evaluates thousands of signals to assess the relevance of each piece of content. These signals can include user interaction (how often the user interacts with the person or site that posted the content), content type (post format, e.g. video, image, text), recency (when the post was published), engagement metrics (popularity of the post based on likes, shares, and comments).
3. Predictions – based on the signals collected, the algorithm predicts how likely the user is to engage with each piece of content. This prediction is based on past behaviour – for example, if a user frequently engages with videos from a certain site, the algorithm will prioritize similar videos in their feed.
4. Relevance rating – Finally, each piece of content is assigned a relevance score based on its predicted engagement potential. Posts with higher scores appear more prominently in the user feed. This scoring system helps ensure that users are shown content that is most likely to engage them (Macready, 2024).

The key features of this current algorithm could be:

- Personalisation – the algorithm tailors the display of content based on the experience and analysis of each user’s unique interactions and preferences.
- Continuous learning – the algorithm uses machine learning techniques to adapt over time and adapts to changing user behaviour.
- Diversity of content – the algorithm prioritizes relevant content, but also tries to provide a variety of posts from different sources to engage users on different topics.
- Credibility assessment – the algorithm focuses on assessing the credibility of sources in order to promote quality information and reduce misinformation
- User feedback – the algorithm incorporates user surveys to get feedback on what types of posts users want to see more or less of, further refining its personalization capabilities.
- Emphasis on video content – The algorithm has increased the emphasis on promoting original and high-quality video content while reducing tactics to explicitly encourage interactions (Zote, 2022).

4 Discussion and Conclusion

By presenting selected milestones in the development of the Facebook algorithm, we can observe how advances in machine learning and artificial intelligence are changing the way social media works. While Facebook’s early algorithm, called EdgeRank, provided a relatively simple personalisation created by combining just a few factors, current algorithms, in contrast, already take into account thousands of signals, which are then translated into a high degree of personalisation and relevance of content for each user. However, this evolution brings a number of questions and challenges. The introduction of a focus on meaningful interactions has shifted Facebook’s attention towards encouraging quality discussions and limiting passive content consumption. While this move has improved the quality of interactions, it has also highlighted the issue of the proliferation of polarizing and often misinformed content that generates high levels of engagement. The integration of AI to moderate content represents a major innovation in the fight against inappropriate posts, but its effectiveness depends on continuous improvement of models and transparency to users. For commercial entities, knowledge of algorithm principles brings an advantage in optimizing content and communication strategy. However, the dynamic nature of the algorithm requires flexibility and constant adaptation to change. The current emphasis on video content, trusted sources and user feedback provides opportunities for brands, but also requires the creation of authentic and valuable content that drives engagement. In terms of societal impact, a balance needs to be corrected between the commercial objectives of the platform and the algorithm’s responsible involvement in fostering a quality information environment. Future discussions in this area should be directed towards issues of both algorithm transparency and privacy protection, as well as minimising the risk of spreading misinformation that can affect the credibility of the platform itself but also society at large. The results presented in this paper provide a useful basis for understanding how the algorithm works in order to use Facebook effectively, but also open a view on other potential areas of research in this topic.

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AI & MEDIA IN SLOVAKIA: CHALLENGES, OPPORTUNITIES, RISKS. THE SOLUTION: AI NEWS AGENCY EDITOR

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Abstract:

Which media to trust at the moment? Which sources of news and information are truthful? Nowadays, the reliability of information sourcing and verification is crucial for any media – news agency, website or television. Their audience, readership and therefore commercial success stand and fall on the credibility of the content and its delivery as quickly as possible. This study reflects the fact that the media see the implementation of AI as a cure-all for all their ills related to the long-term decline of traditional revenues and the transformation of the industry. Moreover, with the emergence of new competition, especially in the form of social networks, traditional methods of collecting and verifying information are insufficient and time-consuming. Added to this is the growing threat of misinformation. All this poses a major problem for the credibility of the media. The AI News Agency Editor project – a student research project at Slovak Technical University in Bratislava, Faculty of Informatics and Information Technologies (FIIT STU) – aims to address these challenges by creating a special tool – an intelligent AI agent that will help automatically generate sanitized and relevant news with minimal human intervention. And to do it quickly, reliably, interestingly, attractively and cheaply. It will find application in various types of media. The results of the research will be verified directly in practice.

Key words:

AI. AI News Agency Editor. Digitalization of Media. Journalistic Working Conditions. Periodical Press. Slovak Media Market. Transformation of Journalism. Team Project.

1 Introduction

The aim of this study is not only to analyse the transformation of the Slovak periodical press market in the context of the emergence of artificial intelligence (AI) technologies. We also want to outline the challenges, opportunities and risks that the implementation of AI brings. The study argues by analysing economic indicators, such as the fall in print sales and the growth in website traffic, which are directly related to the economic condition of media houses at the time of the advent of AI.

The study also reflects the authors' personal experience. One of them held key management positions in media companies for several decades. This experience provides a deeper understanding of the fundamental changes in the periodical press market, with the research findings highlighting the need for adaptation not only in the market as a whole, but also in journalistic practice itself. The latter is facing new challenges related not only to the changes currently brought about by AI, but by the overall digitalisation and technological innovations. The changes in working conditions and the ruins of the journalism profession are also coming under scrutiny. The other authors are in turn IT specialists with practical experience of developing AI tools for academic and commercial research. From this point of view, the authors' collaboration is unique and unparalleled in Slovak conditions.

Therefore, special attention in this study is devoted to the research and development of a unique and original tool called AI News Agency Editor, whose ambition is to make the implementation of AI in the media easier, simpler and faster. This tool is a concrete response to the facts under investigation and the current situation in the media. The tool is being developed under the guidance of the authors by a team of six engineering students at the

Slovak Technical University in Bratislava, Faculty of Informatics and Information Technologies (FIIT STU), within the course Team Project.

2 Theoretical Framework

2.1 Definition of Terms

Periodical press as a medium in Slovakia is defined in legislative terms by Act No. 265/2022 Coll. on publishers of publications, which introduces the term periodical publication. The terminology defines that a periodical publication is publicly distributed or made available to the public at least twice a year under the same title and must have an International Standard Serial Number (ISSN). The legislation also defines a periodical publication as a news web portal that provides information to the general public and regularly updates its content at least once a week (*Zákon č. 265/2022 Z. z. o vydavateľoch publikácií a o registri v oblasti médií a audiovizíe*, 2022).

Artificial intelligence (AI) is the ability of a device to display human-like capabilities such as reasoning, learning, planning and creativity. According to the European Parliament, AI may become a major technology of the future. It enables technical systems to distinguish between their environment and the conditions in which they find themselves and to solve what they detect as a problem, while acting to achieve a specific goal. AI systems are able to operate autonomously and adapt their behaviour to some extent based on an analysis of previous actions. Meanwhile, artificial intelligence is not new; some technologies based on it have been around for over 50 years. However, the dynamic development of information technology in recent years has led to groundbreaking new inventions. The European Union has therefore identified AI as key to the digitalisation of society and one of its priorities (European Parliament, 2023).

2.2 Periodical Press Market in the Context of the Emergence of AI Technologies

Artificial intelligence is bringing fundamental changes to all areas of human life. Human society is evolving and changing ever faster thanks to AI. The impact on humanity is even expected to be more widespread than at any other time in history. As a result, the implementation of AI is already considered one of the most important innovation milestones in history, like the invention of the wheel, the printing press, the steam engine, electricity, the Internet, the mobile smartphone and social networks. AI is also revolutionising human activities, work, and therefore habitual steps, procedures and work routines. Extensive changes are already happening in the media sector. Meanwhile, the media market has been facing significant challenges for a long time. The decline in readership of traditional media such as print periodicals and conventional television is considered a long-term trend. The decline in the importance of print is most evident in the dramatic fall in print circulation and in the number of copies sold of each edition (Hrnčárová, 2023).

These long-term trends have been further amplified and exacerbated by the Covid-19 pandemic that hit Slovakia in 2020 (Prokeš & Solík, 2024).

Table 1: Print media sales in Slovakia (2017 – 2023)

Newspaper	Publisher	Sales (2023)	Print run (2023)	Change compared to 2017 (%)
<i>Nový čas</i>	FDP Media a.s.	34,706	59,999	-45.8%
<i>Plus 1 deň</i>	NMH a.s.	24,723	38,793	-39.6%
<i>Pravda</i>	OUR MEDIA SR a.s.	14,322	21,700	-51.2%
<i>SME</i>	Petit Press a.s.	13,798	22,572	-36.8%
<i>Hospodárske noviny</i>	Mafra Slovakia a.s.	7,625	12,346	-52.3%

Source: Prokeš & Solík (2024)

Table 1 presents the gravity of the situation for the print media. In particular, the trend of a continuous and dramatic decline in circulation sales can be illustrated by the data of the best-selling daily newspaper *Nový čas* and the best-selling opinion/quality daily *Pravda*. *Nový čas* experiencing a 45.8% decline, the largest drop among the newspapers surveyed. On the other hand, *Pravda* showed the largest percentage drop in circulation, at over 51%.

On the other hand, the pandemic has highlighted the growing potential of the online environment, more specifically the websites of periodicals. It also had positive effects in that it kick-started many long-delayed, albeit necessary, technological changes (Prokeš, 2023).

Table 2: Increase in website traffic of major Slovak newspapers during the Covid-19 pandemic

Website	RU Count (2020)	Increase Compared to 2019 (%)
pravda.sk	1.6 million	+32%
sme.sk	2.3 million	+27%
pluska.sk	1.8 million	+25%
cas.sk	2.1 million	+30%
hnonline.sk	0.9 million	+18%

Source: Prokeš & Solík (2024)

Table 2 summarizes the increase in unique users (RU) on selected websites in 2020 compared to the previous year.

Based on the above data, it can be assumed that print media sales will continue to decline and that the willingness of media house owners will be almost exclusively related to digital content and the continuation of the digital transformation. Ensuring the sustainability of online advertising will also be a significant challenge in the face of increasing competition from social media and global digital giants (Jenkins, 2006).

Table 3: Predicted trends in print sales and online traffic in Slovakia (2023 – 2025)

Year	Estimated Decline in Print Sales (%)	Estimated Increase in Online Traffic (%)
2023	-10%	+15%
2024	-12%	+18%
2025	-15%	+20%

Source: Prokeš & Solík (2024)

Table 3 shows the predicted trends in print sales and online traffic for the coming years.

The global Covid-19 pandemic has caused major drops in financial revenues, worsening the economy and the profitability of the media. The path and salvation, as always in the past, is technological advances and innovation (Señor et al., 2021). Therefore, media houses are constantly looking for new opportunities, trying new technologies and business models, and they see the solution to existential problems in digitalization, and, since the advent of ChatGPT in 2022, precisely in the technologies and tools collectively referred to as AI (OpenAI, 2022).

The potential and rapid development of AI means that the use of this technology is beginning to have not only a supporting function (dictionaries, translations, search engines, search, verification, etc.), but is beginning to be implemented directly in the creation of content (text, photo, video, audio). According to WAN-IFRA and Shickler, AI is finding application in the following areas of relevance: 1) Reader Revenue, 2) Content Creation, 3) Content Distribution (Señor et al., 2021).

2.3 Impact of the AI on the Periodical Press

The implementation of specialized autonomous machine learning systems, particularly for their ability to generate content automatically, has been considered a key change and revolutionary innovation leap in media for several years. For example, the “Top 8 Media

Industry Trends & Innovations” (2024) study puts AI at the top of at least the predictions for 2023 to 2025. The rankings give AI the highest importance and impact on the media business – and it’s in the 32 percent range. The ranking awarded the second major innovation change (audience engagement) an impact score of 19 percent.

Also according to the study “This Is How AI Is Impacting – and Shaping – the Creative Industries, According to Experts at Davos” (Whiting, 2024) AI will replace many traditional activities and also jobs positions. In the creative industries, it could even generate the majority of media content. Some predictions even speak of a value of around 90 percent. Thus, AI will be used not only in the process of optimization, monetization or distribution, but also in content creation (Whiting, 2024).

The transformation of the media market, and of course not only the Slovak one, has been going on for a long time. The situation in the struggle for the attention of the audience (readers, listeners, viewers) and advertising, more precisely advertisers (who are the main source of income for the media), has been further complicated in recent years by new competitors (emerging new media, social networks), but also by the financial crisis, followed by the already mentioned global pandemic Covid-19, the increase in disinformation and hoaxes (Višňovský et al., 2022).

This situation has been further complicated and intensified by the ongoing war in Ukraine. Meanwhile, issues of conflict and exploration of the boundaries between fake news and media freedom were already coming to the fore long before the pandemic or war in Ukraine (Richter, 2019).

In a world of AI-powered synthetic content generation and speculative content forgery (deepfake), this increasingly pressing issue is being taken to the next level. There is a need to define criteria for how to use AI to create synthetic content that is both trustworthy. This is also highlighted in the study “How Can We Build Trustworthy Media Ecosystems in the Age of AI and Declining Trust” (Bantourakis, 2023).

These factors and trends are also changing the very nature of journalism – journalists have always had to adapt to new working conditions and face new challenges, as well as new stressful stimuli. With AI, however, comes an experience that cannot be compared to any milestone in the past. These changes are reflected not only in the content of periodicals, but also in the composition of editorial teams, at the same time placing new demands on the journalist’s work, skills and knowledge (Prokeš, 2023). Simply, the journalist has to adapt to the constantly changing conditions. Unfortunately, as it emerged from personal interviews with experienced journalists in management positions at major Slovak media brands, the journalist is often alone in this, without sufficient support from the editorial or publishing house management, or even without any help at all. At the same time, the threat of a pay cut or the complete loss of a job hangs over his head like the sword of Damocles.

The implementation of AI, although considered a panacea, therefore also in the media encounters several barriers (technical, personnel, financial, legal, ethical), which results in slowing down the actual implementation of AI tools. Yet AI can relieve the burden on journalists and help them to carry out particularly routine procedures and tasks.

2.4 Implementation of AI in the Media

In the 2021 edition of the Journalism, media and technology trends and predictions report, it is reported that the POLIS think tank at the London School of Economics has documented a number of practical case studies where AI has been used since the beginning of 2020 (Señor, 2021). To illustrate, we list a few of these:

- The BBC tested an AI-powered chatbot tool to answer questions about the coronavirus using its own trusted reports and information aggregated from official sources.

- The Reuters news agency used speech-to-text technology to add time-coded transcripts to its entire archive of historic videos dating back to 1896 – making key moments easier to find in 11 different languages.
- The Globe and Mail in Canada has delegated many of the editorial choices on its home page and other landing pages to an AI-based tool called Sophi.
- The South China Morning Post used AI to identify look-like audiences to help it better target new subscribers.

In Slovakia, the first attempts to use AI in the media had marketing significance. One example is the short-term use of an AI journalist (avatar) in the TV Markíza news show (Hečková & Kosečková, 2023).



Figure 1: First experiments with text, image and video generation in media in Slovakia (2023-2024)
Source: own processing, 2024

Figure 1 presents specific examples of the use of AI in Slovak media, from left: the virtual journalist of TV Markíza (Hečková & Kosečková, 2023); the generated idea of a new design of police cars in *Pravda* (Domček & TASR, 2024); short stories in Slovak radio generated on the basis of 10 words sent by listeners (Rádío Slovensko, 2024); and the front page of the daily *Hospodárske noviny* – in some editions, short texts for the front page were generated as abstracts from longer texts and themes inside the edition (S. Luppová, former Editor-in-Chief of *Hospodárske noviny*, personal conversation, May 20, 2024).

Now, however, AI is already beginning to significantly change the processes of content creation and distribution. For now, it may be more for generating entertaining lite content, but it is a matter of time before it is also used in mainstream news and hard news production. Currently, AI is mainly used to generate quizzes, horoscopes, illustrations, tip articles “Did you know...”, “Best of...”, “7 tips for...”. These are mainly compilations for lifestyle magazines. AI is also used to extract shorter texts (abstracts) from longer texts.

2.5 Expectations

The main expected benefit of media houses from the use of AI is savings, more specifically a reduction in staffing costs. Only secondarily, if at all, is the use of AI considered in the creation of new and better products and services for readers, viewers or listeners, as well as in the development of new products for clients, business partners and advertisers. However, the potential to create new and better products that are more tailored to the needs and expectations of audiences is undoubtedly there.

This is evidenced by Reuters’ “Overview and Key findings of the 2024 Digital News Report”, which for the first time included a detailed look at consumer attitudes towards

the use of AI in the news, supported by qualitative research in three countries (the UK, US, and Mexico). As publishers rapidly adopt AI, to make their businesses more efficient and to personalise content, Reuters research suggests they need to proceed with caution, as the public generally wants humans in the driving seat at all times (Newman, 2024).

And it is this potential that is the focus of the AI NEWS AGENCY EDITOR tool that is the subject of this research. Indeed, its primary focus is to produce trustworthy content – generated textual article (report, news, story) – that does not threaten, but instead enhances, the reputation of the medium. This is because the text news generated will only be produced from credible, respected and verified sources after approval by and under the supervision of the journalist.

The generated content will be created, for example, by reinterpreting reports, charts and graphs from economic, consumer or political surveys and researches. Specifically, for example, the development of prices, stock values, political preferences or election results, and so on.

3 Methodology

This study uses a combination of quantitative and qualitative research methods, as well as basic research methods. The primary goal of the project is the design (specification, development, prototype) of an original intelligent AI tool-agent that automatically generates sanitized (the source is clearly indicated) and relevant news for media websites and news agencies in a selected domain and based on input from a journalist. In other words, we offer a solution in the form of a specific research project that results in an easy-to-use AI tool (not only) for journalists – an agent for automatic content generation that helps to handle the onset of AI easier, faster and with minimum stress, i.e. more relaxed.

By developing a process that enables automated information processing and verification, we aim to eliminate misinformation and increase the credibility of media outputs. The research focuses on innovative uses of machine learning and natural language processing technologies. The time saved by generating news can be used by newsrooms to expand their offerings, to create additional/new content that they would not have had the time or staff capacity to create without our tool.

Achieving the primary objective (target, goal) would not be possible without achieving the sub-objectives (targets, goals). The main secondary objective was to understand the current specifics of the media market, or the most comprehensive view of the transformation of the Slovak periodical press market at the time of the advent of AI. This methodological approach allowed us not only to orient ourselves in quantitative indicators, such as sales of printed publications or traffic to periodical websites, but also to understand how the transformation of the media market in recent years has affected the work of individual journalists, their routines and the profession of journalism as a whole.

This approach also reflects the personal practical experience of the authors mentioned above. One as a media practitioner and specialist with many years of empirical knowledge, the others as IT specialists with experience in developing AI tools for academic and commercial research. From this point of view, the authors' cooperation is unique in Slovak conditions.

3.1 Research Design and Sample

The research design was based on the principle of triangulation, combining multiple research methods to increase the reliability and validity of the data collected. The main methods used were the analysis of secondary statistical data and semi-structured in-depth interviews with journalists and AI experts. This design was deliberately chosen to explore

quantitative changes in print sales and online traffic, as well as qualitative aspects of journalistic work in the wake of AI's emergence in the media and harnessing the potential of the latest AI technologies.

The development of the tool, called AI NEWS AGENCY EDITOR, is itself an original research project in which the path to the goal is not precisely defined. However, the goal has enormous potential for the future – both technologically and in terms of practical application. At the same time, it also has pedagogical relevance and benefits, as it involves engineering students at FIIT STU who want to work with modern technologies such as LLM, generative AI, information retrieval and many others.

Students and professionals who see the potential and sense in the use of AI in practice and are interested not only in how these technologies work, but also what are the possibilities and limits of its use, have decided to volunteer as researchers in the project. And not only technical and financial, but also personal, legislative and ethical. However, this is not a project exclusively for journalists or exclusively for programmers and IT designers. Its uniqueness lies precisely in the fact that it uses multidisciplinary and combines theoretical knowledge and empirical knowledge from the practice of all the above-mentioned professions. This is not the rule, even in the media houses themselves. On the contrary, it is precisely academia that allows us to make full use of the potential and possibilities that we do not have time for in practice.

3.2 Team Project

Project work is an important feature of engineering degree programmes. It is considered an essential means of acquiring engineering skills, practical habits and application of the acquired theoretical knowledge. At FIIT STU, project work is included in the curricula by two large-scale projects: 1) individual/Diploma project/ and 2) team/Team project/ (FIIT STU, n.d.a).

The aforementioned projects are implemented through five separate project courses, which are compulsory subjects of the engineering studies. These are Team Project I, Team Project II, Diploma Project I, Diploma Project II and Diploma Project III in all degree programmes of engineering studies (FIIT STU, n.d.a).

We have chosen the Team Project course as the main research tool to develop the AI NEWS AGENCY EDITOR agent as it is the most suitable to achieve the primary objective. The advantage of the research is the fact that the supervisor of this subject is one of the authors, who is also an advisor to the Dean of FIIT STU for strategic projects and development.

The primary task of the Team Project course is primarily to learn the methods and procedures of working in a team when solving a large-scale project (assignment, goal, timetable, intermediate control, presentation of the final result). In this way, the students are to demonstrate their readiness for employment in practice. The student teams formed in the course are very often the first to work with practitioners, ensuring that they work on tasks and solutions that are of real interest to practice. In addition, the project topic is always related to selected aspects of the relevant field of study.

In the Team Project course, the student develops skills:

- Communicate effectively and openly (including moderating discussion) within the team, with its leaders and with the industry partner – the customer;
- Collaborate agilely and proactively to create the outcome and achieve the common goal (including documentation);
- Planning the content and time of a relatively large project (two semesters);
- Effective project management and leadership (participation in task and work management).

Achieving the primary research objective would not be possible even in the Team Project course without the establishment of sub-objectives. Students not only solve the sub-tasks, but also individually present the achieved results and goals, orally, to the other team members. The progress of the research work and the presentation of the results usually takes place once a week throughout the duration of the project. The research project lasts for two semesters. The research team usually consists of six engineering students and one supervisor. In our case, there are two leaders – a media specialist (responsible for relevant input data, credible outputs and connection to the media industry – journalistic practice) and an IT and AI systems specialist (responsible for the technology part and pedagogical guidance).

Successful mastery of the subject by the student is conditioned by the application of knowledge from other subjects. Research topics in the Team Project course must reflect the needs of practice. A topic that does not have the potential to be monetized – sold to an industrial partner – is not addressed.

Completion of the Team Project course is conditional on a similar assessment of project work as is applied in practice. Thus, it includes assessment of the documentation of the project (assignment), the level of design and implementation (according to the project requirements) and the presentation of the project (assignment). The emphasis placed on independent work and self-study is also reflected in the credits assigned to the course. Credits reflect not only the number of schedule hours but also the volume of hours devoted to independent work and self-study (FIIT STU, n.d.b).

3.2.1 TP Cup

A special motivational tool to maximise the results achieved in the Team Project course is the TP Cup event. The TP Cup is a competition for the best student research team of the academic year. The competition gives engineering students the opportunity to publicly demonstrate their abilities and present their research results while creating unique solutions within the Team Project course.

The results and presentation of each project by the students are evaluated by a panel of experts. It is chaired by the course supervisor, and the members of the jury are respected practitioners who are also managers of major companies. They are also representatives of potential investors/customers.

During the TP Cup event, students must describe the context and scope of the project, the setting of objectives, the requirements for the final product, as well as the manner and process by which it was achieved. They must also demonstrate the functionality of the solution (product/service) or describe its limitations. The aim of this presentation is to convince the jury that the team has identified an interesting problem, the research and the solution solves this problem, is innovative and has practical application. It also demonstrates which technologies, knowledge and practices the team has used in the implementation.

Each project that participates in the TP Cup competition will also participate in the IIT SRC Student Science Conference, which is held annually at FIIT STU. The most successful teams must also produce a video of up to 90 seconds about the project and publish it on robime.it (FIIT STU, n.d.c).

3.3 Research Limitations

For an objective assessment of the research, its several limitations must be acknowledged. The quantitative part of the research is based on publicly available statistical data, but these do not reflect all aspects of media market transformation. For example, neither the data on sales of print periodicals nor the data on website audience contain accurate socio-demographic data and more specific information on recipient segments. The qualitative part of the research, while providing a deeper insight into the personal experiences of journalists,

is limited by the number of respondents as well as the limited possibilities to verify their personal accounts. In-depth interviews with twelve journalists, despite the fact that they have worked or are working in all key media brands in the country, provide only a partial insight into the transformation of the market and the journalism profession at the time of the advent of AI. This is analogous to the in-depth interviews with five Slovak AI experts. These limitations could distort the overall picture of media behaviour (journalists and audience), or the possibilities of AI technologies and their most appropriate form of usability for the development of the AI NEWS AGENCY EDITOR tool.

Time is also a limiting factor in the development of an AI tool for journalists in this case, as the development of AI technologies themselves is progressing at a breakneck pace and the possibilities of implementation are changing de facto from day to day. The quality of the tool will also be influenced by the extent to which it is tested in practice, in specific media.

4 Research Findings: AI News Agency Editor

4.1 Features

Based on our research and the empirical knowledge of the authors, we have chosen the primary needs that the AI NEWS AGENCY EDITOR tool must satisfy to be those required as content characteristics by serious media as well as by the recipients, i.e. the receivers of the content. These are: (A) credibility, (B) reliability, (C) timeliness (news).

These qualities are directly related to the reputational as well as existential risk of the medium, or the success of its product, i.e. the audience, readership and therefore commercial success of the medium (content/service). The simplification and facilitation of the journalist's work when using the AI NEWS AGENCY EDITOR tool is concretely manifested by the elimination of the obligation to address basic and key issues: "Is it true?", "Should I trust the source?", "How do I verify the information?"

Based on the above needs/features, we have identified the following as the main capabilities of the agent:

1. **Automated information processing:** The agent will be able to process large amounts of data from different sources, analyse it and generate reports based on this data.
2. **Verification of information:** It is by processing only relevant sources into the knowledge base that the agent will only have access to verified and up-to-date information, thus eliminating the possibility of misinformation. This will increase the credibility of the generated reports.
3. **Personalisation and customisation:** The agent will be able to customise the generated reports based on input from the journalist, allowing for topic or domain specific reports to be created.
4. **Modularity and extensibility:** The final design of the prototype will be based on a modular architecture that will allow the platform to be flexibly extended with new functionality using new modules
5. **Use of LLMs (Large Language Models):** The agent will work with modern language models (such as GPT) that can automatically generate meaningful text, process user input and analyse complex data. These models will enable the agent to produce high quality and comprehensible outputs based on the information gathered.

As part of the initial prototype design, we will implement several key modules:

1. **Data Processing Module:** This module will be responsible for collecting and processing data from various sources. It will include tools for data processing and analysis, as well as algorithms to identify relevant information.

2. **Report Generation Module:** This module will use an LLM to generate texts based on processed data. It will be able to produce different types of news, including short newspaper articles and longer ones.
3. **Information Retrieval Module:** This module will implement information retrieval algorithms using machine learning and natural language processing techniques.
4. **Customization Module:** This module will allow journalists to customize the generated news based on their inputs and preferences. It will include a user interface for human input of requirements and parameters.

4.2 Tool Design and Use

The research project AI NEWS AGENCY EDITOR has exceptional potential to significantly accelerate content creation, improve its quality and credibility, simplify information flows, increase the efficiency of journalists' work or entire editorial teams, and, most importantly, substantially reduce personnel and other costs for all types of media – news agencies, websites, television, radio, magazines, and newspapers. This contributes primarily to enhancing the speed and credibility of the media, offering a richer range of content, improving public information, and increasing the quality of life across society.

Its design and user-friendly interface eliminate concerns and barriers associated with the use of new technology by journalists. Specifically, journalists do not need to understand the other technologies used in the tool's development (e.g., Python, Javascript, SQL DB, Vector DB, Docker, working with LLMs (Large Language Models) and their nuances), and they don't even have to learn to write complex prompts (specific commands for other AI tools).

The most important advantage of the agent is its credibility and reliability – that is, the fact that the journalist has control over the beginning and end of the content generation process, knows the source of the information because it must be verified, and can quickly and easily check the quality of the output at any time.

4.3 Workflow

The use of the AI NEWS AGENCY EDITOR tool is very simple and follows three main steps:

1. **Choosing the source** (the journalist inserts the source link into a field and selects from the list of suggested topics) → the news is then generated →
2. **Option for immediate editing of the generated content** (headline, lead, news article, etc.) →
3. **Export to the editorial system**

Thus, the entire process of automatic news generation is constantly under the journalist's control.

Based on empirical knowledge and the current needs of the media, we have identified additional capabilities of the tool that can be considered essential benefits. Therefore, after generating the news article, the AI NEWS AGENCY EDITOR also suggests:

- Alternatives for the title of the article;
- Alternative: perex (introduction of the article), or summary of the article in points;
- Suggestion of #tags to help distribute the article;
- Indicating topicality and sources in the created article (references);
- Additional content suitable for addition when publishing the generated text, which is a visual accompaniment to the topic. Specifically, it is a graph, graphics, illustration, collage, photos, etc.

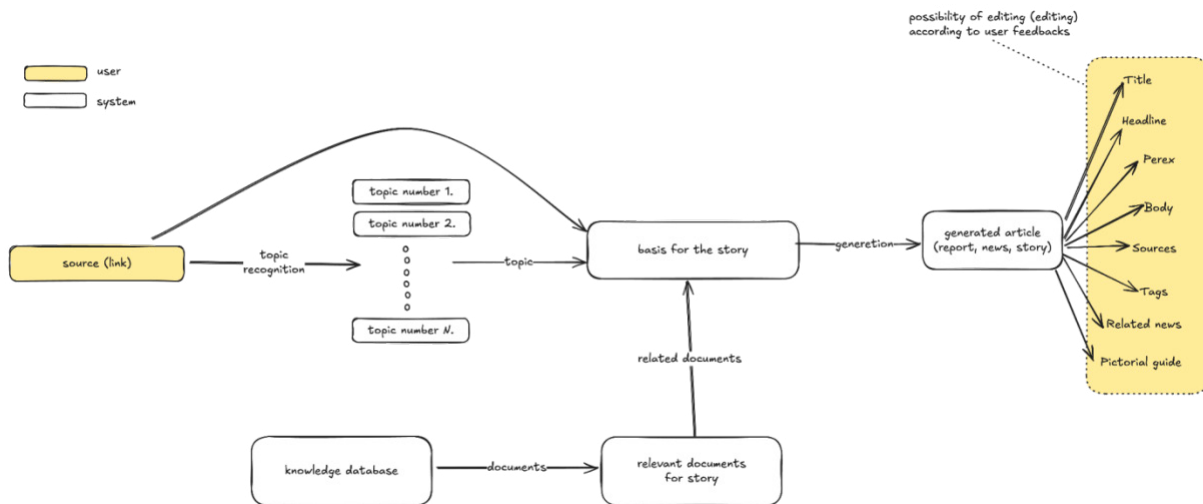


Figure 2: Schematic of the tool AI NEWS AGENCY EDITOR
Source: own processing, 2024

Figure 2 presents a flowchart depicting an automated article generation system’s workflow. It begins with a user-provided source (link), marked in yellow, which undergoes topic recognition to identify multiple topics (numbered 1 to N). These topics flow into a “basis for the story” component. Simultaneously, a knowledge database provides documents that are filtered into relevant documents for the story, which also feed into the basis component. The system then generates an article (report, news, story) that includes several structured components shown in a yellow box: Title, Headline, Perex, Body, Sources, Tags, Related news, and Pictorial guide. At the end of flow there is possibility of editing these components based on user feedback, shown by a dotted line. The entire process is clearly differentiated between user elements (shown in yellow) and system components (shown in white boxes), illustrating a comprehensive automated content generation pipeline from source material to finished article.

4.4 The Dramaturgy of the Generated Report

The report itself consists of the following components:

- **Title of the article;**
- **Engaging text** (not used in smartphones);
- **Signature:** Name, Family name, sign, time / XX. min. for reading;
- **Perex** (introduction of the article), or **summary of the article in points;**
- **Body of the article** (paragraphs);
- **Identification:** source, time... (ABC, 09:21);
- **Link to source** (URL);
- **Tags** (#XXXX);
- **Thematically related articles** (from the media/client website).

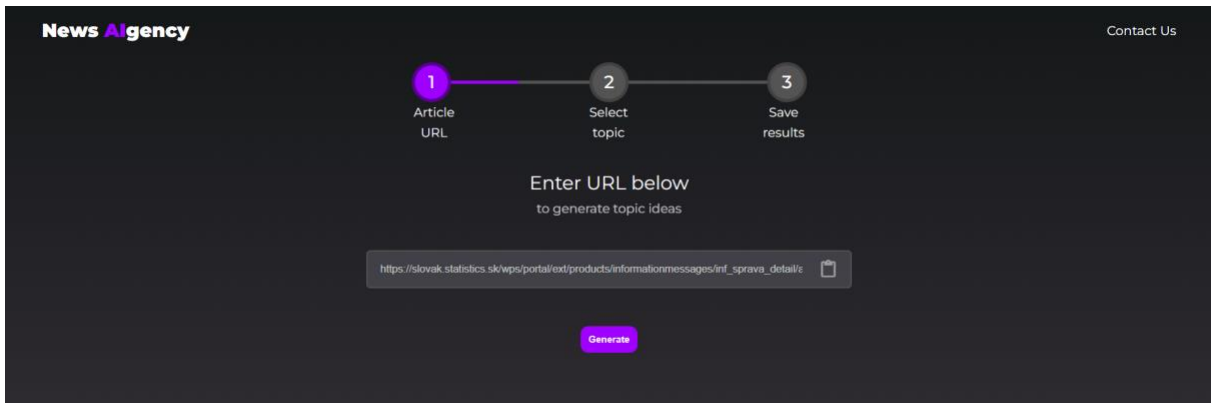


Figure 3: Step 1: Insert article
Source: own processing, 2024

Figure 3 presents web interface for “News Agency” that features a simple 3-step workflow displayed as connected circles at the top: Article URL (highlighted in purple), Select topic, and Save results. Below this is a text input field prompting users to “Enter URL below to generate topic ideas”, with a Slovak statistics URL visible in the field and a purple “Generate” button underneath.

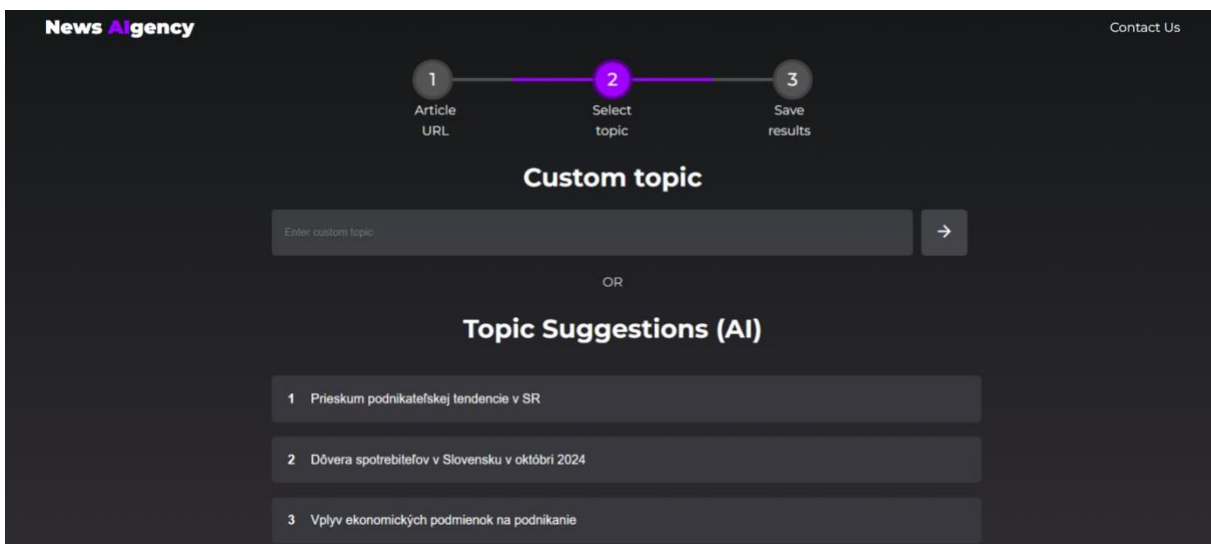


Figure 4: Step 2: Select right topic
Source: own processing, 2024

Figure 4 presents an interface displaying step 2 of a 3-step process in the News Agency platform, where users can either enter their own custom topic in the input field or choose from AI-generated topic suggestions below. The platform offers three pre-generated topics in Slovak about business trends, consumer confidence, and economic conditions, letting users select their preferred focus for the article analysis.

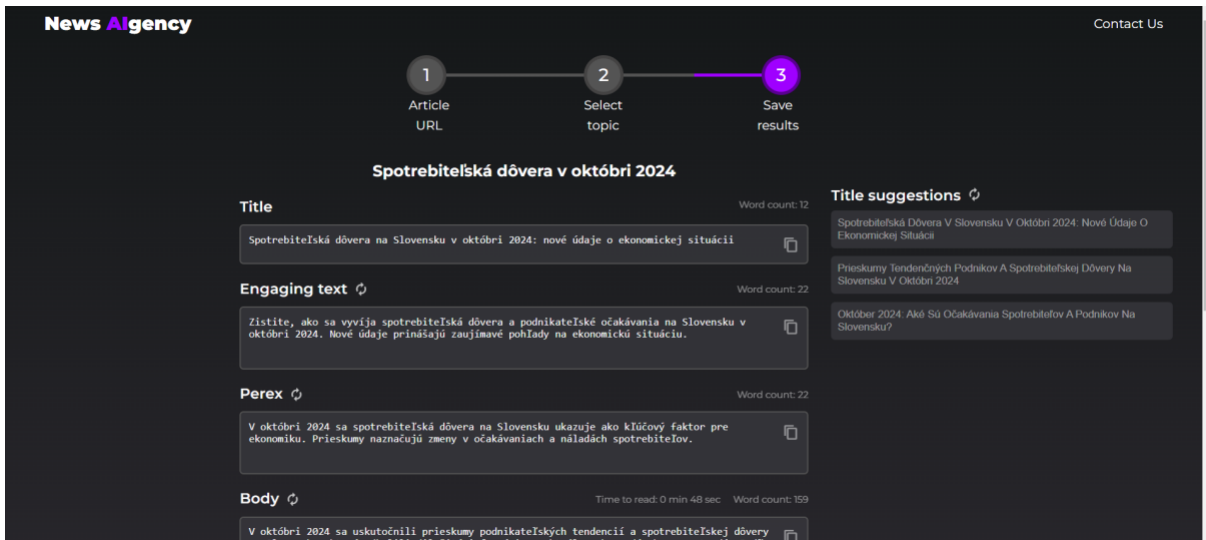


Figure 5: Step 3: Parts of the generated article
Source: own processing, 2024

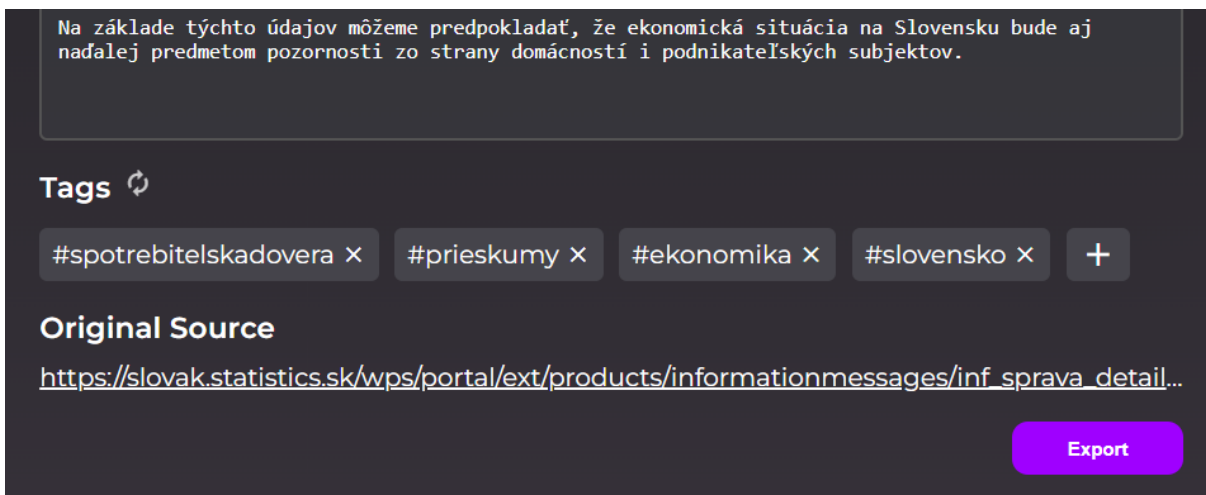


Figure 6: Step 3: Tags and Source for generated article
Source: own processing, 2024

Figures 5 and 6 presents the final step of a three-step content flow (1. Article URL → 2. Select topic → 3. Save results) where users can review and edit the generated report content, with options to modify the title, engaging text, and body sections before exporting it to the system using the purple “Export” button shown at the bottom.

5 Discussion

The findings of the research clearly demonstrate the fundamental and irreversible changes that the market for periodical publications in Slovakia has undergone in recent years. Externally, the transformation is most negatively reflected in the decline in sales of traditional print editions of individual periodicals, which, on the other hand, is accompanied by positive growth in website traffic. Upon closer examination, the fatal impact on the entire media market, including the journalism profession and the economy of media houses, becomes evident. The media (as well as other segments of the economy) traditionally seek solutions in technological innovations, and they are no exception in the current context – with the rise of AI. We discuss the broader implications of the findings with other studies, compare the results, and identify key challenges and future perspectives.

5.1 Transformation of the Media Market

The era of print periodicals is slowly coming to an end, and their sales will never return to previous levels, as evidenced by quantitative analysis. The number of copies sold for certain newspapers has dropped by 50 percent in recent years, with others not far from this threshold (Audit Bureau of Circulations, 2024). The question is how long the publication of print periodicals will remain profitable and how long publishers will be willing to maintain print editions of traditional and well-known titles. In the Czech Republic, the process has already begun, with MAFRA publishing house ending the print version of the legendary *Lidové noviny* at the end of August 2024 (ČTK, 2024).

This phenomenon cannot be solely attributed to the pandemic, but also to a long-standing trend where readers have been increasingly shifting to digital formats, and print media has faced growing competition from digital platforms (see, e.g., Škarba & Višňovský, 2022; Radošínská et al., 2020).

On the other hand, the websites of periodicals show growth potential. The rankings of Slovak internet sites have even shifted at the top (Gemius, n.d.; Prokeš & Solík, 2024).

The increase in website traffic presents a significant opportunity for Slovak media, which are adapting to the digital environment. However, the rise in traffic also brings new challenges, including the need to improve user experience on online platforms and implement sustainable business models for digital content monetization. Many international media companies have already introduced paid content and subscription systems, enabling the financing of quality journalism in the digital space (Jenkins, 2006).

In the discussion about the future of media in Slovakia, it is necessary to consider local specifics, particularly the size of the market (population) and the strength of the economy. These two main factors significantly influence the willingness of media owners to invest in technological changes, modernization, and innovation. Increasing competition from social networks, however, forces publishers to respond and seek new ways of creating original, as well as personalized content and services, and new methods for distributing advertising, content, and monetization. AI technologies, in particular, offer opportunities to fulfill these new visions and goals.

5.2 The Rise of AI

The introduction of artificial intelligence (AI) in news and marketing writing has revolutionized the way content is created and consumed, significantly altering the landscape of these industries. AI technologies enable the automation of content generation, allowing for real-time news reporting and efficient marketing strategies that adapt to audience preferences. This transformation not only enhances productivity and streamlines workflows but also raises important questions about the quality, integrity, and ethics of AI-generated content, making it a notable topic in contemporary discussions on journalism and marketing practices (FutureAIWeb, 2024; On-Page.ai, 2023).

In the realm of news writing, AI-driven tools have emerged as essential assets for journalists, capable of analyzing data, identifying trends, and crafting coherent narratives. This shift allows news organizations to produce a high volume of content rapidly, thereby enhancing their competitiveness in a fast-paced environment. However, concerns about the accuracy and depth of AI-generated articles persist, particularly in covering complex issues that require human insight and ethical oversight (FutureAIWeb, 2024; “AI Tools for Journalists”, 2023).

Similarly, the marketing sector has witnessed a paradigm shift with the adoption of AI tools that optimize content creation and enhance audience targeting. By employing natural language processing algorithms, marketers can generate personalized content that resonates with specific demographic segments, thereby improving engagement and conversion rates.

Nevertheless, the rise of AI in marketing has sparked debates regarding privacy, data ethics, and the potential for manipulation, necessitating a balance between innovation and accountability (On-Page.ai, 2023; Somanathan, 2024; Molinaro, 2023). As AI continues to evolve, the future of both news and marketing writing will likely see deeper integration of these technologies. The collaborative potential between AI and human creativity holds promise for producing richer, more diverse content, yet it also demands vigilance in upholding journalistic integrity and ethical standards to foster audience trust and engagement.

5.2.1 Enhanced Content Production

AI technologies have improved the efficiency of content production within news organizations. For instance, AI-powered news writing tools can generate a high volume of articles in a short period, allowing media companies to stay competitive in a fast-paced news environment (The Friday Team, 2023). Additionally, these tools can tailor news content to specific platforms, adapting the tone and style to suit different audiences, which enhances reader engagement and diversifies storytelling methods (The Friday Team, 2023).

5.2.2 Future Prospects

Looking ahead, the role of AI in news writing is expected to expand, with advancements in technology likely to enhance its capabilities further (FutureAIWeb, 2024).

By fostering collaboration between tech companies and news organizations, the industry can harness the potential of AI while emphasizing the importance of journalistic integrity and ethical practices. The symbiotic relationship between AI and human writers could ultimately lead to richer, more informative news content that appeal to a diverse audience.

5.3 Journalists' Working Conditions: AI Impact on Journalistic Practice

The study “9 Trends That Will Shape Work in 2024 and Beyond” states that:

A 2023 Gartner survey found that 22% of employees expected AI to replace their job in the next five years. Despite this anxiety, in the short- to medium-term, GenAI won't replace many jobs, but it will lead jobs to be redesigned to include new responsibilities, such as interacting with GenAI tools. Gartner predicts that GenAI will play a role in 70% of text- and data-heavy tasks by 2025, up from less than 10% in 2023. (McRae et al., 2024, “AI Will Create, Not Diminish, Workforce Opportunity” section, para. 1)

This will also apply to the journalism profession. Rapid changes require new skills and competencies. The work routines of journalists in periodical publications are changing the most. While just a few years ago, a journalist only needed to be able to write an article for a newspaper or magazine, today, in addition to the print edition, they must be capable of writing an online version of the article, preparing a rich and engaging photo gallery with descriptions, selecting related articles and embedding links, and often securing and describing an attractive video. They also help with the distribution of the article and its promotion on social networks. In some cases, an audio version of the text or an original podcast is also required.

The rise of AI, however, will change the workflow and work routines of journalists more than ever before. It brings new demands on individuals as well as on teamwork. Journalists will need to learn how to work with new tools and think about when and how to use them effectively (Señor et al., 2021). The situation in the rapidly developing field of AI and the constant influx of new tools, however, is starting to become overwhelming, and success could be achieved primarily by tools integrated into the newsroom workflow or directly into editorial systems. This is precisely the ambition of the AI NEWS AGENCY EDITOR agent.

6 Conclusion

AI is bringing profound changes to the life and functioning of human society as a whole. It will also deeply impact the journalism profession. The media market has long been in crisis and undergoing digital transformation. While the Covid-19 pandemic accelerated many processes (Prokeš & Solík, 2024), AI will completely transform the entire industry beyond recognition (Señor et al., 2021). Traditional digital media, such as the websites of periodicals, are responding and adapting to new trends relatively more flexibly. The ability to adapt to new conditions, however, will depend primarily on the ability of individuals to quickly adjust to the rapidly changing landscape and the development of AI, both on the communicator's (journalist's) and the recipient's (reader, viewer, or listener's) side.

6.1 Key Research Findings: Trustworthiness

Despite the dramatic and turbulent changes the media industry has undergone in recent years – especially the sharp decline in print newspaper sales, the ongoing digital transformation, and the rising competition from social media – there is a need to return to the core of the media profession. With the increasing volume of available information, including misinformation and various kinds of hoaxes, which accelerated in Slovakia during the pandemic and with the onset of the war in Ukraine, the question of trust has become fundamental. What is true? Which sources can we trust? These are the questions not only recipients (readers and viewers) are asking, but also journalists themselves.

Therefore, the most important characteristic of content – the value that media houses can offer – is not the quantity of information, but its quality – its trustworthiness. Of course, this was true even before the rise of AI, but with the mass spread of this technology in the age of fake news, reliability and fact-checking have become even more crucial.

Media houses are increasingly emphasizing that their content must not only be relevant but also verified and reliable. A lack of trustworthiness represents a serious reputational and existential risk for traditional media, which they can no longer afford due to the crisis they are facing. Losing audience interest leads to commercial failure, threatens market position, and ultimately results in the demise of a media business.

Media houses see AI as a solution, but insufficient communication of its benefits, poor selection of the right tools, a lack of education, and ambiguous goals among journalists in newsrooms only generate mistrust and create new barriers in implementing AI that could help them. A potential solution could be universal, easy-to-use, and intuitive tools for generating trustworthy content (that can always be edited by journalists), which would take into account the specifics of the journalism profession and the biases that often accompany the implementation of new technologies.

6.2 Future Perspectives and Challenges

An original approach to the risks of uncontrolled AI usage and the fragility of trust in sources in the era of deepfakes was highlighted by Czech student Matyáš Boháček. In December 2023, he presented a digital version (avatar) of the famous CNN journalist Anderson Cooper during prime time on the global news station CNN (CNN, 2023).

Boháček created the avatar in just a few weeks, and even the CNN newsroom could not distinguish the imitation from the real person. Less than a year later, in November 2024, Boháček claimed that he could create any avatar using AI tools in just 20 minutes, requiring only a few photos, a short voice recording, and a video snippet.

Boháček, who is focusing on detecting fake news and false content – particularly photos and videos – at Stanford University in the United States, suggested that every piece of online content should include an informational origin and quality label, similar to how food

products are labeled. The label would not only indicate when and where the content was created, but also whether it had been altered and how. Boháček, who developed an app with the support of the United Nations to convert sign language into text and audio, explains that this informational label would be a simple way for users to immediately verify that the content is authentic and not pretending to be something it is not (ČT24, 2024).

6.3 The Urgency and Relevance of the Research: Long-term Effects of the AI

The development of AI is rapidly evolving and accelerating, not just from month to month, but from week to week. As the most crucial characteristic of generated content, trustworthiness has become increasingly apparent. This is emphasized in the study “In a World of Deepfakes, We Must Build a Case for Trustworthy Synthetic AI Content” (Ammanath, 2024).

This characteristic has also been selected as the primary priority for the AI NEWS AGENCY EDITOR tool we are developing. By generating content exclusively from trusted sources, based solely on the editor’s instructions, and with speed and ease of use, the tool opens up broad practical applications. The generated report, which can be instantly edited within the tool, also contains information about the source’s origin, as well as the full URL where the source information is located, whether it’s a report, graphic, or table. The origin of the content can thus be verified at any time, not only by the journalist using the tool but also by the recipient who receives the generated content. This way, the AI NEWS AGENCY EDITOR tool responds to the latest trends and helps protect the reputation of the media using it.

Thanks to its intuitive interface, input and output control, and simple editing, the tool also helps break down prejudices and eliminate barriers to implementing AI in the journalistic profession. It combines the latest technological innovations that AI offers with the expertise of the human professional. Thus, the AI NEWS AGENCY EDITOR becomes a fully functional assistant, a kind of digital twin to the journalist.

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HUMAN VS. ARTIFICIAL: DETECTING FAKE NEWS AND DISINFORMATION

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Abstract:

The present paper addresses the applicability of artificial intelligence (AI) in detecting fake news and disinformation, reflecting on the issue of a post-truth society in which the spread of false information poses a significant challenge. From a theoretical perspective, the paper describes the phenomenon of post-truth, emphasizes the necessity for critical thinking, and analyses the potential and limitations of AI in this context. The practical part of the research is concerned with the analysis of media content related to the US presidential election in 2024, with a particular focus on the fact-checking of disinformation and false statements made during Donald Trump's election campaign. The research involves an evaluation of the statements through the ChatGPT 4o model. The methodological approach is based on qualitative content analysis and a comparison of the outputs produced by human and AI interpreters, with the aim of debunking disinformation. The key analytical categories include claims identified as problematic, sources used in debunking, and proposed solutions. The results reveal differences in human and AI approaches to disinformation detection, indicating that while AI is an effective support tool, it is still subject to human decision-making.

Key words:

Artificial Intelligence. Disinformation. Fact-checking. Fake News. ChatGPT. Post-factual Society.

1 Introduction: Briefly on the Problems of the Post-truth Society

Academic and scientific community, as well as the general public, has been paying increased attention to the so-called negative phenomena of contemporary society for several years (Hossová, 2018). The latter is nowadays called post-factual, or also post-truth, and is defined as a society in which information based on the emotions and subjective beliefs of individuals and groups is increasingly disseminated. On the contrary, relevant and objective facts are sidelined, rational thinking and relevant scientific evidence are considered tendentious and produced in an attempt to establish a kind of order or even a social system that suppresses the freedom of the individual. In a post-factual society, there is a weakening of trust in traditional media and information sources (journalists, scientific studies and authorities). The acceptance of scientifically based facts is being replaced by the selective acceptance of information that is in line with the value anchors, beliefs and opinions of the recipient, regardless of its veracity. This often leads to the proclamation of half-truths, misinformation, disinformation or even conspiracies (Moravčíková, 2020), which an individual, or a group of people with identical value and opinion settings (the so-called information filter bubbles – see, Mirga & Hrková, 2019), consider to be true, revealing “the efforts of various powers to establish order”. The result of such events and settings of individual components of society is a massive polarization of opinion leading to intolerance and to the distortion of the democratic functioning of society (Kapec, 2021). Truth and facts are considered relative and become easy to manipulate. This affects the day-to-day running of the society, life in it, social relations and also the political direction. There is distrust of its members towards each other in the society, which leads to the polarization.

Behind the “success” of disinformation and fake news are the interests of its creators, who may be motivated by the pursuit of their political, economic or social goals. Conspiracies often arise in the context of political conflicts (Wainberg, 2018), which are characterized by

the presence of strong emotions and can mobilize collective emotions, leading to increased engagement and cohesion within certain social groups (Marie & Bang Petersen, 2022). The creation and dissemination of fake news is also motivated by the desire for power and profit, with the creator prioritizing self-interest over public interests (Winter, 2022). Looking at the motivations of the disseminators of such news, we identify several key psychological and sociological factors that influence this dissemination, e.g., group dynamics and conformity, cognitive and emotional factors, cultural influences, and technological factors. Failure to share fake news, for example, can lead to reduced interaction within a social group, which puts pressure to conform to the group norm (Lawson et al., 2023). An individual's personality traits (high impulsivity, low level of analytical thinking) may also play a significant role, which then increase the propensity of such a person to believe fake news or disinformation (Taurino et al., 2023). Taurino et al. (2023) also state that the propensity to believe such news is increased by emotional reactions, such as fear, which affect or even prevent rational thinking about the problem. This is followed by the presence of cognitive biases in society's thinking as a consequence of technological development (Acampa, 2024), which has changed the ways in which information is disseminated in society and promotes phenomena such as confirmation bias (the tendency to seek out, interpret and remember information that is consistent with our existing beliefs, formed by adopting attitudes from opinion leaders, by identifying with a group, or also by the strong emotions associated with the topic at hand).

Today, a lively topic of professional and lay publicists to precisely address the problem of the presence and massive dissemination of disinformation and fake news in society. The subject of discussion is raising the level of media literacy in society and strengthening individuals' critical thinking skills. When we talk about critical thinking, we are talking about analytical, active, rational thinking, selecting information, evaluating it and drawing conclusions, while being able to judge the relevance and credibility of this information and verify its veracity (see, Potter, 2022). Critical thinking is thus an integral part of media literacy (Buckingham, 2003; Potter, 2016; Hoechsman & Poyntz, 2012; Trilling & Fadel, 2009), and it also plays a crucial role in countering disinformation in terms of assessing the credibility of sources and the information itself. Willingham (2010) sees critical thinking as unbiased reasoning backed by evidence. Thus, an essential component of combating disinformation and fake news is precisely the ability to think critically and to verify the truthfulness/correctness of information – i.e., *fact-checking* (Merriam-Webster, n.d.). The latter can be considered one of the most important skills of the 21st century (UNESCO, n.d.). The skill of analytical thinking (analytical thinking is an integral part of critical thinking and assessing information) is also considered a key skill of the future (*Future of Jobs Report 2023*, 2023).

We can approach fact-checking from several levels – regulatory (legislative framework of approach to the issue), educational (educational programmes and anchoring of the issue in the educational system) and technological (use of fact-checking tools and artificial intelligence).

2 Using AI to Detect Disinformation and Fake News

Fact-checking is nowadays not only the domain of a fact-checker, who would verify “suspicious” or dubious information, its credibility or even its truthfulness. Machine learning tools and artificial intelligence play a significant role in the process of verifying information. “Manual” fact-checking is, moreover, a lengthy process, which is simply not enough in the context of social media and the speed at which disinformation spreads in their environment, and the automation of these processes using artificial intelligence (AI) is coming into its turn (Anders, n.d.).

Jakub Šimko, an expert researcher at the Kempelen Institute for Intelligent Technologies, lists three main areas of application of AI in the fight against disinformation: indicating false content, detecting machine-generated content, and assisting media professionals¹ (Zsigmondová, 2023). In machine-generated content detection, we are talking about detecting fictitious content that is delivered to recipients as various scams for profit (scams), spam, etc. False content indication is about judging information/media content based on features that indicate informationally poor-quality content. However, this is not the AI's final decision on whether the content is true or false. That decision has to be made by a human fact-checker. To some extent, this option represents a kind of assistance to media professionals (which includes fact-checkers) in detecting disinformation and fake news. The usefulness of AI in this respect can be seen, for example, in identifying supporting materials, finding evidence of the falsity of the analysed content or claim matching (comparing statements with previously verified claims in order to moderate content, detecting and refuting disinformation, see, Choi & Ferrara, 2024). The above suggests that humans are (so far) irreplaceable in this process, or not excludable from it. Šimko sees the potential of AI in the fight against disinformation mainly in increasing the efficiency of the fact-checker's work, in automating the steps of fact-checking itself, thus speeding up responses, and also in a potentially better approach to fact-checking resulting from the amount of information available to AI models (Zsigmondová, 2023).

In discussing the potential usefulness of AI in verifying or debunking disinformation, we must not forget the limits or challenges that AI has in this area. In particular, Šimko (Zsigmondová, 2023) reminds us of human intentionality in training AI models, which fundamentally influences the direction a given AI model takes, the information it works with, and the way it assesses and verifies the truth of that information. The responsibility of the model operator is therefore the key.² The phenomenon of AI hallucination, where AI offers information that is inaccurate, misleading or fabricated, is also emerging in relation to AI-generated content. AI hallucinations can stem from, for example, linguistic inaccuracies or quality issues with the data it is working with (Abbas, 2024). Again, we can only eliminate the negative or potentially dangerous effects of information obtained in this way by verifying the information obtained and not relying on AI systems excessively (Schmitt et al., 2024). The possibility of using AI to create disinformation, i.e. practically misusing it, e.g. in the creation of deepfake videos or images, also appears to be a significant problem.

AI models should therefore assist in identifying disinformation or proving the falsity of specific analysed communications, but they require human oversight. This is, after all, also determined by the Artificial Intelligence Act (2024), which identifies human oversight as inevitable. In their study, Zeng et al. (2024) state that a hybrid approach to detecting disinformation, i.e., a combination of AI and human factors, leverages the strengths of both domains, leading to improved veracity assessments. At the same time, it can lead to improving the ability to identify fake news in an individual (Schmitt et al., 2024). Thus, effective disinformation detection requires a partnership between AI and human analysts who interpret the results and provide context (Montoro-Montarroso et al., 2023).

3 Methodology

The present paper deals with the applicability of AI in detecting fake news and disinformation. The theoretical part outlines the issue of post-factual/post-truth societies with a focus on describing the phenomenon of post-truth in the context of disinformation and fake

¹ Author's note: The dialogue occurs in the time frame 04:58 – 06:33.

² Author's note: The dialogue occurs in the time frame 09:10 – 09:58.

news. On the theoretical level, the paper also outlines the issue of the dissemination of disinformation and fake news and defines the necessity of critical thinking as a key competence applied in the fight against the above-mentioned phenomena of the post-truth society. Following the theoretical outline of the problem, the text also discusses the use of AI in detecting disinformation and fake news, outlining the possibilities that AI offers, as well as the challenges that its use brings.

The aim of the present paper is to identify the differences in the approach to debunking disinformation and fake news by human and artificial intelligence. As the views of AI experts show, despite concerns about the replacement of human power by artificial intelligence, the human remains at the imaginary top of the chain and is the end point that makes decisions, chooses the most appropriate solutions and proposes actions. AI is emerging as a tool to assist, increase efficiency and optimise processes across many areas of life, including fact-checking and the work of media professionals. Based on this knowledge, I set the **partial objectives of** the present paper as follows:

- Identify the reasons and assertions by which the AI evaluates the analysed content as problematic and relies on them to debunk disinformation.
- Find out what resources AI uses in detecting disinformation.
- Define the differences between human and AI interpretation in the process of debunking or fact-checking of analysed content.

The research material for the purpose of this investigation consists of media content dealing with the topic of the US presidential election in 2024, which is focused on debunking disinformation, fake news, false claims or conspiracies spread by the politician during the election campaign. At this point, the research material consists of only one comprehensive and summarizing text published on the CNN news portal (Dale, 2024a), from which we select (by deliberate choice) the three most interesting and “bizarre” pieces of information subjected to fact-checking by the author. The research material also includes AI-generated content based on a prompt, the intention of which is to ask the AI to evaluate the veracity, or fact-checking, of the statements and assertions contained in the above media communication.

The workflow consists of several stages. The first phase involves studying and analysing the research material chosen on the basis of research and deliberate selection with a view to the depth of description and explanation of debunked disinformation and fake news. The next step is to create a prompt that I input to the AI model. For the purposes of this paper, I work with the ChatGPT 4o model. In the next stage, I enter a query to the AI model, which is a prompt along the lines of

You're a fact-checking professional and you verify potential fake news and disinformation. Verify the accuracy or debunk the information. Point to the sources you use in your verification and highlight the claims you evaluate as problematic and an indication that they are disinformation, fake news, or false content. The information you are to verify and debunk: <information>. Outcome: evaluate the information you have analysed and suggest a solution.

Prompt takes into account the recommendations and points to consider when creating assignments for AI (see, e.g., Gindham, 2024) – role, instruction/command, context, input, and desired output (format, outcome). After receiving a response from the AI model, I proceed to a content analysis of the responses and to a comparison of the content provided by the AI with the content published in the analysed article based on the **analytical categories**: the assertions that the author of the article/AI relies on in debunking the specific disinformation; the sources that the author/AI uses and refers to in debunking the disinformation; the proposed solution/concluding evaluation that the author/AI provides to the reader. The analysis results in the delineation of the differences between human and AI

interpretation in the process of detecting or fact-checking fake news and disinformation. I approach the fulfilment of the stated objectives by using **qualitative content analysis** and subsequent comparison. Based on the data collected and its interpretation, I answer a **research question based on** the stated aim of the thesis:

RQ: What differences do we identify in the analysis and evaluation of the detection of disinformation and fake news by human and artificial intelligence?

4 Results

In the following section, we present the data obtained by reading with the ChatGPT 4o model processed in a table.

Table 1: ChatGPT model responses to requests related to debunking disinformation and fake news

Information	Prompt	ChatGPT 4o' answer	Sources used by ChatGPT 4o ³
<p>1. Trump claimed that schools are sending children for gender-affirming surgeries without their parents' knowledge.</p>	<p>You're a fact-checking professional and you verify potential fake news and disinformation. Verify the accuracy or debunk the information. Point to the sources you use in your verification and highlight the claims you evaluate as problematic and an indication that they are disinformation, fake news, or false content. The information you are to verify and debunk: "At an event held by a conservative group in late August, Trump claimed that schools are sending children for gender-affirming surgeries without their parents' knowledge. He said, 'The transgender thing is incredible. Think of it. Your kid goes to school and comes home a few days later with an operation. The school decides what's going to happen with your child.'" Outcome: evaluate the information you have analysed and suggest a solution.</p>	<p>Former President Donald Trump claimed at a conservative event in late August that schools are sending children for gender-affirming surgeries without parental knowledge, stating, "Your kid goes to school and comes home a few days later with an operation. The school decides what's going to happen with your child."</p> <p>Evaluation of the Claim:</p> <p><i>1. Medical Procedures in Schools:</i> Schools are not equipped to perform surgical procedures, including gender-affirming surgeries. Such operations are complex and require specialized medical facilities. There is no evidence to support the claim that schools are facilitating or arranging for students to undergo gender-affirming surgeries without parental consent. Fact-checking organizations have debunked this assertion, highlighting the lack of substantiating cases or reports.</p> <p><i>2. Parental Consent and Medical Ethics:</i> In the United States, minors typically cannot undergo significant medical procedures without parental consent, except in specific emergency situations. Gender-affirming surgeries for minors are rare and involve thorough evaluations by medical professionals, mental health assessments, and, crucially, parental involvement and consent.</p> <p><i>3. Professional Standards and Guidelines:</i> Major medical associations, such as the American Medical Association and the American Academy of Pediatrics, have established guidelines for treating transgender youth. These guidelines emphasize the necessity of parental involvement in the decision-making process for any medical interventions.</p>	<p>Yandell, K. (2023, May 22). <i>Young children do not receive medical gender transition treatment.</i> https://www.factcheck.org/2023/05/sci-check-young-children-do-not-receive-medical-gender-transition-treatment/</p> <p>Abels, G. (2024, September 5). <i>Trump's Pants on Fire claim that schools are performing gender surgeries without parent knowledge.</i> https://www.politifact.com/factchecks/2024/sep/05/donald-trump/trumps-pants-on-fire-claim-that-schools-are-perfor/</p> <p>+ 22 sources (used but not directly cited)</p>

³ Author's note: Sources have been edited by the author due to not conforming to the APA Style 7 citation system. The original entry created by ChatGPT can be found in the links: OpenAI (n.d.a), OpenAI (n.d.b), OpenAI (n.d.c).

		<p>Conclusion: The claim that schools are sending children for gender-affirming surgeries without parental knowledge is unfounded and lacks credible evidence. Such statements can contribute to misinformation and unwarranted fear among parents and communities.</p> <p>Recommendation: To ensure accurate information dissemination, it is essential to consult reputable sources and rely on verified data, especially concerning sensitive topics like medical procedures for minors. Engaging with healthcare professionals and educational authorities can provide clarity and prevent the spread of misinformation.</p>	
<p>2. President Joe Biden supposedly sent Kamala Harris to negotiate with Russian President Vladimir Putin in 2022 in an effort to prevent an invasion of Ukraine.</p>	<p>You're a fact-checking professional and you verify potential fake news and disinformation. Verify the accuracy or debunk the information. Point to the sources you use in your verification and highlight the claims you evaluate as problematic and an indication that they are disinformation, fake news, or false content. The information you are to verify and debunk: Trump told a vivid story on Fox News in late August about how President Joe Biden supposedly sent Harris to negotiate with Russian President Vladimir Putin in 2022 in an effort to prevent an invasion of Ukraine. Trump claimed Harris was sent "to see Putin in Russia three days before the attack. She went. She said – she gave her case. He attacked three days later. He attacked three days later. He laughed at her. He thought she was a joke." Trump also told a version of the story at the September debate. Outcome: evaluate the information you have analysed and suggest a solution.</p>	<p>Former President Donald Trump has repeatedly claimed that Vice President Kamala Harris met with Russian President Vladimir Putin in Russia shortly before the February 2022 invasion of Ukraine. He asserted that Harris's meeting was ineffective, leading Putin to proceed with the invasion.</p> <p>Fact-Check Analysis:</p> <p>1. <i>Claim:</i> Vice President Kamala Harris met with President Vladimir Putin in Russia three days before the invasion of Ukraine.</p> <p>- Verification: There is no evidence to support that Vice President Harris met with President Putin in Russia or elsewhere before the invasion. In February 2022, Harris attended the Munich Security Conference in Germany, where she met with Ukrainian President Volodymyr Zelensky and other European leaders to discuss the escalating tensions. She did not travel to Russia or meet with Putin during this period.</p> <p>2. <i>Claim:</i> Harris's meeting with Putin was intended to prevent the invasion, but Putin proceeded three days later, allegedly laughing at her efforts.</p> <p>- Verification: Since no such meeting between Harris and Putin occurred, the assertion that Putin laughed at Harris's efforts is unfounded. This narrative appears to be a fabrication without basis in documented events.</p> <p>Conclusion: The claims made by former President Trump regarding Vice President Harris's supposed meeting with President Putin are false. No such meeting took place, and the narrative suggesting it did is a fabrication. It's crucial to rely on verified information and credible sources to prevent the spread of misinformation.</p>	<p>Gore, D. (2024, August 23). <i>Trump's false claim that Harris met with Putin.</i> https://www.factcheck.org/2024/08/trumps-false-claim-that-harris-met-with-putin/</p> <p>+ 14 sources (used but not directly cited)</p>

<p>3. Trump has told a story about how “the Congo” has deliberately emptied prisons to somehow get its criminals to come to the United States as migrants.</p>	<p>You’re a fact-checking professional and you verify potential fake news and disinformation. Verify the accuracy or debunk the information. Point to the sources you use in your verification and highlight the claims you evaluate as problematic and an indication that they are disinformation, fake news, or false content. The information you are to verify and debunk: Trump has told a story about how “the Congo” has deliberately emptied prisons to somehow get its criminals to come to the United States as migrants. “Many prisoners let go from the Congo in Africa, rough prisoners,” he said at an August event in Arizona. At an August rally in Pennsylvania the week after, he said, “In the Congo, in Africa: 22 people deposited into our country. ‘Where do you come from?’ ‘The Congo.’ ‘Where in the Congo?’ ‘Jail.’” Outcome: evaluate the information you have analysed and suggest a solution.</p>	<p>Former President Donald Trump has repeatedly claimed that the Democratic Republic of the Congo (DRC) is releasing prisoners to migrate to the United States. For instance, at an August event in Arizona, he stated, “Many prisoners let go from the Congo in Africa, rough prisoners.” Subsequently, at a rally in Pennsylvania, he mentioned, “In the Congo, in Africa: 22 people deposited into our country. ‘Where do you come from?’ ‘The Congo.’ ‘Where in the Congo?’ ‘Jail.’”</p> <p>Evaluation of Claims:</p> <p>1. <i>Mass Release of Prisoners for Migration:</i></p> <ul style="list-style-type: none"> - Claim: The DRC is intentionally releasing prisoners to migrate to the U.S. - Findings: There is no evidence supporting this claim. Experts on Congolese prisons have found no indications that the DRC is releasing prisoners for the purpose of migration to the U.S. <p>2. <i>Specific Incidents of Released Prisoners Migrating:</i></p> <ul style="list-style-type: none"> - Claim: Individuals from Congolese prisons are arriving in the U.S. - Findings: No credible reports or data corroborate this assertion. U.S. border officials have encountered migrants from the DRC, but there is no evidence linking these individuals to recent prison releases in the Congo. <p>3. <i>Statements from Congolese Authorities:</i></p> <ul style="list-style-type: none"> - Claim: The DRC government is facilitating the migration of ex-prisoners to the U.S. - Findings: Congolese officials have denied these allegations. Patrick Muyaya Katembwe, a spokesperson for the DRC, stated, “Everything he is saying is not true.” <p>Conclusion: The claims made by former President Trump regarding the DRC releasing prisoners to migrate to the U.S. lack credible evidence and have been refuted by experts and Congolese authorities. These assertions appear to be unfounded and should be regarded as misinformation.</p> <p>Recommendation: To prevent the spread of misinformation, it is essential to verify claims through credible sources before sharing or endorsing them. Relying on established fact-checking organizations and official statements can help ensure the accuracy of information.</p>	<p>Ramirez Uribe, M., & Sherman, A. (2024, June 12). <i>No evidence for Donald Trump’s claim that Congo is emptying its prisons to send prisoners to the U.S.</i> https://www.politifact.com/factchecks/2024/jun/12/donald-trump/no-evidence-for-donald-trumps-claim-that-congo-is/</p> <p>CNN Newsource. (2024, March 16). <i>‘Everything he is saying isn’t true’: Congolese governments denounce Trump’s baseless stories about emptied prisons.</i> https://kion546.com/politics/cnn-us-politics/2024/03/16/everything-he-is-saying-isnt-true-congolese-governments-denounce-trumps-baseless-stories-about-emptied-prisons/</p> <p>+ 23 sources (used but not directly cited)</p>
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Source: own processing, 2024 based on chats taken with ChatGPT (OpenAI, n.d.a; OpenAI, n.d.b; OpenAI, n.d.c)

4.1 Human vs. Artificial: Evaluation of the Analysed Information and Comparison of the Human and AI Approach

Information 1: Trump claimed that schools are sending children for gender-affirming surgeries without their parents’ knowledge.

Table 2: Comparison of human and AI approaches to debunking information 1

	CNN article (Dale, 2024a)	ChatGPT 4o (OpenAI, n.d.a)
The claims that the author of the article/AI relies on to debunk a particular piece of disinformation	without evidence, even in states where it is allowed children under 18 need parental consent	Schools are not equipped to implement such changes/transitions, medical ethics and parental consent required, existing standards and guidelines
The sources used and referenced by the author/AI in debunking the disinformation	Dale, 2024b – works with testimonies of doctors and competent persons	Yandell, 2023 Abels, 2024 In addition, it lists 22 other sources that are not directly cited in the response that ChatGPT provides. ⁴
The proposed solution/final evaluation that the author/AI provides to the reader	It does not propose a solution stemming from the nature of the article, the essence of which is to debunk this disinformation and alert the reader to the problematic and untrue content	Unsubstantiated information without evidence with the potential to cause fear, recommendation: non-specific – consult experts, refer to relevant sources

Source: own processing, 2024

Information 2: President Joe Biden supposedly sent Kamala Harris to negotiate with Russian President Vladimir Putin in 2022 in an effort to prevent an invasion of Ukraine.

Table 3: Comparison of human and AI approaches to debunking information 2

	CNN article (Dale, 2024a)	ChatGPT 4o (OpenAI, n.d.a)
The claims that the author of the article/AI relies on to debunk a particular piece of disinformation	Biden did not send Harris to negotiate with Putin Putin never spoke to Kamala Harris Harris attended a conference in Germany where she met with Zelensky	Kamala Harris did not meet with Putin and did not travel to Russia at the time in question.
The sources used and referenced by the author/AI in debunking the disinformation	Dale, 2024c fact-checking article published before to debunk this disinformation The White House (2022) – report of Harris and Zelensky meeting in 2022 Stokols (2022) – report of news TASS (2024) – Kremlin statement	Gore, 2024 mentions 14 additional, not directly cited sources
The proposed solution/final evaluation that the author/AI provides to the reader	States that the story is wholly false. It does not propose a solution stemming from the nature of the article, the essence of which is to debunk this disinformation and alert the reader to the problematic and untrue content	The allegations are false. It suggests relying on verified information and credible sources to avoid the spread of disinformation.

Source: own processing, 2024

⁴ Autor’s note: ChatGPT explains using not directly cited sources in order to “...to confirm and locate the most relevant and reputable sources. While I used them to cross-check the accuracy of the claims and retrieve fact-checking articles, I did not directly cite search engines or the search results in the evaluation. Instead, I cited the specific authoritative sources (e.g., FactCheck.org and PolitiFact) that provided the information I used to verify the claim. This ensures that the references are clear, credible, and directly traceable to their original content” (OpenAI, n.d.a). It also states that it prioritizes resources that provide clear links to data, medical guidelines, or official policies (OpenAI, n.d.a).

Information 3: Trump has told a story about how “the Congo” has deliberately emptied prisons to somehow get its criminals to come to the United States as migrants.

Table 4: Comparison of human and AI approaches to debunking information 3

	CNN article (Dale, 2024a)	ChatGPT 4o (OpenAI, n.d.a)
The claims that the author of the article/AI relies on to debunk a particular piece of disinformation	Zero evidence Information rejected by Democratic Republic of Congo (DRC) and Republic of Congo	Zero evidence supporting the claim that the DRC is intentionally releasing prisoners to migrate to the U.S. or that Congolese prisoners are arriving in the U.S. Congolese officials have denied these allegations.
The sources used and referenced by the author/AI in debunking the disinformation	Dale, 2024d	Ramirez Uribe & Sherman, 2024 CNN Newsource, 2024 mentions 23 additional, not directly cited sources
The proposed solution/final evaluation that the author/AI provides to the reader	The claim is fiction. It does not propose a solution stemming from the nature of the article, the essence of which is to debunk this disinformation and alert the reader to the problematic and untrue content	The allegations are refuted and should be treated as disinformation. It suggests relying on verified information and trusted sources – e.g. official authorities before we share information and therefore to avoid spreading disinformation.

Source: own processing, 2024

5 Discussion

From the above tables, it can be said that the approach of human and AI in debunking the above information is not fundamentally different. Analysing the claims relied upon by the author (Dale, 2024a) and ChatGPT (OpenAI, n.d.a; OpenAI, n.d.b; OpenAI, n.d.c), I identify that the primary goal of both approaches is to find relevant evidence to help evaluate the information presented as true or false, respectively. In the case of the former information (see Table 2), we see little difference between the human and AI approaches. The AI model lists as its first key claim the statement that schools are not equipped to perform gender-affirming surgeries, while Dale does not pay attention to this information. Here, ChatGPT’s evaluation can be seen as “shallow” or it is too obvious evidence that is not essential in debunking this information. On the other hand, however, there is agreement between Dale and ChatGPT on other assertions (the necessity of parental consent, medical ethics, standard medical practice on this matter). The agreement in the human and AI approach is also evident in key claims in the debunking of information about candidate Kamala Harris’ visit to Russia and information about the resettlement of Congolese prisoners to the US. In Table 4, the arguments or claims relied upon by both human and AI are identical. In the case of the second piece of analysed information (Table 3), the arguments of the human are more numerous, but at the same time the arguments relied upon by ChatGPT cannot be considered insufficient – they cover the essentials, although they do not provide as broad a context as Dale does in the article.

If we look at the sources used by both humans and AI to argue their decisions about the falsity of information, we see a greater difference than in the previous category. While Dale, in all three cases, refers to his own previously published articles, the gist of which is to debunk said disinformation, ChatGPT chooses fact-checking sites that have addressed the issue. We consider the above to be a natural and expected phenomenon. Ad 1, the article that constitutes the research paper (Dale, 2024a) is a summary article that references several problematic statements made by President Trump in the election campaign. Ad 2, Daniel Dale is a fact-checker focusing on verifying politicians’ statements. Thus, in the summary article,

he cites previously debunked disinformation and naturally links to the original, summary published articles that contain compelling arguments, statements by competent persons, doctors, politicians, references to official documents, etc. At the same time, however, he also makes these references in the analysed article (Dale, 2024a) – e.g. official statements or opinions. ChatGPT uses fact-checking sites that have covered the topic to refute the disinformation and refers to a wider range of sources, although it does not cite these directly in the text. It directly cites one or two sources, but always lists a larger number of additional sources in the source list that support the refutation of the disinformation. In this way, it can be said to give the user the opportunity to study the issue in more detail. It is important to mention that it always refers to relevant and credible sources. At the same time, it is important to note that ChatGPT cited the sources used incorrectly (in the context of established citation rules - APA Style 7). However, the URL of the source is correct in all cases, which we consider very important.

In the final evaluation of the fact-checked information, little difference between human and AI can be observed. Dale (2024a) does not propose a solution; the article is in the nature of fact-checking information and alerts the reader to problematic and false content. Although he does not make a direct request to the reader to ignore the information, he clearly labels it as misleading and false. In all three cases, ChatGPT states that the information is unsubstantiated without existing evidence and labels it as potentially dangerous in the sense of fear-mongering (which is essentially a characteristic of disinformation and fake news). At the same time, ChatGPT makes a general recommendation to rely on relevant sources and to verify the information in order to prevent the spread of this particular disinformation. AI's caution in this regard can be attributed to the way the brief for the AI model is worded (calling for a proposed solution or summary of the situation). The position of the human and the AI is basically the same and clearly readable – it evaluates the analysed content as problematic, untrue and potentially dangerous.

Based on the carried out analysis, I proceed to answer the stated research question:

RQ: What differences do we identify in the analysis and evaluation of human and artificial intelligence detection of disinformation and fake news?

Based on the analysis and comparison, I conclude that there are small differences in the approach of humans and AI in the process of detecting fake news and disinformation. These differences stem from the nature of how AI models work and the nature of the journalist's/fact-checker's job. The differences logically and expectedly register in the sources used to debunk disinformation and fake news. In this case, one refers for the sake of argument to one's own previously published articles, official documents, official statements, and works directly with the testimony of competent persons who are able to comment relevantly on the topic. AI operates with available fact-checking articles and published content, mostly from websites dedicated to analysing and exposing problematic content. I see the above as a logical consequence of AI using information and evaluating content from publicly available online sources. However, the fact that AI works with relevant and credible sources can clearly be considered fundamental and positive.

6 Conclusion

In the present paper, I discuss the use of AI in the process of fake news detection. The results of the analysis and comparison of the human and AI approach in this process show what I suggest in the theoretical part of the paper and what researchers and practitioners in this field say. AI can be an effective tool in the fight against disinformation, hoaxes, fake news or conspiracies. However, it is important to note that the information that AI draws on

comes from humans and the responsibility of the creators and operators of the various AI models plays a crucial role here⁵ (Zsigmondová, 2023). At the same time, it is essential to recall that AI used in the fact-checking process requires human oversight (*Artificial Intelligence Act*, 2024), and it is the competent individual or group of individuals who should “have the final say” in the process and decide on the truthfulness/untruthfulness or problematic nature of specific content.

In the context of the digital age and the post-factual society in which we live, there is also a lively debate about the necessity of raising the level of media literacy and the emphasis on building critical (analytical) thinking competence across all population groups. While fact-checking alone is an effective tool, it is important to recognise that disinformation can thrive in an environment where solid media literacy is lacking. Anders (n.d.) points out that fake news is intensely spread not only through social media (which we often perceive as the sole culprit), but also by word of mouth in face-to-face interactions. We should therefore fight not only against the creators of deceptive content, but also focus on increasing society’s resilience to this phenomenon. Therefore, an effective fight against disinformation requires a multifaceted and systematic approach that combines fact-checking with comprehensive educational strategies in order to result in a media-literate and critically thinking population.

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⁵ Author’s note: The dialogue occurs in the time frame 09:10 – 09:58.

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COMPARATIVE ANALYSIS OF THE TOP FRAMEWORKS OF DIGITAL TRANSFORMATION

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Abstract:

Digital transformation is a critical factor for the long-term development and competitiveness of organizations in areas such as IT, marketing, and education. This study conducts a comparative analysis of 12 key digital transformation frameworks, including ITIL, TOGAF, and BIZBOK, evaluating their application across industries and their ability to address challenges associated with digital transformation. The analysis considers several factors, such as the complexity, flexibility, implementation costs, and the level of support each framework provides to organizations during the transformation process. Findings show that no single framework is universally applicable. Instead, the effectiveness of each framework depends on the specific context of the organization, its technological maturity, and its ability to adapt to dynamic changes. This study particularly highlights the relevance of digital transformation frameworks in marketing and education, where adaptability and customer-focused strategies are key. The conclusions offer practical recommendations for organizations considering the adoption of a digital transformation framework, emphasizing the importance of aligning the chosen framework with the organization's unique needs and goals.

Key words:

BIZBOK. Digital Transformation. Digital Transformation Frameworks. ITIL. TOGAF.

1 Introduction

In today's rapidly evolving business landscape, digital transformation has become a critical imperative for organizations seeking to remain competitive and relevant. This chapter sets the stage for our research by establishing the necessary theoretical foundation. We begin by defining key concepts related to digital transformation in marketing, including digitization, digitalization, and digital maturity. Next, we examine the growing interest and search trends surrounding digital transformation, along with forecasts for its development over the next two years (European Commission, 2021). We then introduce the main frameworks that guide digital transformation efforts, such as ITIL (*ITIL® Foundation ITIL® 4 Edition*, 2019), TOGAF (Generoso, 2024), and BIZBOK (*A Guide to the Business Architecture. Body of Knowledge (BIZBOK Guide)*, 2020), followed by an analysis of the challenges organizations face when implementing these frameworks (Bist et al., 2022). This chapter also identifies the primary risks and obstacles associated with digital transformation (Gong & Ribiere, 2021).

Finally, we conclude with a review of current digital transformation frameworks in use both globally and within the Slovak context (Bellaaj, 2023; Deogaonkar, 2023). Digital transformation presents a multifaceted challenge, as many organizations are striving to transition their operations to digital platforms in order to maximize efficiency and value creation (Gong & Ribiere, 2021). In pursuing this transformation, businesses increasingly adopt agile and lean methodologies while leveraging advanced technologies such as the Internet of Things (IoT), big data analytics, machine learning, and artificial intelligence (Erevelles et al., 2016). These digital innovations often lead to cost reductions, increased revenue, and enhanced profitability, while also providing the flexibility necessary to address contemporary challenges (Deloitte, 2024). As customer expectations for quality and availability continue to rise, businesses are under greater pressure to optimize their processes.

By continuously improving their services and products and embracing innovation, both customers and organizations can realize mutual benefits (Hanandeh & Haddad, 2024). Leading trends in digital transformation include DevOps, virtual and augmented reality, and user experience (UX) design (Fernandes & Gabriel, 2023). These trends are captured within various digital transformation frameworks, such as ITIL, TOGAF, BIZBOK, and others, which are applicable across both IT and marketing sectors (American Marketing Association, 2023).

In Slovakia, the digital transformation process is particularly prominent in industries such as automotive manufacturing, IT development, banking, education, and logistics.

Government initiatives are also underway to digitize public services, improving citizen engagement (Czerska & Bouchra, 2023). The digital transformation trend is evolving dynamically and has substantial growth potential across all sectors of society. While advanced digital skills are becoming essential for the digitalization of businesses and the broader economy in Slovakia, those with such skills remain in the minority (Haryanti et al., 2023). Nonetheless, the development of basic digital competencies will be necessary for all employees, as digital tools and online applications become integral to daily work tasks. Despite this need, a clear digital skills gap persists in Slovakia when compared to global standards (Ahmi, 2022).

The first academic publication addressing digital transformation, as we understand it today, was published in 2001. In their work, “The Digital Transformation of Oral Healthcare: Teledentistry and Electronic Commerce”, Bauer and Brown (2001) argued that dental professionals must stay abreast of technological advancements in IT. Over time, the topic of digital transformation expanded into various fields of study, especially as digital technologies rapidly advanced. With this progression, digital transformation is now expected to significantly impact diverse research areas, including strategy, organizational studies, and marketing, extending well beyond its technological roots (Bist et al., 2022).

In the field of marketing, the first notable article on digital transformation was published in 2018, seventeen years after Bauer and Brown’s original work. This research highlighted the ongoing importance of traditional retail channels, which continue to reduce consumer costs related to searching, waiting, inventory management, and other aspects of the purchasing process. However, this model is rapidly being disrupted by technological advancements, digital transformation, servitization, changing customer needs, and demographic shifts (Deogaonkar, 2023). Today, manufacturers, third-party providers, and customers themselves are more involved in retail activities, creating value traditionally confined to institutional retailers. Specialized third-party providers, including delivery services, product comparison websites, educational platforms, and payment services, are reshaping the retail landscape (Chen et al., 2023). The concept of servitization reflects the shift from a product-based model to a service-based one, enhancing value creation for customers (Gil-Gomez et al., 2020).

While terms like digital transformation and digitalization are frequently encountered, they are often misunderstood or misapplied. Their meaning varies depending on linguistic and cultural contexts, particularly between English and Slovak (Fernandes & Gabriel, 2023). In English, digitization refers to converting analog information into digital formats, while digitalization involves the integration of digital technologies into business processes. In Slovak, “digitalizácia” encompasses both concepts, referring to the broader process of transforming analog to digital. Digitization is the first stage in this digital evolution, focusing on converting analog information into digital formats. This stage, however, does not directly impact business processes, but rather prepares the groundwork by providing digital representations of data and information.

According to Gartner, digitalization is defined as “the process of transitioning from analog to digital forms of information and data” (*Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities*, 2023, p. 26). This stage typically involves converting physical documents into digital formats, such as PDFs, DOCX files, or images in formats like TIFF, PNG, JPEG, and BMP.

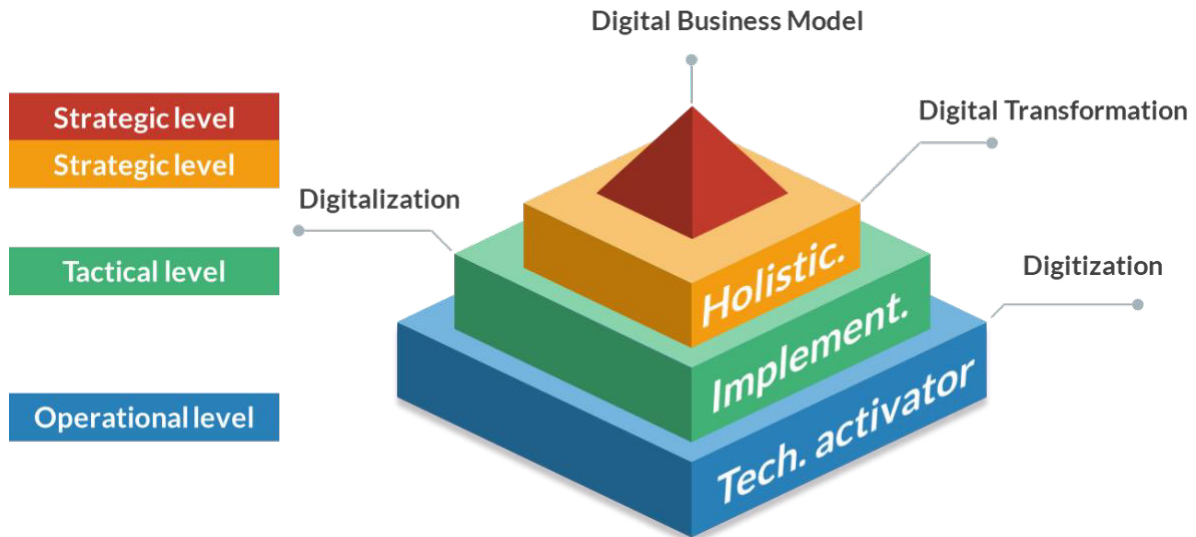


Figure 1: Digitalization of the company
Source: own processing, 2024

The second level, digitalization, centers on the implementation of digitization technologies within business operations. This stage leverages digitization as a tool to achieve broader organizational goals. Digitalization involves integrating digital technologies into existing business processes, reconfiguring workflows to optimize efficiency. It is often associated with specific areas of business, such as the creation of digital workplaces, mobile platforms, social collaboration tools, and management systems (Vărzaru, 2023).

At its highest level, digital transformation represents a comprehensive and systemic process that either alters existing business processes or creates entirely new ones to meet the changing demands of the market and the organization (Bist et al., 2022). Digital transformation requires substantial reengineering of business processes to make them digital, while also reshaping customer experiences to align with the new digital landscape. McKinsey’s recent research reveals that business leaders are increasingly recognizing the urgency of modernizing their operations and systems in the aftermath of the COVID-19 pandemic. Many companies acknowledge that their business models have become outdated, prompting them to embark on digital transformation (Deloitte, 2024). This holistic process utilizes digital technologies and data to achieve goals such as:

- Profit generation (Gong & Ribiere, 2021)
- Business process improvement (Vărzaru, 2023)
- Transformation of business processes and competencies (Generoso, 2024)
- Evolution of management and operational models (Haryanti et al., 2023)
- Creation of environments conducive to digital commerce and collaboration (Gil-Gomez et al., 2020)

Digitalization involves transforming critical business data, processes, and systems, while digital transformation extends this process to encompass broader strategic goals.

Digital transformation should be understood as an ongoing, evolutionary process of business improvement. As organizations navigate changes in their external environment, they often need to reassess their strategies and adapt their activities accordingly. The ultimate objective of digital transformation is to create new value for customers through digital business models, underpinned by the application of emerging technologies. The result is the development of new products, services, and functionalities that customers are willing to pay for, leading to greater customer satisfaction, operational efficiency, and long-term competitive advantage (Bist et al., 2022).

2 Methods

Until now, there have been no publicly available statistics on the most widely used frameworks for digital transformation. Typically, only basic lists of frameworks are accessible. These are strategic and intellectual resources used by large and private companies, rather than standard software products or services where such information and statistics are more readily available. To address this gap, we conducted an analysis and market survey through a custom Python script within a Jupyter notebook. The methodology applied in this research is designed to provide an empirical analysis of the most commonly used frameworks for digital transformation.

This research aims to answer the following key questions:

RQ1: What are the most widely used frameworks for digital transformation?

RQ2: Which is the most widely used digital transformation framework in Slovakia?

RQ3: Which digital transformation framework is most suitable for the fields of marketing?

RQ4: Which digital transformation framework is most suitable for the fields of education?

2.1 Research Methods

The research is based on four key methods: web scraping, document analysis, quantitative data analysis, and comparative framework analysis. These methods allow for the systematic collection, examination, and comparison of frameworks that are widely implemented in various sectors to support digital transformation initiatives.

1. **Web Scraping:** Web scraping was used to collect publicly available data from websites of organizations involved in digital transformation. Python libraries like BeautifulSoup and requests were utilized within a Jupyter notebook environment to scan .sk and .com domains. The process focused on extracting relevant data from predefined keywords related to digital transformation frameworks, as well as scraping PDF documents containing case studies and strategies. This method efficiently gathered real-time data on the frameworks' practical implementation.

2. **Document Analysis:** Document analysis helped identify and validate the frameworks used by organizations, particularly through PDF documents retrieved during web scraping. These documents, including case studies and strategic reports, provided insights into the adoption and benefits of various frameworks. The analysis focused on extracting relevant details from these texts to understand the frameworks' practical application and their alignment with organizational goals.

3. **Quantitative Data Analysis:** Quantitative analysis was used to process data from web scraping and document analysis. The collected data was stored in a Pandas DataFrame for efficient manipulation. The primary aim was to quantify the frequency of mentions of each framework, which helped identify the most widely used frameworks. Data was rounded to the nearest five-thousand for consistency, and the results were visualized in a table to rank the top frameworks.

4. Comparative Framework Analysis: After gathering and analyzing the data, a comparative analysis was conducted to evaluate and rank the most widely used digital transformation frameworks. The frameworks were compared based on their application across industries and organizational types. Each was assessed for its strengths, focus, and the contexts in which it was most applicable. This analysis revealed the most effective frameworks and highlighted overlap, where organizations used combinations of frameworks for different transformation aspects.

3 Results

We compiled a table of the twelve most commonly used frameworks, widely adopted across various industries to support digital transformation initiatives. Each framework is unique in its focus and offers distinct advantages, creating diverse opportunities for organizations in implementing changes that drive digital efficiency and innovation. The table presents the ranking of each framework, a detailed description of their key characteristics, approximate frequency of occurrences, and their percentage share of the total usage. This provides a comprehensive overview of the prevalence and impact of these frameworks within the context of digital transformation. We also included a column with the results from Google API searches, from which we calculated the percentage shares. For better clarity, we applied conditional formatting to the columns displaying the percentage shares of digital transformation framework searches. The table offers a comparison of various digital transformation frameworks based on their characteristics, estimated user base, market share, and their relative popularity in Google searches.

Table 1: Overview of digital transformation frameworks global market

N	Framework DT	Approx. Count	Share %	Google Approx.	Share % Google	Δ
1	ITIL 4	60 000	15,38%	30 600 000	10,11%	5,28%
2	TOGAF 10	55 000	14,10%	3 790 000	1,25%	12,85%
3	BIZBOK 12	50 000	12,82%	293 000	0,10%	12,72%
4	Gartner’s Six Key Steps	45 000	11,54%	3 770 000	1,25%	10,29%
5	BCG’s Digital Transformation Framework	40 000	10,26%	831 000	0,27%	9,98%
6	McKinsey’s 4Ds of Digital Transformation	35 000	8,97%	320 000	0,11%	8,87%
7	Accenture’s Full-Scale Digital Transformation	30 000	7,69%	11 900 000	3,93%	3,76%
8	Altimeter’s Six Stages of Digital Transformation	25 000	6,41%	498 000	0,16%	6,25%
9	Ernst & Young Digital Transformation Framework	20 000	5,13%	19 700 000	6,51%	-1,38%
10	Agile Innovation Model	15 000	3,85%	103 000 000	34,03%	-30,18%
11	The Transformation Model by The Digital Adoption	10 000	2,56%	126 000 000	41,62%	-39,06%
12	IDEO’s Design Thinking	5 000	1,28%	2 010 000	0,66%	0,62%
		390 000	100%	302 712 000	100%	

Source: own processing, 2024

This table allows for a systematic comparison of different approaches to digital transformation, identification of key success factors, and an analysis of how various frameworks contribute to achieving organizational strategic objectives. It serves as a foundation for a deeper analysis and discussion of how these three most widely used frameworks support technological adaptability and an innovation-driven culture within organizations.

Based on our analysis, the three most widely used frameworks globally are:

1. ITIL 4: Focuses on IT service management with an emphasis on continuous improvement. It is invaluable for organizations aiming to optimize their IT processes and enhance the value of IT services for the business.
2. TOGAF 10: Aimed at organizations seeking to overhaul their IT infrastructure and system development. TOGAF provides a methodology and tools for effective enterprise architecture management and planning.

3. BIZBOK 12: Focused on business architecture, it is ideal for organizations looking to improve the integration and management of their business processes and resources.

According to the results from the Google API, the ranking is as follows:

1. The Transformation Model by The Digital Adoption
2. Agile Innovation Model
3. ITIL 4

As in the case of our custom Python solution, the Google API results are approximate and based on regular crawling and indexing of web pages. Google uses estimates rather than direct measurements or precise calculations. The reliability of these results should be considered in light of their temporal accuracy and the potential margin of error. We conducted the same survey and analysis for the Slovak market and domains. In total, we analyzed 3,984 functional Slovak websites.

Table 2: Overview of digital transformation frameworks Slovak market

N	Framework DT	Approx. Count	Share %	Google Approx.	Share % Google	Δ
1	ITIL 4	732	18,37%	64 200	69,18%	-50,80%
2	TOGAF 10	658	16,52%	3 710	4,00%	12,52%
3	Ernst & Young (EY) Digital Transformation Framework	585	14,68%	441	0,48%	14,21%
4	Accenture's Full-Scale Digital Transformation	419	10,52%	3 360	3,62%	6,90%
5	BIZBOK 12	384	9,64%	1 220	1,31%	8,32%
6	McKinsey's 4Ds of Digital Transformation	330	8,28%	80	0,09%	8,20%
7	Gartner's Six Key Steps	292	7,33%	2160	2,33%	5,00%
8	BCG's Digital Transformation Framework	256	6,43%	154	0,17%	6,26%
9	Agile Innovation Model	146	3,66%	8 590	9,26%	-5,59%
10	The Transformation Model by The Digital Adoption	110	2,76%	8 220	8,86%	-6,10%
11	Altimeter's Six Stages of Digital Transformation	51	1,28%	42	0,05%	1,23%
12	IDEO's Design Thinking	21	0,53%	628	0,68%	-0,15%
		3 984	100%	92 805	100%	

Source: own processing, 2024

When selecting a framework for digital transformation, organizations should consider their specific needs, goals, scope, and type, as well as the technological environment and corporate culture. In this section, we present a multicriteria comparison of digital transformation models. ITIL and TOGAF are often perceived as the most suitable frameworks for large corporate environments. BIZBOK, on the other hand, is recommended for organizations that require a detailed breakdown and documentation of their processes. ITIL and TOGAF are also well-suited for government and public institutions. When comparing digital transformation frameworks, it is essential to establish criteria that adequately reflect various aspects of effectiveness and relevance of these frameworks for specific types of organizations or projects. For creating the radar chart, we used the following dimensions:

1. Process Coverage: This dimension assesses the extent to which the framework covers the necessary processes for effectively managing and executing digital transformation projects.
2. Customer Focus: Evaluates how well the framework enables an organization to focus on customer needs and demands.
3. Digital Marketing Integration: Measures the ability of the frameworks to integrate digital marketing strategies and tools.
4. Flexibility and Adaptability: Assesses how easily the framework adapts to changes in the business environment and technological advancements.
5. Innovation Support: This dimension evaluates the extent to which the framework supports and stimulates innovation within the organization.

6. Change Management: Measures the effectiveness of the frameworks in managing and overseeing changes within the organization.
7. Sustainability and Scalability: Evaluates how well the framework supports long-term sustainability and the ability to scale to larger or multiple projects.
8. Cost and Resources: Measures the total costs associated with implementing and maintaining the framework, including initial investments, ongoing costs, and resources required for management and operation.
9. Security and Compliance: Evaluates the framework’s ability to ensure data and information protection.
10. Outcomes and Success Measurement: Assesses how well the framework enables the organization to measure and evaluate the success of its digital transformation projects.

These dimensions provide a comprehensive overview of the strengths and weaknesses of individual digital transformation frameworks. They can help organizations make key decisions when selecting the most appropriate framework for their needs. Additionally, they allow for objective comparison of the advantages and disadvantages of each framework for specific use cases. The radar chart, which applies these criteria, effectively visualizes the strengths and weaknesses of each model, simplifying the decision-making process in selecting the most suitable framework for a specific organization or project.

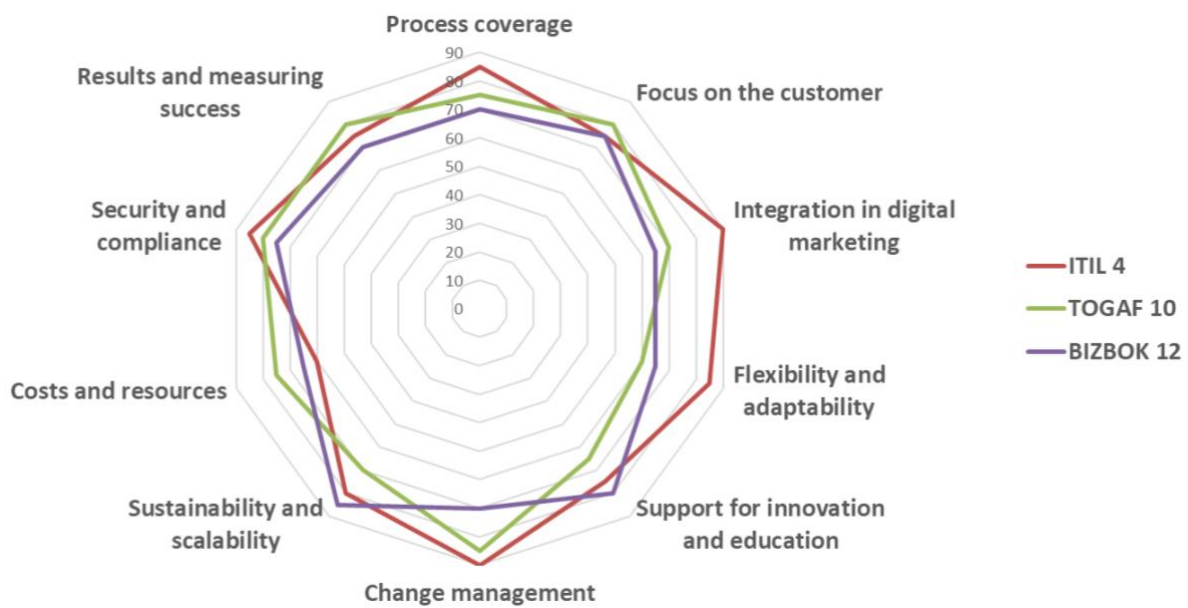


Figure 2: Comparison of digital transformation frameworks
 Source: own processing, 2024

4 Discussion

The research reveals important insights into the most widely used digital transformation frameworks globally and within Slovakia. Through a detailed market analysis, including a custom Python script and the use of Google API search data, we have identified the leading frameworks in digital transformation. Additionally, we have provided an in-depth comparison of how these frameworks are applied in different industries, such as marketing and education, based on their characteristics, adaptability, and suitability for various organizational needs. The findings offer a clearer understanding of the global trends in digital transformation, as well as specific insights into the Slovak market.

RQ1: Based on the market analysis and the results obtained from our custom Python script, as well as the Google API search data, the three most widely used frameworks for digital transformation globally are:

1. ITIL 4: ITIL 4, focusing on IT service management, is the most widely used framework. Its emphasis on continuous improvement and optimization of IT processes makes it indispensable for organizations looking to enhance IT services' value for the business.
2. TOGAF 10: TOGAF (The Open Group Architecture Framework) is widely adopted for organizations seeking to redesign and manage their IT infrastructure.
3. BIZBOK 12: The Business Architecture Body of Knowledge (BIZBOK) framework focuses on business architecture. It is particularly suitable for organizations looking to improve the integration and management of their business processes and resources.

These frameworks stand out due to their broad applicability across various industries, and their ability to support long-term, sustainable digital transformation strategies.

RQ2: For the Slovak market, the most widely used digital transformation framework is ITIL 4. This framework, primarily focused on IT service management, remains highly relevant in Slovakia, especially in sectors that emphasize service quality, continuous improvement, and efficient IT process management. Its broad applicability and focus on optimizing IT services make it a key framework for organizations looking to enhance their IT infrastructure and service delivery.

RQ3: In the context of marketing, the most widely used digital transformation framework is ITIL 4. While ITIL 4 is primarily an IT service management framework, its focus on improving customer service quality and ensuring seamless interaction between departments makes it highly relevant for marketing teams. ITIL 4 emphasizes optimizing service delivery, enhancing customer experience, and ensuring alignment between IT services and customer needs. This framework supports marketing strategies that require consistent customer engagement, service design, and digital interaction, making it particularly suitable for organizations aiming to improve customer satisfaction and service quality through digital tools and processes.

RQ4: For the education sector, the most widely used digital transformation framework is ITIL 4. It is highly valuable in education due to its focus on improving service quality and ensuring seamless integration between different departments. Educational institutions often require efficient management of digital services such as online learning platforms, student information systems, and administrative processes. ITIL 4's emphasis on continuous improvement, service delivery optimization, and customer satisfaction aligns well with the needs of educational organizations. This framework helps institutions manage digital services effectively, ensuring that they remain adaptable and responsive to evolving technological advancements and the changing needs of students and faculty.

Limitations of the research include several factors that may affect the accuracy and generalizability of the findings. First, the data collected relied on approximated information from Google API and custom Python scripts, which may not fully capture the global or Slovak usage of digital transformation frameworks. These methods provide approximations that can be influenced by the dynamic nature of web indexing and outdated information. Additionally, the Slovak sample of 3,984 websites may not be fully representative of the entire market, excluding smaller organizations or sectors that also use these frameworks. The evaluation of frameworks was based on subjective criteria, which may not apply equally to all organizations, potentially impacting the relevance of the results for different contexts. Finally, the rapidly evolving nature of digital transformation may affect the relevance of the frameworks over time.

5 Conclusion

This research explored the most widely used digital transformation frameworks, focusing on their application in marketing, education, and the Slovak market. The findings highlight ITIL 4 as the most prevalent framework globally and within Slovakia, particularly in IT service management, where its emphasis on continuous improvement and service optimization makes it indispensable. In marketing, ITIL 4's focus on enhancing customer experience and streamlining service design positions it as a critical tool for organizations seeking to adapt to rapidly changing market conditions. In the education sector, ITIL 4 demonstrates its value by supporting the efficient management of digital services, ensuring that institutions can adapt to evolving technological demands and deliver effective learning experiences. The study underscores that no single framework can address the diverse needs of all industries or organizations. Frameworks like ITIL 4 and TOGAF 10 provide valuable methodologies, but their effectiveness depends on aligning their characteristics with the specific goals, technological maturity, and operational context of the organization. This comparative analysis reveals the nuanced ways frameworks contribute to achieving strategic objectives, highlighting the need for a tailored approach to framework selection. By evaluating frameworks based on criteria such as complexity, flexibility, and cost, this study provides actionable insights for managers and professionals. It offers a roadmap for understanding which frameworks best support organizational goals in digital transformation initiatives. These findings are particularly relevant in critical areas like marketing and education, where adaptability, customer focus, and scalability are essential for success. Future research could extend this analysis to include the influence of emerging technologies like artificial intelligence and blockchain on the evolution and adoption of digital transformation frameworks. Furthermore, examining the integration challenges specific to sectors such as education, where resource constraints and long-term planning are significant factors, could provide deeper insights into optimizing digital transformation efforts.

In conclusion, this study provides a comprehensive overview of digital transformation frameworks, their applications, and their limitations. It equips organizations with the knowledge needed to navigate the complexities of digital transformation, ensuring they select frameworks that not only align with their strategic goals but also position them for sustained success in a dynamic digital environment.

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SELECTED ETHICAL PROBLEMS IN JOURNALISTIC PRACTICE IN SLOVAKIA

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Abstract:

The media has undergone a dynamic development in the past decades, which was, among other things, conditioned by the development of new information technologies, social, political, economic, and cultural changes, as well as changes in lifestyle, value orientation, or the perception and thinking of individuals and society. Under the influence of these dynamic social, political, and cultural changes, but also due to the impact of old and new ideologies, the anchoring of current mass communication trends and media approaches in ethical frameworks is becoming increasingly challenging. To limit/eliminate the emergence of disinformation and manipulative media content and to reduce their potential threat to recipients and society, several platforms were created in Slovakia, the aim of which is to prevent the occurrence of misleading, false information in society/the media and to initiate projects aimed at increasing media literacy/critical thinking of recipients. The article maps the most frequent forms of violations of journalistic ethics in the Slovak media space, the most frequent disinformation narratives in 2021 – 2023 (with an overlap to the present), and selected tools for eliminating hoaxes and conspiracy theories in practice.

Key words:

Conspiracy Media. Disinformation Narratives. Hoaxes. Journalistic Ethics. Mass Media.

1 Introduction

On the one hand, the media world is autonomous with its own organizational structure, hierarchy, rules, and relationship levels. On the other hand, it forms an inseparable part of “other worlds”. It actively intervenes in socio-political events, influences them, changes, transforms, and shapes everything that will touch them. However, as stated by G. Burton and J. Jiráček (2003), it is necessary to distinguish between what the media can theoretically do and what they do.

Under the influence of globalization, cross-ownership of media, a market economy, and related requirements for the functioning of mass media, the uniqueness and creativity of journalistic work are suppressed; the quantity of media messages begins to prevail over their quality, which leads to the deepening of stereotypes in society and to the presentation and reinforcement of undesirable values and patterns of behavior. As P. Staněk states, there is even a process that some call *digital dumbing down*, which means that we are creating a situation in which the media form desirable patterns. Social networks allow venting different levels of interests, but in the end, they do what they want with us. This process continues to accelerate with the continued development of a controlled society because people do not want to think. When they lack the necessary thinking and reasoning, they are fully manipulable and influenced by disinformation, conspiracy theories, and misleading information (Hroník, 2015).

2 Methodology

The article aims to specify selected ethical problems in the media in Slovakia, with special emphasis on the spread of hoaxes, disinformation, and conspiracy theories.

In practice, we encounter journalists as mediators of (sometimes serious) information, publishers, and media owners who are not fully aware of the elementary function of the journalistic profession as a form of service to the public interest and the associated responsibility.

In the first part of the article, we draw attention to the characteristics of the key concept of ethics in journalistic practice and examples of its violations in the media space in Slovakia.

In the second part, we analyze the problem of creating and spreading hoaxes and disinformation in the media space (via conspiracy media) and the most common disinformation narratives that dominated Slovakia in the years 2021 – 2023 (with an overlap to the present). At the same time, we present tools for eliminating the occurrence of disinformation, conspiracy theories, and hoaxes in the media through selected platforms and initiatives.

In the context of the above-mentioned goals, we defined the following research questions:

- Q1: What violations of the principles of journalistic ethics are the most frequent in the Slovak media space?
- Q2: Which hoaxes and disinformation appeared in the conspiracy media in Slovakia in 2021 – 2023?
- Q3: Which platforms and initiatives were created in Slovakia to eliminate the occurrence of hoaxes and conspiracy theories in the media (in society) and educate recipients of media content?

3 Results and Discussion

3.1 Selected Ethical Problems in Journalistic Practice in Slovakia

The media world represents a complex mechanism of interactions and ordinary recipients of media messages find it difficult to navigate, or they do not orient themselves in it. However, not only the recipients of media announcements but also their creators and mediators – journalists – can be exposed to negative influences. Forms of self-regulation of journalistic professional ethics, emphasizing professional value, represent a certain form of protection for all participants in the media communication process. These values are passed down from generation to generation, while the autonomy of each profession is considered one of the greatest values in professional activity. As international experience suggests, the most effective self-regulatory tools in the media environment include the media or press council, the ombudsman, the educational system of journalists, and the professional code of ethics (Remišová, 2010).

As J. Sand (2010) states, the ethics of journalists as creators presupposes responsibility for the consequences of what is written, spoken, and shown. Accepted criteria for the moral behavior of authors of journalistic speeches already became part of the code of moral values in the 19th century. Publishers and journalists set them voluntarily as recognition of status honor and gentlemanly submission to their “restrictive” regulation in influencing public opinion. As A. Školka (2002) points out, journalists should be well prepared to solve moral dilemmas since it is obvious that even the knowledge and effort to observe written moral code alone is not sufficient in all situations.

In his publication, L. Šefčák (1997) formulates his position on the ethical professional requirement of truthfulness. He believes that in any honest effort of journalists, the truth as such has and will always have a subjective character. What is the truth for one person can be a lie for another person because it is a group matter or social agreement. Therefore, in a democratic society, it is particularly problematic to establish the principle of truth within media legislation.

The forms of manipulation by the media are very diverse: in news, reportage, commentaries, and documentaries, they manifest themselves in the form of deliberately spreading inaccurate or distorted data, deliberately spreading fake news, purposely preferring certain people and their opinions and way of life, intentionally spreading alarmist messages or conscious concealment of serious news or bias in news and reports. In the Slovak media, the choice of experts who comment on a specific event and can bring a well-founded opinion to the issue is also problematic. An ethical problem arises if experts are sought purposefully, depending on their opinion, which can lead to deliberate manipulation of the public (Remišová, 2010).

Another important relational level, among others, interesting from the point of view of journalistic ethics, is the relationship between the journalist and the object of his interest. Media interference in the private lives of individuals is one of the most frequently violated ethical principles in the media, primarily (but not exclusively) in tabloids. In addition to presenting the privacy of publicly known persons, we also include information about crimes and traffic accidents, their perpetrators, and victims.

For a long time, the media have focused on arousing emotion, fear, or laughter in their readers, viewers, and listeners (Prokop, 2005). The unceasing interest of the public in the news of this type is determined by human curiosity, the feeling of excitement from the unknown, the psychological effect of forgetting one's problems when confronted with the tragic fates of other people, etc.

The media interest in the privacy of publicly well-known people is increasing in parallel with the demands of the market or the public. It is often associated with the humiliation of an individual, for example with his/her injury and attack on his/her human dignity in the form of mockery and defamatory criticism, insults based on belonging to an ethnic group, religion, or sexual orientation, inappropriate comments on appearance, etc. (Remišová, 2010).

Information about the ethnic origin and racial or religious affiliation of people regularly appears in the media, especially in connection with negative events and phenomena (crime – Roma, terrorism – Muslims, etc.) that contradict the ethical standards for journalistic work. This leads to the strengthening of stereotypes and prejudices in society, which are further deepened by the media with a one-sided, tendentious way of informing.

3.2 Conspiracy Media and Disinformation Narratives in Slovakia in 2021 – 2023

The creation and dissemination of disinformation, hoaxes, and conspiracy theories are serious violations of the principles of journalistic ethics, on several levels.

By conspiracy (disinformation) media, we mean media that differ from serious media in several key features. Their goal is not to inform about the facts objectively but, on the contrary, to question the content of standard media and, in many cases, state the exact opposite. It is a collective designation for media spreading disinformation, conspiracy theories, hoaxes, and manipulated data that contribute to the polarization of society and the spread of propaganda by specific interests or power structures (Šnidl, 2017). They bring marginalized or marginal points of view, a provocative and alternative perspective of current events, and place events in a different context than the mainstream (Čulík, 2010). They include unsubstantiated, unverified, or officially unaccepted information that warns of a dangerous conspiracy or in connection with significant historical facts, highlight the role of conspiracy, and do not believe in official (scientific) justifications (Panczová, 2017).

Misinformation often lacks traceable sources, which means the origin of the article and the attribution of the author or media owner are unknown. Such information is either completely missing or incomplete. In addition, they use less recognizable camouflages: fabrication, selective selection of information, deliberate falsification, deception,

unsubstantiated claims, or distortion of the contents of an article from the mainstream media (Gregor & Vejvodová, 2018).

Disinformation media, thanks to the creation and dissemination of such content, contribute to the construction and distribution of conspiracy theories that try to explain the ultimate cause of some significant political or social event and attribute to them the qualities of a conspiracy by powerful individuals or organizations (Douglas et al., 2017; Min, 2021) and they support the emergence of radical ideologies undermining the basic pillars of democracy and threatening social ties in society. At the same time, they use ignorance, insecurity, goodwill, naivety, and fear of their “victims” to realize their own, often hidden interests and goals (Keklak, 2018). Hardoš (2015) adds in this context that every evidence, every explanation that you put against them, the paranoid thinker can artfully turn to his advantage. The official version is always falsified, experts and media are bribed or intimidated, consent is evidence of blindness – every fact is just a puzzle piece of a monstrous conspiracy.

Van Helsing (2011) identifies the biggest problem of the percipients of conspiratorial media content to integrate the received information into a context, categorize it, and actively approach its interpretation that many of those who are eager for information and surf the Internet all night are not able to see things from a perspective and understand their complexity. They choose individual aspects and install them into their already existing worldview.

Several conspiracy (disinformation) print, audiovisual, auditory, and online media currently operate in Slovakia. Without claiming completeness, we list the following of them: Slovenský web, Slobodný vysielateľ, *Zem a Vek*, Parlamentné listy, Proti prúdu, Pán Občan, Hlavné správy and other.

In the years 2021 – 2023, the content structure of Slovak conspiracy media focused on a limited range of similar, even identical topics, and disinformation narratives, which could be divided into three groups:

1. “The Covid-19 coronavirus pandemic” in 2019 – 2021 brought the first significant wave of hoaxes, disinformation, and conspiracy theories in the Slovak media space. According to the Report on disinformation in Slovakia in 2023, for the second year in a row, the number of disinformation about the disease Covid-19 in the Slovak online environment and on social networks has decreased. However, in 2023, several topics were repeatedly noted in the case of this narrative, namely: side and fatal effects of vaccines, plans for a “new” pandemic, and the upcoming WHO regulation that will be able to “mandate” pandemics. In the case of disinformation about the fatal consequences of vaccination, for example, as evidence, despite the results of the autopsy, which refuted this causality, the abused deaths of known and unknown persons, for example, athletes. In this context, in 2023, disinformation about a significant increase in unexpected deaths of athletes was widely spread. Even in this case, the causality between vaccination against Covid-19 and mortality was not confirmed. The most frequent disinformation narratives related to the Covid-19 pandemic in the disinformation and conspiracy media were as follows: vaccines cause AIDS, mass burning of face masks in Germany, new pandemic measures will be introduced under the auspices of Bill Gates, Switzerland stopped vaccination due to vaccine side effects, US government authorized ivermectin (never been banned), the pandemic treaty will remove laws to protect human rights, Bill Gates secret plan to vaccinate the unvaccinated was revealed (Púchovský, 2024).
2. “Russian-Ukrainian war conflict”, which began on February 24, 2022, with the invasion of the armed forces of the Russian Federation on the territory of Ukraine resonated significantly in the Slovak disinformation media and still affects their thematic focus today. Fake news related to this conflict dominated even before the war. For example, in

2020, according to Kriššák and Dubóczy (2021), the numerous narratives of disinformation and conspiracy media in the Slovak online space and on social networks included supporting the annexation of Crimea by the Russian Federation or questioning the effectiveness of sanctions against the Russian Federation for its actions against Ukraine and other.

The mentioned narratives influenced the thematic focus of conspiracy and disinformation media even later. At the same time, after February 2022, the share of communications supporting increasing hatred towards refugees from Ukraine increased. Disinformation contributions either placed Ukrainians in the position of a group of persons who receive disproportionately large benefits from the Slovak authorities, or accused them of various criminal activities without providing evidence: refugees were supposed to receive an allowance of 25,000 euros for the purchase of real estate, but also other benefits (Púchovský, 2024).

According to the *Disinformation Report in Slovakia* in 2023 (Púchovský, 2024), the primary goals of this disinformation and manipulation included supporting the Russian Federation in the conflict, supporting public opinion pressure to stop aid to Ukraine, supporting information chaos, supporting involved people who have the potential to fulfill the interests of the Russian Federation on Slovakia, as well as increasing mistrust towards local state institutions. When reporting on events from the war front, there was often a disinformation paradox. While some of the attacks by the Russian military were downplayed as a form of aid to the “oppressed Russian minority” without impact on civilian infrastructure and civilian lives, in many other cases its absurd, non-existent achievements were cited. Some media continued to spread disinformation narratives into 2023 from 2022, which had already been explained multiple times then. It was, for example, retrospectively pointing out unfulfilled Russian threats (without Russian gas, Europe will freeze), informing about the effects of propaganda on the Russian audience and its aspects (threats to several countries, including the Slovak Republic, absurd propaganda videos), bringing current news about the killing of civilians and specific actions of Russian soldiers, explaining the connection between politics and sports in the Russian Federation or sharing the real interventions of the Russian police against the domestic population claiming for peace. Even in 2023, the demand for peace in the form of the slogan “We want peace” was typical of conspiracy and disinformation media that spread pro-Russian narratives about the war in Ukraine, while, according to these media, peace could only be achieved with a Russian victory (Púchovský, 2024).

3. “Parliamentary elections in Slovakia” in 2023 have become one of the main disinformation narratives in Slovak conspiracy media. According to D. Púchovský, this topic dominated the Slovak information space in the spring of 2023. In February 2023, the Department of Communication and Prevention of the Presidium of the Slovak Police Force intercepted the first attempts to spread the narrative. What was interesting was the fact that this narrative was massively spread in the USA for the first time. This means that the Slovak disinformation scene was inspired by the country, which is attacked by them in many cases through disinformation and manipulated content. In manipulative and misleading media communications dominated the claims that voters should bring their pens to the polling station because prepared pens can be erased. Thus votes for other candidates could be overwritten. Or the claim that electoral votes are counted by an automated system, or that the Slovak company Eset influences this system. The effect of the mentioned narratives was also manifested on the day of the elections. For example, with the spread of false information, the ballots must only have a red stamp even though their color could also be blue. Some citizens, disinformed by this narrative, called the police at polling stations when they received an envelope with a blue stamp. At the same

time, the minimization of the spread of the news about election falsification took place in the summer, and it did not occur again before the parliamentary elections or during their proceedings at the end of September. After the election, it was no longer disseminated in any way (Púchovský, 2024).

However, the spread of disinformation and conspiracy theories about influencing elections did not happen for the first time in 2023. Even in 2020, disinformation and conspiracy media communicated narratives warning of this “danger”. The difference was that one of the main topics communicated in these media in 2020 was the pre-election polls falsification, which was often interpreted by the conspirators as being manipulated in favor of some political parties, and vice versa, to the disadvantage of other, “inconvenient” party subjects. In response to the allegedly rigged polls, disinformation websites advocated for a proposed 50-day poll moratorium. At the same time, they referred to false survey results as dangerous hybrid threats (Kriššák & Dubóczy, 2021).

To limit/eliminate the emergence of disinformation and manipulative media content and reduce their potential threat to recipients and society itself, several platforms and initiatives have been created in Slovakia in recent years, for example:

Konšpirátori.sk – the project aims to analyze the content in the Slovak media and advertising space and to list fraudulent, deceptive, and disinformation websites evaluated by a committee of experts (Konšpirátori.sk, n.d.).



Figure 1: Website logo Konšpirátori.sk
Source: Konšpirátori.sk (n.d.)

Lovcišarlatánov.sk – the website focuses on exposing conspiracies and hoaxes from the medical field evaluated by doctors, health workers, and doctoral students from medical and pharmaceutical faculties, also engaged in research (Lovcišarlatánov.sk, n.d.).



Figure 2: Website logo Lovcišarlatánov.sk
Source: Lovcisarlatanov.sk (n.d.)

Infosecurity.sk – the project and organizational unit of the Adapt Institute focuses on the control of the information space regarding disinformation and security on social networks (Infosecurity.sk, n.d.).



Figure 3: Website logo Infosecurity.sk
Source: Infosecurity.sk (n.d.)

Each of the above-mentioned platforms functions as a service to the public and, in addition to the website, also fulfills its goals within its own Facebook page. All three try to preserve their independence by obtaining resources for their activities exclusively through voluntary financial donations from citizens, including 2% of the tax.

4 Conclusion

The ethical dimension of journalistic work in the media environment in Slovakia and abroad has several points of contact. This results from a similar situation in the media markets and from the negative influences to which they are exposed. While before 1989 the nature of the media environment in Slovakia was significantly different from the media environment in "Western countries", both in a positive and a negative sense, the change of regime significantly affected the formation of media in our geographical area. This change affected not only the quantitative (e.g. enormous increase in the number of new media and the subsequent disappearance of most of them) but also the qualitative component of the media market. In addition to the positive changes, many negative ones persist to this day and interfere with the ethical level of journalistic work.

As stated by A. Školka (2002), the media and the journalists working in them can significantly influence the development of morality in society through criticism, control of those in power, and corruption exposure. However, for the media and journalists to fully fulfill their journalistic mission and perform the journalistic profession by the principles of journalistic ethics, effective changes are required at several levels, for example in the approach and work of journalists, media owners, recipients, legislators, and more. News is presented to the audience through a process that reflects the cultural and social context of their creation. It is important to offer recipients the option of choosing from a wide range of high-quality media presenting journalistic work at a high professional level (and therefore also by the principles of journalistic ethics).

Forming a generation of recipients who will actively approach the selection of media and media announcements and will not just be passive recipients of the offered content is one of the prerequisites for higher professionalization of the journalistic profession and increasing sensitivity to violations of ethical principles. Pressure from the public can be a positive but also a negative determinant in the further development of the media and compliance with the principles of journalistic ethics.

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UTILIZATION OF METAVERSE AND THE POTENTIAL ROLE IN EDUCATION

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Abstract:

The metaverse is rapidly emerging as a transformative innovation in education, reshaping traditional learning models through immersive, interactive, and experiential virtual environments. This abstract provides a focused exploration of the metaverse's integration into educational settings, highlighting its potential to enhance student engagement, democratize access to high-quality resources, and foster creativity and innovation. By enabling dynamic interactions and collaborative learning experiences, the metaverse transcends the limitations of physical classrooms and supports personalized, experiential education. Its ability to simulate complex scenarios and environments offers students opportunities to acquire skills in ways that were previously inaccessible. Additionally, the metaverse facilitates real-time collaboration between educators and learners, enriching the pedagogical process. However, challenges such as high implementation costs, accessibility barriers, and cybersecurity concerns remain obstacles to broader adoption. With strategic investment and policy support, the metaverse has the potential to address these challenges and revolutionize global education systems. Despite these challenges, the metaverse's evolving technological capabilities and its capacity to address critical educational needs position it as a pivotal force in the future of learning. This analysis underscores the transformative role of the metaverse in education, offering insights into its benefits and the strategies required to overcome adoption barriers.

Key words:

Experience Learning. Immersive Learning Environment. Metaverse. Student Engagement. Virtual Reality.

1 Introduction

Every individual begins life devoid of knowledge, acquiring it progressively through various mechanisms over time. Multiple theories and paradigms exist to explain the process of human learning, including behaviorism, cognitivism, experientialism, connectivism, and constructivism, the latter being most frequently associated with educational applications of the metaverse. According to Radianti et al. (2020), learning is an active and constructive process wherein learners function as constructors of knowledge, actively building subjective representations and interpretations of reality. Newly acquired information is integrated with pre-existing knowledge, rendering the mental representation inherently subjective. When learners fail to assimilate new information effectively, they adapt their subjective worldview based on novel experiences, suggesting that the learning process operates as a form of active hypothesis testing.

From this constructivist perspective, learning occurs through experiential acquisition, environmental interaction, and sensory processing of information about the world. The ability of the metaverse to replace certain sensory stimuli with computer-generated simulations, coupled with its capacity to mirror real-world human interactions, makes it a highly promising educational tool. It allows learners to "experience" scenarios rather than relying solely on imagination.

Novák (2006) emphasizes that an in-depth analysis of various educational methods often reveals that traditional approaches, such as textbook-based learning or teacher-led lectures, are relatively inefficient. Optimal learning outcomes are achieved when students engage with problems through direct experience, enabling them to see, hear, and enact solutions in real-

world contexts. The metaverse offers a compelling medium for experiential learning, simulating environments where students can practice tasks actively rather than passively receiving information. Research demonstrates that this approach can lead to an 80% retention rate of educational materials (Onofrejšová, 2014).

The efficacy of the metaverse in education is further validated by empirical studies highlighting improvements in “time on task,” increased learner motivation, enhanced enjoyment of learning, deeper comprehension of instructional content, and improved long-term memory retention (Kavanagh et al., 2017). Metaverse learning environments (MLEs) provide immersive virtual spaces in which learners are active participants rather than passive recipients. These environments facilitate collaboration and communication between learners and educators, fostering problem-solving and innovative thinking (Ménová, 2020). Learning within MLEs typically involves exploratory activities, encouraging learners to navigate virtual settings and complete tasks designed to enhance knowledge acquisition. These environments respond to user actions with multisensory feedback, promoting the development and testing of new ideas and problem-solving strategies.

MLEs are categorized into three primary types based on their educational objectives. The first category focuses on problem-based learning, where students solve smaller problems incrementally to address a larger overarching issue. The second category, inquiry-based learning environments, requires students to observe phenomena, generate research questions, analyze data, and propose methodologies. The third category, collaborative learning environments, supports group-based problem-solving and is particularly effective for remote learning contexts enabled by metaverse technologies (Ip & Li, 2015).

Freina and Ott (2015) conducted a comprehensive review of research on the metaverse in education, analyzing 93 studies conducted between 2013 and 2014. Their findings indicated a declining trend in metaverse research during this period, with most studies originating from the United States. These studies predominantly examined metaverse applications in higher education, such as university-level training and adult professional development, with limited focus on children. Many applications targeted healthcare and specialized adult training, including simulations of hazardous or otherwise challenging scenarios. Freina and Ott identified the ability to simulate such scenarios as a primary driver for metaverse adoption in education.

Recent technological advancements have significantly expanded the application of the metaverse across various fields, including healthcare, tourism, digital gaming, the military, and education. In the educational sector, the metaverse is primarily utilized for distance learning, advanced training programs, and virtual field trips. For example, the metaverse facilitates immersive virtual classrooms where students and instructors can interact dynamically using avatars, simulating activities such as laboratory experiments typically conducted in physical settings. Furthermore, the metaverse enables high-tech professional training by combining virtual simulations with realistic hardware or tools used in actual practice (Muskan, 2021). The technology also allows learners to virtually explore locations otherwise inaccessible, providing an experiential dimension to educational content.

In recent years, numerous metaverse applications have been developed to support education. For instance, Washington University created the Atom World and Phase World systems, designed to teach high school students about atomic particles and the effects of temperature and pressure on matter, respectively (Christou, 2010). Similarly, Lockheed Martin developed an immersive metaverse experience simulating a journey to Mars, utilizing a modified school bus equipped with transparent 4K displays to eliminate the need for head-mounted devices (Hernandez, 2019).

In Slovakia, noteworthy metaverse applications include the Virtual Anatomy Lab at Comenius University, initiated by T. Brngál and M. Svrček. This lab offers students the ability

to interact with highly detailed virtual anatomical models, providing feedback on errors and facilitating hands-on learning experiences (Rádio Regina Západ, 2017). Additionally, the Coven platform, developed by Moving Medical Media and the Slovak Technical University, enables collaborative metaverse learning for diverse audiences, from school children to professionals in high-risk industries (Spiegel, 2020).

While the metaverse presents substantial potential for advancing education, its adoption requires a balanced consideration of its benefits and limitations. Advantages include its broad applicability, enhanced learner engagement, interactive and experiential learning, and multisensory stimulation (Christou, 2010). However, challenges such as high hardware costs, the need for specialized training, limited realism, adaptation difficulties for some learners, and motion sickness persist (Kavanagh, 2017). Despite these challenges, ongoing technological progress is expected to mitigate these issues, enabling the metaverse to become an integral component of educational practices across various levels.

2 Methodology

This study utilizes general qualitative content analysis to examine four freely available educational digital games and virtual reality applications within the context of the metaverse. The games and applications are grouped into pairs based on their shared themes. The analysis identifies what students can learn from each game or application and explores motivational factors that encourage continued engagement and learning within immersive metaverse environments. Insights gained from this process are compared, and specific criteria are used to select the more suitable product from each pair for integration into the educational process at Slovak elementary schools. In some cases, neither product in a pair may be deemed suitable for recommendation, or both may be equally viable. Furthermore, the integration of these educational games and applications within the metaverse not only enhances engagement but also poses unique challenges that educators must navigate. As immersive technologies evolve, considerations surrounding privacy, security, and potential addictive behaviors become increasingly pertinent. For instance, while students may be drawn to the captivating environments these tools create, it is crucial for educators to establish guidelines that ensure a balanced approach to technology use in the classroom. By fostering an environment where digital literacy is emphasized alongside game-based learning, schools can empower students to harness the benefits of these tools responsibly, thereby maximizing their educational outcomes while mitigating associated risks. This holistic approach not only prepares students for the complexities of a digital world but also encourages critical thinking and self-regulation in their use of technology. The material under examination includes four VR applications that explore themes in art and astronomy. *The (Virtual) Reality Museum of Immersive Experiences*, developed by Volker Kuchelmeister (2018), is an educational simulation that combines art and design, allowing users to interact with installations like 360° panoramas and 3D displays. Available for platforms such as VIVE and Oculus Rift, it provides an artistic, exploratory experience with no age restrictions.

Another metaverse, *Claude Monet – The Water Lily Obsession*, was developed by Lucid Realities (2018). This documentary-style VR experience immerses users in the world of Claude Monet, taking them through his garden, atelier, and the Musée de l'Orangerie in Paris. The application blends narrative and educational genres and is accessible on various VR platforms.

From the metaverse of astronomy, *Earthlight: Spacewalk*, created by Opaque Space (2017), offers a simulation of life as an astronaut, including realistic tasks and a unique view of Earth from space. Designed for players aged ten and above, this educational game is supported on leading VR platforms.

Lastly, *OVERVIEW: A Walk Through the Universe*, developed by Orbital Views (2017), provides an educational and documentary-style experience that explores the solar system, featuring planets, moons, and other celestial bodies. With no age restrictions, it is available on a wide range of VR devices.

These metaverses form the basis of our analysis, demonstrating the potential of VR to create immersive and interactive experiences across artistic and scientific domains. The metaverses will be analyzed based on their gameplay, the design and immersion of their virtual worlds, and the degree of interactivity they offer within their environments.

3 Results

This analysis explores four educational applications that utilize virtual and immersive environments, illustrating the diverse potential of these technologies to transform educational experiences. By providing unique methods of engagement, from passive observation to interactive tasks, these applications showcase how such tools can enrich learning, foster curiosity, and broaden access to educational content.

Claude Monet – The Water Lily Obsession is a single-section application accessed through a gaze-controlled menu. Users are introduced to the works of Claude Monet in a museum setting, where an automated monologue narrated by Monet himself recounts nearly three decades of his life, artistic journey, and inspirations. The environment dynamically transforms as the monologue progresses, transitioning from the museum to Monet's garden, where users experience the changing seasons. The journey further evolves into an abstract space that immerses users in Monet's paintings, and it concludes in his studio before returning to the museum, completing the circular narrative. Throughout the experience, users act as passive observers, with the ability to look around and move within a restricted area. The application provides valuable insights into Monet's life, artistic process, and thematic motivations, offering a compelling blend of art history and virtual immersion. The visuals are stylized to reflect Monet's work, particularly in the garden scenes, where the colors and textures evoke the painter's iconic style. While visually stunning, some transitions, especially in the abstract space, can be disorienting due to rapid environmental changes. Interactivity is absent, limiting users to exploration and observation. Available in English and French without subtitles, the application offers an artistic and historical narrative rather than direct interaction or engagement.

The (Virtual) Reality Museum of Immersive Experiences focuses on art, design, and education, allowing users to navigate and interact with its exhibits freely within a large industrial-style virtual building. Upon starting the application, users are greeted with an informational panel explaining movement and interaction. Users can teleport around the environment, explore at their own pace, and interact with audiovisual exhibits displayed on curved screens, 360-degree projections, and other formats. Although the application emphasizes technological capabilities, such as innovative display methods, it offers limited educational content, focusing more on the medium than the material itself. For example, users can view short films on topics like glassmaking and ballet, but the primary emphasis remains on showcasing the display technology. The application includes one interactive element that allows users to rotate their perspective within a hemispherical screen using controller trackpads. Despite its limited educational focus, the application highlights the potential of immersive environments for presenting large-scale installations and engaging visual experiences. The realistic virtual environment includes multiple exhibit areas on the ground floor of the building, which lacks extraneous elements beyond its primary exhibits. Available in English without subtitles, the application serves as a demonstration of immersive technology's potential rather than a fully realized educational tool.

OVERVIEW: A Walk Through the Universe offers a dual experience comprising a documentary section and an activity-based component. The documentary section places users in a virtual space environment as passive observers and listeners. A narrator guides users through a structured journey that begins with Earth and gradually expands outward to the solar system, galaxies, and the observable universe. The narration is complemented by ambient music, creating an immersive atmosphere. The content combines fundamental knowledge with intriguing facts, such as the potential for Jupiter to transform into a small star under specific conditions. The virtual environment is meticulously designed using data from NASA and ESA, ensuring scientific accuracy and a high degree of realism. Celestial objects, including planets, stars, and meteors, are depicted at scale relative to one another, with dynamic movements such as rotation and orbiting. However, interactivity is entirely absent, as users cannot engage with the objects displayed. This segment serves as an educational yet passive exploration of space, offering valuable insights into the universe's structure and mechanics. The application is available in English, French, and Chinese, but it lacks subtitles, which may limit accessibility for some users.

Earthlight: Spacewalk is an interactive educational game that immerses players in the role of a crew member aboard a space station. The game focuses on simulating the daily tasks and challenges faced by astronauts. Players perform tasks such as capturing photographs and repairing circuit panels, all while navigating the zero-gravity environment of the station. Movement is achieved by gripping and pulling along rails, with missteps resulting in drifting into space and resetting the game. Throughout the experience, players are accompanied by another crew member who provides guidance and engages in friendly dialogue. The game offers a high level of interactivity, allowing users to manipulate a variety of virtual objects. For instance, in the airlock, players can open cabinets, interact with tools, and experiment with zero-gravity dynamics, such as floating water. In the later stages, tasks involve handling wiring and circuit boxes, providing a realistic simulation of space station operations. The environment is a detailed and immersive depiction of a space station and its surroundings, including views of Earth. Although movement is restricted to specific areas, the game effectively conveys the challenges and nuances of working in space. Available in English and simplified Chinese without subtitles, the application provides a unique educational perspective on astronautics and the dynamics of zero gravity.

These applications collectively demonstrate the transformative potential of immersive and virtual environments in education. Each offers unique strengths, from artistic storytelling in *Claude Monet – The Water Lily Obsession* to scientific exploration in *OVERVIEW: A Walk Through the Universe* and interactive engagement in *Earthlight: Spacewalk*. However, their educational impact varies depending on factors such as interactivity, accessibility, and focus. Applications like *The (Virtual) Reality Museum of Immersive Experiences* emphasize technological capabilities over content depth, showcasing the possibilities of virtual environments while leaving room for further development. These examples underscore the diverse applications of immersive technologies in education, highlighting their capacity to enrich content delivery, foster engagement, and provide novel learning opportunities. While challenges such as limited interactivity, accessibility, and high development costs remain, the potential of these technologies to revolutionize education is undeniable. With thoughtful integration, virtual and immersive environments can become powerful tools for enhancing learning across disciplines.

This analysis explores four educational applications within the broader context of the metaverse, showcasing how immersive technologies are transforming learning experiences. These applications – *Claude Monet – The Water Lily Obsession*, *The (Virtual) Reality Museum of Immersive Experiences*, *OVERVIEW: A Walk Through the Universe*, and *Earthlight: Spacewalk* demonstrate diverse approaches to utilizing virtual environments for educational

purposes. While they share certain features, their differences reveal the versatility of the metaverse in catering to various educational needs.

All four applications rely on immersive visual and auditory environments to engage users, leveraging the metaverse's ability to create realistic or stylized virtual spaces. From the Impressionist-inspired visuals of *Claude Monet – The Water Lily Obsession* to the scientifically accurate depictions of space in *OVERVIEW: A Walk Through the Universe*, these applications transport users into unique settings that enhance learning by transcending physical and conceptual barriers. This ability to simulate inaccessible locations or abstract concepts highlights a core strength of the metaverse in education.

Another commonality lies in their educational goals. Each application seeks to enrich knowledge in its respective domain, whether through art history, technological innovation, astronomy, or space exploration. For instance, *Claude Monet* offers insights into the life and work of the renowned Impressionist painter, while *Earthlight* immerses users in the daily tasks of astronauts aboard a space station. The metaverse facilitates these learning experiences by creating environments that support both passive and active engagement, depending on the application's design.

Despite these similarities, the applications differ significantly in their level of interactivity, educational focus, and target audiences. Interactivity, a defining feature of many metaverse experiences, ranges widely across the applications. *Earthlight: Spacewalk* offers a high degree of interactivity, allowing users to manipulate objects, complete tasks, and navigate dynamically within a zero-gravity environment. In contrast, *Claude Monet* and *OVERVIEW* are entirely passive, immersing users in narrative-driven experiences without the ability to interact directly. *The (Virtual) Reality Museum of Immersive Experiences* occupies a middle ground, enabling limited interactions such as teleportation and the rotation of perspectives within a hemispherical screen.

The focus of these applications also varies. *Claude Monet* emphasizes art history and Impressionism, using the metaverse to recreate the painter's world in a visually engaging manner. *The Virtual Museum* explores technological possibilities, showcasing innovative methods of audiovisual display rather than delivering substantive educational content. Meanwhile, *OVERVIEW* uses data-driven realism to educate users about space science, and *Earthlight* provides an experiential understanding of astronomical tasks and zero-gravity dynamics.

The metaverse's flexibility also caters to different target audiences. *Claude Monet* and *The Virtual Museum* appeal to general audiences and art enthusiasts, while *OVERVIEW* and *Earthlight* are better suited for science and technology learners. This adaptability illustrates the metaverse's potential to address a wide range of educational objectives, from fostering creativity and curiosity to teaching technical skills.

Another key difference lies in the applications' environmental design. While all rely on the immersive capabilities of the metaverse, their aesthetic approaches differ. *Claude Monet* blends realism with artistic abstraction to mirror the painter's style, particularly in the garden scenes. In contrast, *Earthlight* and *The Virtual Museum* focus on realistic depictions, creating a sense of presence through detailed environments. *OVERVIEW* strikes a balance, using scientifically accurate data for celestial objects while adjusting scale and perspective to enhance user accessibility.

A notable limitation shared by these applications is their accessibility. None provide subtitles or multi-modal features, potentially excluding non-native speakers or users with disabilities. This highlights a broader challenge in metaverse-based educational tools: ensuring inclusivity without compromising the immersive experience.

In conclusion, these applications demonstrate the metaverse's transformative potential in education, offering a spectrum of experiences from passive storytelling to active engagement.

While Claude Monet and OVERVIEW excel in presenting curated, narrative-driven content, Earthlight exemplifies the interactive possibilities of metaverse environments. The Virtual Museum highlights the technological innovations enabled by the metaverse, though it sacrifices content depth in favor of showcasing display capabilities. Together, these applications reveal the metaverse's ability to cater to diverse learning styles and objectives, enriching educational content, fostering engagement, and opening new avenues for exploration. However, their varying levels of interactivity, accessibility, and focus underscore the importance of thoughtful design and integration to maximize their educational impact. The metaverse holds immense promise as a tool for revolutionizing education, but realizing its full potential will require balancing technological innovation with user-centered accessibility and meaningful content.

4 Conclusion

The analysis highlights the transformative potential of the metaverse in education through its application in four distinct virtual environments: *Claude Monet – The Water Lily Obsession*, *The (Virtual) Reality Museum of Immersive Experiences*, *OVERVIEW: A Walk Through the Universe*, and *Earthlight: Spacewalk*. These platforms demonstrate the versatility of immersive technologies in delivering educational content, fostering engagement, and providing unique learning experiences. Despite their differences, all four applications leverage the metaverse to transcend traditional educational barriers, offering environments that facilitate both passive observation and active participation.

A key strength of these applications lies in their ability to simulate otherwise inaccessible settings. The metaverse enables learners to explore environments like Monet's garden, outer space, or intricate art installations, creating experiential opportunities that surpass the limitations of physical classrooms. These experiences not only enrich traditional learning models but also support innovative pedagogical approaches, such as problem-based and inquiry-driven learning.

However, the applications differ significantly in their interactivity, educational focus, and target audiences. While Earthlight exemplifies high interactivity through task-based engagement, Claude Monet and OVERVIEW rely on passive narrative-driven experiences to convey artistic and scientific knowledge. The Virtual Museum strikes a middle ground, showcasing technological capabilities while offering limited user interaction. These variations highlight the adaptability of the metaverse to cater to diverse educational objectives, from cultivating curiosity and creativity to teaching technical skills.

Despite their promise, the applications also reveal critical challenges that must be addressed to fully harness the metaverse's potential. Accessibility remains a major issue, as none of the applications offer subtitles or multi-modal support, potentially excluding non-native speakers and individuals with disabilities. High development costs, the need for specialized training, and technical issues such as motion sickness further complicate broader adoption. Overcoming these barriers will require thoughtful design, strategic investment, and the development of inclusive practices that prioritize user needs without compromising immersive experiences.

In conclusion, the metaverse represents a powerful tool for revolutionizing education, offering unparalleled opportunities for engagement, creativity, and experiential learning. The applications analyzed here illustrate both the strengths and challenges of integrating metaverse technologies into educational contexts. By addressing issues of accessibility, interactivity, and scalability, the metaverse can be more effectively utilized to create inclusive and impactful learning environments. As technological advancements continue to shape its capabilities, the metaverse is poised to become a pivotal force in education, fostering innovative practices and preparing learners for the complexities of a digital future.

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THE USE OF ARTIFICIAL INTELLIGENCE IN INTERNATIONAL BRAND MARKETING

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Abstract:

This paper explores the use of artificial intelligence in international brand marketing. Within the paper, we explore how AI, rather than posing a threat to marketers, can serve as a valuable tool to enhance their capabilities. In addition to the theoretical insights, the paper also provides a practical example of how AI can help a brand improve its product offering and subsequently a campaign design created by us and AI assistance, for that brand's existing AI-based product. The main goal of the work is not to emphasize the replaceability of human labor, but to show the possibility of symbiosis between humans and artificial intelligence, where they complement each other and strengthen their strengths. We believe that artificial intelligence has a very high potential in various fields, including marketing. In this work, we want to demonstrate how artificial intelligence can simplify and make the work of marketers more efficient, without jeopardizing their creativity and strategic thinking. For this demonstration of theoretical knowledge, we decided to choose an internationally active cosmetic brand.

Key words:

AI. Artificial Intelligence. Garnier. International Marketing. Marketing.

1 Theoretical Background

1.1 International Marketing

International marketing is exciting in that it combines the science and art of business with many other disciplines. Disciplines such as economics, anthropology, statistics, history, languages, demographics, cultural studies, geography and many other fields come together to help you explore the global marketplace. As Czinkota et al. (2022) argue in their book, different business environments will stimulate your intellectual curiosity, which will allow you to absorb and understand new phenomena.

International marketing is important because the world has globalized. Increasingly, we are all fulfilling the assertion of the Greek philosopher Socrates, who declared, "I am not a citizen of Athens or Greece, but of the whole world." The international market is happening around us every day, it has a great impact on our lives and offers new opportunities and challenges.

International marketing is essential because economic isolation from the point of view of a nation is not possible. If a country does not participate in the global market, it leads to a weakening of its economic capabilities and a reduction in the standard of living of its people.

Many authors from all over the world have commented on the definition of the term "international marketing". For example, Czinkota et al. (2022) mention in their book that international marketing takes various forms, ranging from export and import trading to licensing, joint ventures, wholly owned subsidiaries, turnkey operations and management contracts. As noted by Ghauri and Cateora (2014), the international marketing is the conduct of business activities that direct the flow of a company's goods and services to consumers or users in more than one country for profit. It is the fact that there is more than one country that creates this challenge for managers who have to consider different approaches to entering other countries' markets.

Foreign marketing differs from domestic marketing by its broader scope, encompassing multiple national markets. This expansion introduces challenges such as cultural, economic, legal, and consumer behaviour differences. As Kotabe and Helsen (2022) points out, global marketing does not mean that products can be developed everywhere on a global basis. Economic geography, climate, and culture, among other things, influence the way companies develop certain products and consumers want them. Ultimately, successful foreign marketing requires a deep understanding of diverse cultures, economies, and political systems, as well as the ability to leverage the marketing mix effectively in a constantly evolving environment.

1.2 Artificial Intelligence

Artificial intelligence (AI) in marketing has gained momentum due to its practical relevance in current and future business. As noted by Sharma et al. (2023), artificial intelligence (AI) is revolutionizing business processes by automating tasks and enhancing efficiency within shorter timeframes. Artificial intelligence finds its application in various contexts in today's business scenario. Practitioners and academicians are convinced that artificial intelligence is the very future of our society. In the words of Verma et al. (2021), nowadays people come in contact with some form of artificial intelligence in their day to day activities. For example, the user uses the automatic email filtering function. On a smartphone, the user can probably fill in the calendar using Siri, Cortana or Bixby. Owners of newer vehicles can be assisted while driving. As Davenport and Kalakota (2019), artificial intelligence can automate business processes, learn insights from past data, and generate consumer and market insights through algorithm-based programming. Technologies such as Machine Learning (ML), Deep Learning (Deep Learning) and Natural Language Processing (NLP) train machines to process large amounts of data to generate market intelligence. Authors Russel and Norvig's (2016) artificial intelligence describes machines (computers) that simulate the cognitive and affective functions of the human mind. The development of artificial intelligence has been astounding, and experts have worked tirelessly over several decades to develop AI concepts. Even Pichai, the CEO of Google, opined in an article by Clifford (2018) that artificial intelligence is one of the most important things humanity is working on. Data ingestion is a very important function of AI. Artificial intelligence systems work with huge amounts of data, collecting data as per the requirements and analyzing huge chunks of data.

Artificial intelligence (AI) in marketing is now gaining importance due to increasing computing power, lower computational cost, availability of large amount of data and advancement of machine learning algorithms and models. Huang and Rust (2020) in their study highlight the wide application of AI in various areas of marketing. For example, Amazon.com's Prime Air service uses drones to automate shipping and delivery. Domino's pizza is experimenting with autonomous cars and delivery drones to deliver pizzas to the customer's door. The use of artificial intelligence in marketing has become an essential part of businesses. Companies are constantly trying to modernize their practices and hence taking AI as a norm is becoming a requirement rather than an option over time.

As Taylor (2019) mentions in his study, artificial intelligence provides marketers with valuable insights about consumers in real time. Cannella (2018) highlights in his study that the era of artificial intelligence has come closer to the world and offers numerous benefits for businesses, marketers, consumers, and the entire society. Artificial intelligence brings many benefits that we can use in marketing. Based on our investigations, we can list the following positive aspects and uses of AI:

- Marketing campaign automation
- Improving customer experience
- Creating, generating content
- Personalizing content
- SEO optimization
- Chatbots
- Content recognition
- E-mail marketing etc.

2 Methodology

To apply the theoretical knowledge of domestic and foreign literature, we decided to choose the internationally operating cosmetic brand Garnier for the research part. Garnier is a brand, which is generally globally known, has also brought with it the plus aspect that this brand is moving with the times and is no stranger to the use of artificial intelligence. This fact was the driving force behind the deeper analysis of the brand and the subsequent creation and achievement of the objectives we set ourselves. We decided to explore the AI tools that the brand offers to its consumers. Using the exploration of these virtual tools, we decided to create a short questionnaire survey to confirm our hypotheses. This questionnaire survey focused on the respondents' knowledge of the brand and the virtual tools it freely offers. This questionnaire survey contained 10 questions, of which 4 were research questions and the remaining 6 questions were identification questions. For the statistical processing of the data of this questionnaire survey, we decided to use Google Forms designed for creating online questionnaires.

Using statistical questionnaire development, we were able to confirm the validity of our pre-specified hypotheses, which can be seen below:

- H1: More than 80% of respondents know the cosmetic brand Garnier
- H2: More than 70% of respondents are not familiar with the virtual artificial intelligence tool Skin Coach of the Garnier brand
- H3: More than 50% of respondents who are familiar with the tool have used it.
- H4: More than 50% of respondents who have used the tool have purchased the recommended products.
- H5: More than 70% of respondents are women

This rigorous analysis of the respondents' answers to the given questions of the questionnaire was a guiding basis for the subsequent design of the brand's marketing campaign. The resulting evaluation then moved us forward in the creation of the marketing campaign, which was based on the use of artificial intelligence. Using AI, we decided to generate a content design for the campaign, which was based on the promotion of the virtual tool and the brand's products.

3 Analysis of the Selected International Brand

Our research focuses on the Garnier brand, which operates in the international market. Its origins date back to 1904, since when the brand has been a hair and skin specialist. In that year, specifically, Alfred Amour Garnier launched his first patented plant-based hair cream, named La Lotion Garnier by the then Laboratories Garnier. This anti-hair loss and anti-dandruff product quickly became a bestseller.

Other products that made the brand famous were sunless tanning products. Just as Garnier (n.d.a) states on its official website, in 1935, the company launched the iconic Ambre Solaire line. This product later even became a symbol of Paris holidays, as France introduced paid holidays for all at that time. In 1960, Garnier introduced fashion for women, which was not only about clothes and accessories, but women began to think more about the fact that hair, too, is a major accessory to a woman's beauty. The first home colouring product, Belle Color, not only covered grey hairs but brought women confidence and a quick option to take care of their hair at home.

A milestone for Garnier was that 5 years later Garnier became a property of the L'Oréal group. Hemanth (2020) mentions in his study that Garnier is one of the oldest cosmetics and skincare companies in the world and is the second largest brand of the L'Oréal group. Garnier

mentions on its website that Garnier is a global brand and since 1995 and has become a major player in the international cosmetics market.

The brand is also no stranger to being environmentally friendly. In 2001, Garnier teamed up with TerraCycle®, a company we've seen on its packaging for several years. This partnership brought an opportunity for every customer in that, once the contents of the product were used up, the customer simply sent the product packaging to TerraCycle. Based on the customer's submission of that product, TerraCycle contributed two cents for every unit of waste to the charity of the customer's choice. This demand among customers for natural and eco-friendly products increased so much that in 2019, the company decided to form another partnership with the GoodPlanet Foundation, an environmental impact group, and thus the "Bio Garnier" skincare products were launched. This project involves the planting of 2,800 trees. This three-year partnership between Garnier and the GoodPlanet Foundation involves an initiative called "giving back to nature".

Today, the brand is present in more than 140 countries and offers products developed to meet the specific hair and skin care needs of men and women across the planet. Garnier offers several types of hair or skin care products. It has its products and product lines not only for women but also for men. It offers products for different types of skin or hair types.

3.1 Examples of the Use of Artificial Intelligence within Garnier

Digital transformation affects many activities in businesses. Activities ranging from production aspects, science, research, product development to the broad concept of marketing management in enterprises (Chovanová Supeková, 2022). Garnier is one of the beauty brands that is moving with the times and has been working with artificial intelligence for a few years now. The results of working with artificial intelligence can be seen in the applications that the brand offers to customers. Based on the available information and findings, we can note 2 ways Garnier has used and is using artificial intelligence to the benefit of its brand and customer and these are Skin Coach Hair Color Virtual Try-on.

Skin Coach

This use of artificial intelligence came from Garnier in 2019. Skin coach is a mobile app that uses artificial intelligence to analyze the user's skin type, and based on the skin scan, this app will offer you products for your skin type that she scans. As Garnier (n.d.b) states on their official website that this app was created through their 9 times patented AI technology with over 20 years of research. The skin analysis is based using a database of 15,000 real faces and thanks to this, after a quick scan, it will help you find a perfect match to your skin.

The app works by using a QR code or by going directly to the Garnier website to get to a scanner that will suggest you scan your face, or if you're in a situation that doesn't allow you to scan yourself without makeup at the moment or for any other reason, you can use it to upload a photo of yourself. Based on the scan of your shape, the app will start working with comparing your skin to 15,000 skin types that have similar aspects to your skin. Next, the app takes you to a smaller quick form where you specify your gender, age, your skin sensitivity, and what type of skin you think you have. Based on this, the app will tell you exactly what's good about your skin and what you need to work on. The application breaks down your skin step by step what is good and what is lacking for your skin to be supple, have brightness, have good pigmentation, skin unification and a smooth appearance. At the end, the application will still summarize your morning and night routine, which she thinks is the most suitable. The app will recommend Garnier products that will improve your imperfections that it has detected using the scanner. In our case, we also tried this virtual tool, which recommended suitable products, as we can see in Figure 1.

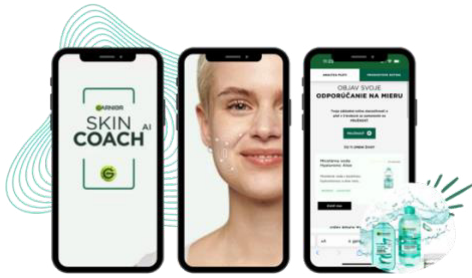


Figure 1: Garnier Skin Coach
Source: own processing, 2024

Hair Colour

Another tool that can make it easier for customers to determine the right hair colour is the Garnier Hair colour app. A great way to try out a hair colour before you buy it is Garnier's app, which allows customers to try out any hair shade using a filter thanks to their virtual mirror technology. This collaboration with the Modiface augmented reality platform makes it easy to choose the exact hair shade you need. This collaboration uses personalized technology to recommend different shades to customers within one minute, so customers can decide which shade is best from the comfort of their home or directly while shopping.

In order to try out your maybe new hair colour it is necessary for you to have a phone or webcam in your hand. Next, you just choose the hair colour you want to try on the app. On this app, you can try any Garnier colour and also compare your current colour with the one you have chosen. Also, while you're choosing your shade, the app will show you a link to the product, which you can then purchase. Also as Chovanová Supeková et al. (2023) mentioned Social media and networks are becoming an inimitable tool and medium for marketing businesses, especially a means of promoting and advertising them. Garnier also wanted to connect customers with each other and create their own communication in such a way that on its official website, Garnier still encourages customers to remember to take a picture of their "virtual look" and share it on their social media under #MyGarnierShade.



Figure 2: Garnier Hair Colour
Source: own processing, 2024

These virtual tools based on artificial intelligence are, in our opinion, a very good tool to facilitate the customer's purchase, to help them with their decision-making, but most importantly, an excellent tool to promote the brand further to the people. From our point of view, we would just recommend a higher promotion of these virtual means, based on which it would increase brand awareness and news related to artificial intelligence, which we can say is now in vogue.

3.2 Questionnaire Survey

Based on our observations, we concluded that the brand is, in our opinion, poorly promoting its virtual instruments. Based on this, we decided to investigate this fact for the virtual tool Skin Coach. To understand how to set up a marketing campaign strategy and what

to pay attention to, we decided to create a questionnaire survey. This questionnaire survey was created using the website www.gmail.com, specifically using Google Forms. This short survey was conducted from April 11, 2024 to April 15, 2024. The questionnaire survey was based on multiple choice questions, which ensured clear answers to our stated hypotheses.

As mentioned above, the questionnaire survey was offered to respondents using an electronic form in Google Forms and consisted of 10 questions, of which 4 questions were research questions and the remaining 6 questions were identification questions.

3.3 Results and Evaluation of the Questionnaire Survey

432 respondents from all over Slovakia answered this published questionnaire survey. On the basis of these answers of the respondents and their analysis, we have come to confirm our hypotheses, which we have determined at the beginning of the work.

The first hypothesis (H1), confirmed thanks to the questionnaire survey, was that more than 80% of the respondents know the cosmetic brand Garnier. The result of our questionnaire survey indicated that even more than 90% of the respondents know the brand Garnier. Our next question in our questionnaire confirmed our next hypothesis (H2) in its result values, in which we claimed that more than 70% of the respondents will not be familiar with the artificial intelligence tool of Garnier Skin Coach brand (the result value is as high as 80.3%). The third hypothesis (H3) within the questionnaire survey, which was also confirmed, is that more than 50% of the respondents who answered the previous question that if they are familiar with this tool, they have used this Skin Coach. From the research part of the questions regarding the Garnier brand, we were also able to confirm the hypothesis (H4), based on which we reported the claim that more than 50% of the respondents who used this tool purchased the recommended products (resulting value of 69.2%). The last hypothesis (H5) on our part for this present work, was that more than 70% of the respondents, would be female. This hypothesis was confirmed in the final value of the questionnaire survey of more than 80%, which specifically represented the number of 349 female respondents.

The resulting values of the questionnaire survey confirmed to us that our observation and analysis of the brand showed that the brand is highly known among consumers and in the Slovak market in general. For the questionnaire survey, we chose the questions related to the virtual brand tool, based on artificial intelligence, as in our opinion and observations this tool seemed to be insufficiently publicized among consumers. This fact was confirmed to us in all the related questions based on the results of the questionnaire survey, and so, on this basis, we recommend the brand to create a marketing campaign based on the promotion of this tool with a link to their products. We present the subsequent proposal in the following sections of the present work.

4 Marketing Campaign Design Using Artificial Intelligence

Within the framework of a campaign design created with the help of artificial intelligence, we decided to point out how the creator can make his work easier. As noted by Fabo et al. (2023), the open market economy is putting pressure on companies, perhaps in every industry segment. Continuous product innovation is important for the survival of individual companies. Companies must be able to develop new products and services that replace obsolete ones.

From a creator's point of view, it can sometimes be very challenging to create a marketing campaign for a product, since in today's modern era, many trends are already being utilized. However, if a person, a brand, a company wants to come up with something new and unique, it is very difficult to come up with something. However, sometimes a brand doesn't need to be too different with a brand new idea, but it can't match the trend or doesn't understand how to follow the trend. In this case, there is no harm for the creator to reach out to artificial

intelligence, which can help the creator with the processing of the creation from the script itself to its visuals.

We decided to focus on our home market Slovakia and foreign market United Kingdom (UK). As our advertising should appear neutral for both countries, we feel that this option of combining a skin scanner and a recommended product is a suitable way of advertising that can be promoted in both markets. For our part, we have used artificial intelligence to suggest it to us:

- idea how to make a video with our request
- video script
- subtitle generation using artificial intelligence
- idea for an Instagram post
- translation of the necessary parts using AI

For the design of the social media marketing campaign, we decided to approach Google's Gemini service. For the following research, we wanted to create a campaign using this artificial intelligence, as it works on the basis of the Internet, which, despite possible errors that are understandable for an evolving technology, brings excellent generation results.

4.1 Video and Post Idea Generation

In our case, we initially decided to create a proposal for video generation. For this step 1, we wrote a prompt along the lines of: Imagine you are a digital content creator and you need to create a marketing campaign for the cosmetics brand Garnier. To start with, we would like to create a short video for the brand's Instagram profile in which we would like to promote the Skin Coach app that Garnier has. This app is available to everyone through Garnier's official website, where the consumer can scan their face and based on the results of the scanner, the consumer can buy recommended Garnier products. Give me a creative idea for a video of 30 seconds to 1 minute maximum where we show this way where the consumer can choose the product that their skin needs right now. This assignment was followed by a series of ideas from Gemini on our part, who were then asked to generate further ideas. In the end, however, we settled on the first idea, and this particular one Gemini named as Garnier Skin Coach: Your Journey to Perfect Skin. We liked this title and decided to keep it for the actual video creation.

In the case of generating an idea for a post, Gemini advised us to create a Carousel, which is a set of images within a single post that a person can browse through. This type of post saves the brand space on the Instagram profile area, as they don't have to have multiple posts with multiple descriptions, but it's all embedded within one. In our case, this is also the most ideal option as based on the idea generated, we decided on 5 photos and that's specifically what we will feature on them:

- Figure 1: A woman scans her face with Skin Coach.
- Figure 2: The application analyzes the woman's skin.
- Figure 3: A woman views the recommended products and the results of the skin analysis.
- Figure 4: A woman holds the Garnier products recommended by Skin Coach and smiles.
- Figure 5: Garnier logo with QR code linking to Skin Coach.

For a better understanding of what the following photos might look like, we can also create preview images, also using artificial intelligence generation. In our case, we decided to use the Canva application, on the basis of which we used DALL·E, which enables the generation of images using text input. In addition to the fact that we used the AI tool DALL·E, in Canva it is possible to use other tools based on artificial intelligence, such as removing the background, reworking the text and editing the photo, which will create the final result for us. The following preview result can be seen in Figure 3.



Figure 3: Design of campaign images
Source: own processing, 2024

Under the post, we would choose an eye-catching title and the following description, which was also helped to generate artificial intelligence, and we only chose the best from it and at the same time easily edited it. Specifically, we decided on the following:

- Garnier Skin Coach: Your secret recipe for perfect skin!
- Do you have skin problems? Don't know which product to use? Get a professional analysis of your skin type and its current needs. You will receive personalized Garnier product recommendations that are ideal for your skin.

At the end, Gemini suggested several types of hashtags, the selection of which we decided to use. Hashtags are helpful on Instagram as search engines, so it is necessary to choose the type of hashtags that will be related to the post and what the person will be looking for. Specifically, in Slovak language we decided to:

- #Garnier • #GarnierSkinCoach • #SkontrolujSiPlet' • #Dokonaláplet'
- #Starostlivost'OPlet' • #Krása • #Sebavedomie

We chose the mentioned hashtags in order to indicate for whom the post was created and that's how the post will be found. Next, we decided to enter the name of the application that is used in the post. Then we selected hashtags that represent the given message on the post and the message on it. As the last hashtag, we chose to put the country for which we created the content.

For the UK market, we have decided to keep the overall design above, only translating it into English and using the English version of the Skin Coach app. As the translation of the text could be difficult for some creators, it is possible to use either the Gemini service directly to translate the given text into English, or we could move to the DeepL site, which is a translator based on artificial intelligence that knows with great accuracy translate not only short texts, but also entire documents.

During the translation, when moving to the given translated words, this tool can show us another variant of the word, a synonym, which it can automatically replace in the text. In our case, we also decided to move to the DeepL site, to test the translation using this site. In this case, we helped with the translation of the text into the video, the text under the post and the translation of the hashtags themselves.

The advantage in our case is also the fact that we decided to operate on the foreign market of Great Britain, but since it is about creating a campaign in the English language, there is a high probability that the creation will also reach other consumers from other corners of the world, since the English language is a language that pretty much everyone speaks these days.

4.2 Visual Representation

The visual representation that is the result of this marketing campaign can be seen directly on Instagram, thanks to the cooperation with the UGC platform in Slovakia, which, thanks to internal communication and by mutual agreement, made it possible to publish a video and a post created with the help of artificial intelligence as an example for creators how to help themselves when creating content for brands.

This platform is the first platform in Slovakia that covers cooperation with various local and international brands. On his Instagram profile, he presents not only created content for brands, but also ideas and advice for creators on how to create interesting content on social networks for brands. Based on this, we chose to approach this very platform, which could publish this content as one of the examples.

At the same time, the video created for the Slovak market was also a success with the Garnier brand itself, which approached us to share the video on its official Instagram profile for Slovakia and the Czech Republic @garnier_czsk.

5 Conclusion

The aim of this work was to assess the effectiveness of artificial intelligence tools of the cosmetic brand Garnier. Through in-depth brand analysis and consumer research, we discovered that artificial intelligence has enormous potential to improve marketing efforts. The results showed that artificial intelligence can significantly influence the perception of the brand and its marketing activities. Although the analysis of the questionnaire suggests that the sample obtained may not be fully representative due to some inaccurate responses, on the part of respondents, the results of this pilot study provide valuable information for further research that will aim to expand the sample and refine the methodological procedures. The Garnier brand should promote its tools based on artificial intelligence more. The combination of human creativity and artificial intelligence brings the best results in marketing.

In conclusion, it can be concluded that artificial intelligence is a promising tool in international marketing, but it requires human supervision and optimization. Although artificial intelligence can automate many tasks, human creativity and the ability to think strategically remain irreplaceable. The future of marketing lies in the symbiosis of humans and artificial intelligence, which will lead to innovative and effective strategies.

This paper does not say that artificial intelligence will replace humans, but that it can support them and improve their work. The future of marketing lies in the cooperation of humans and artificial intelligence. Based on our findings, we recommend intensifying marketing communication about AI tools, integrating AI into the overall marketing strategy, regularly monitoring AI development and adapting strategies, and not forgetting the importance of the human factor.

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THE USE OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE FACILITY COMMUNICATION AS AN IMPORTANT TOOL OF BRANDING

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Abstract:

Medical tourism is an important segment of tourism as such. On the one hand, this is due to higher life expectancy, increasing demands on health care, on the other hand, price, global trends and legislative restrictions in this area of social reality play an important role. This reality is also becoming a matter of interest for the Czech Republic, and the interest in the services of specialised healthcare IVF (in vitro fertilisation) facilities on the part of foreign buyers is growing significantly, currently amounting to more than CZK 6 billion. There is no doubt about the importance of a brand that symbolises this quality and communication aimed on potential clients, so the first stage of our research was to identify the critical factors of reputation and a strong brand. The next step was a draft of effective communication, of IVF clinic in Prague. Nowadays, the communication of these facilities can be greatly streamlined by artificial intelligence. The scope of this paper is to present the results of the research and to document the use of artificial intelligence in draft of creative strategy of an advertising campaign aimed on foreign clients.

Key words:

Advertising Campaign. AI Tools. Creative Strategy. IVF. Media. Medical Device Brand Attributes. Medical Tourism.

1 Introduction

Medical tourism has become a worldwide phenomenon where patients seek medical services beyond their country's borders. The main motivations include lower costs, shorter waiting times, legal barriers, specialised treatment, and in some cases the possibility of combining medical care with tourism. This trend is made possible by the improvement in the quality and availability of healthcare, but also by globalisation, advances in air transport in particular and, in the EU, the removal of barriers to crossing national borders. Many countries, not only in Asia but also in Eastern Europe, are renowned for affordable and high-quality medical interventions, which attracts patients seeking an alternative to expensive care in their home countries. Currently, the medical tourism market has been valued at approximately USD 40 billion, with estimates projecting a compound annual growth rate of 22.44% through 2032. In 2032, the medical tourism industry is projected to have a turnover of USD 243.72 billion (Fortune Business Insights, n.d.). In the Czech Republic, medical tourism is gradually gaining popularity due to highly qualified doctors, modern facilities and competitive prices. Over the past 10 years, the number of medical tourism participants in the Czech Republic has tripled and currently accounts for approximately 100,000 visitors per year (Stavař & Tomek, 2024).

The Czech Republic, renowned for its specialisation in fields such as dentistry, plastic surgery, orthopaedic procedures as well as reproductive medicine, offers attractive opportunities for foreign patients. Moreover, its central location in Europe, easy accessibility and rich cultural heritage make it highly desirable. The growth of medical tourism also has a positive impact on the Czech economy, as it generates income and supports employment opportunities in both the healthcare and tourism sectors. For the Czech Republic, it represents a promising route not only to extraordinary economic benefits but also, at the very least, to

European-wide recognition in the field of specialised medical services. One of the key factors for choosing a healthcare facility is the brand symbolising its reputation, quality of healthcare, trust and quality accompanying services. A strong and credible brand can be a key factor in a patient's decision to choose a healthcare facility, symbolizing not only the quality of services provided but also trust and reputation in the eyes of potential clients, which is particularly important as patients often come from different cultural backgrounds and have limited information about local healthcare facilities, their quality and reputation. In the context of medical tourism, building a strong and credible brand and communicating it effectively is a crucial step to increase the attractiveness and success of a healthcare facility internationally.

We are currently conducting research at the Pan-European University in Prague on this specific area. In the first phase, we have conducted extensive research on the key factors influencing the choice of the relevant healthcare facility abroad. It was found that quality of care and related services, modernity and expertise play a major role in the perceived image and brand reputation of a healthcare provider. Specifically, the positive image of the facility, the quality of the doctors and the accompanying services. Price also plays a role here, meaning the total costs associated with travelling to the country for the relevant healthcare procedure, not just the price of the procedure itself. Research has shown that from a communication perspective, the content created by the hospital (websites, use of social media, etc.) is of great importance in the perception of clients. These forms of communication go hand in hand with WOM, and according to previously published research, the traditional face to face form of WOM is a significant factor, but our study did not confirm this compared to others (Ha My & Le Thanh, 2023). However, the situation is different for e-WOM (more or less anonymous reviews on professional blogs, etc.). This may be due to a certain sensitivity and intimacy of medical care; in the case of the research, it involved IVF (assisted reproductive technology) clinics and eye clinics; the aforementioned intimacy of the medical procedure is quite understandable in the case of IVF. The above research was followed by the next phase. This phase is the design of an advertising campaign for a specific IVF assisted reproduction clinic (listed under the name "Novus"). The clinic management decided, if the campaign design is accepted, not to outsource its implementation to a large advertising agency and to effectively handle the campaign "in house" and by working with an expert (freelancer) on the use of AI in marketing communication. The following text will present a review study mapping the empirical research carried out in this area of social reality recently, a methodological and design part presenting the design of the IVF Novus advertising campaign using AI tools.

2 Literature Review

This part of the paper presents a summary overview, which is based both on work and research carried out in this area and on the first stage of our research, which has already been published (Stavař & Tomek, 2024). The findings obtained by previous research relevant to this issue are described and the generalization of their results creates an appropriate theoretical basis for the methodology and especially the design part.

If we follow the development of birth rates in Europe, we see that birth rates in our countries are declining and the population is ageing. One of the reasons for this is the fact that more and more married couples are having problems conceiving children, and some are also postponing it because of career, background, lifestyle, etc. The Czech Republic has become one of the renowned reproductive superpowers of Europe, where people from all over the world come. At present, the turnover of IVF clinics in the Czech Republic is estimated at more than 6 billion crowns. When choosing a reproductive clinic for infertility treatment, the brand and reputation of the institution plays a vital role. For couples, the decision to undergo assisted reproductive technology such as IVF is often one of the most emotional and important steps in

their lives. In such situations, trust in the healthcare provider is crucial. A clinic with a positive brand and a good reputation can significantly influence not only patients' decision-making, but also, for example, their psychological well-being during treatment.

2.1 The Importance of the Brand in the Choice of IVF Clinic

As mentioned above, this conference paper builds on extensive research conducted at our university last year, research looking at the importance of brand in medical tourism, with our other analysis and research focusing on the brand communication of IVF clinics as one of the most important branding tools. The aim of that research was to determine the importance of a medical facility's brand image on the decision-making process of foreign patients who travel to the Czech Republic for medical procedures. Through a combination of research analyses previously conducted and published on this topic, as well as our own qualitative and quantitative research, the key factors that influence the choice of clinic in this case were identified. The decisive factors include the quality of the services provided, both the medical procedure itself and the accompanying services, the physical environment – modernity, the safety of the facility, the cost of not only the procedure itself but also other associated costs, the speed of the services provided and the possible length of the wait and, last but not least, **effective communication**. Regarding the above factors, Hilšerová cites the recommendation of friends and family and price as the key factors in choosing a foreign medical facility (Hilšerová, 2022). The importance of Word of Mouth, specifically face to face does not apply to IVF clinics as the latter provide very intimate services where confidentiality and anonymity are usually a prerequisite.

A somewhat older but still interesting study by Kim et al. (2008) defines in their study five main factors creating brand equity. These are trust, customer satisfaction, commitment, brand loyalty and brand awareness. In his study, Bergmann explains how the legislative conditions regarding IVF in some EU countries, the anonymity and origin of the potential egg donor, as well as the price or waiting time for the procedure, can also play an important role in clients' decision-making. All this can be decisive in the choice of country and clinic. Legislative conditions include, for example, the ban on artificial insemination via egg donation in Germany. This is also why German women are most interested in this procedure and mainly choose between Spain and the Czech Republic. Cultural factors may also play an important role here. The Czech Republic may still be perceived by some German women as a country with an 'post-soviet eastern flavour'. On the other hand, egg donors in the Czech Republic are most often young students or young mothers of Czech nationality, who undergo rigorous medical and genetic tests. In Spain, they are often women from the ranks of migration, where Spanish citizenship is not required. This fact may also play a role in their decision-making for many of the clinic's clients. In the Czech Republic, donors are strictly anonymous, which is not the case for example in Denmark, Sweden or the UK (Bergmann, 2011). In Austria, for a long time similar regulations as in Germany were in place, but now they have come into line with the Czech legislation with the exception of prevention. Thus, Czech clinics have lost some clientele from this country. If we summarize the existing findings in the field of decisive factors for the brand image and reputation of healthcare facilities then the five most important ones are:

1. Quality of service, which is further divided into the area of medical care, technological equipment of the clinic, level of service, specialization of the clinic and modern equipment of the clinic including its location.
2. Price, which also plays an important role here and determines to a large extent the availability and convenience of healthcare.
3. Brand communication not only provides information but also generates trust and positive emotions.

4. Personal referral by WOM in IVF clinics does not play as significant a role in face to face WOM as it does in e-WOM.
5. Perceptions of the Czech Republic in terms of accessibility, safety and reliability, discretion and attractiveness (Stavař & Tomek, 2024).

Other factors influencing the decision-making of potential clients include the aforementioned legislative barriers and restrictions, especially in the case of IVF clinics.

2.2 Marketing Communication as an Important Branding Tool in IVF

Marketing communication is undergoing a significant transformation, caused mainly by the rapid development of technology, for example the emergence of new digital platforms, but also by major and substantial changes in society. Innovations such as virtual reality or social media have revolutionized the way brands/companies communicate with their consumers, enabling experiences and experiential blurring the previous boundaries between the present and virtual worlds and thus engaging target audiences to a much greater extent (Lincenyi et al., 2022). The world is evolving and people with it. There is a very deep communication gap between generations, in addition to technological, social and value gaps. And it is not only a division of society into digital natives and immigrants (Světlík & Bačíková, 2015). If we present our product/service, we will certainly choose not only different media, but also different appeals for a twenty-year-old college student, a forty-year-old programmer, or a younger woman who wants to start a family. One of the first conditions for choosing a communication strategy is to clearly define the target group of communication and to define the typical representative of this group in the form of a so-called persona. Only by considering all of the above factors and forming a persona can we choose an effective advertising message and a suitable platform or medium for effective communication with the target group (Světlík, 2017).

The Internet and online advertising offer a number of advantages compared to the use of traditional media. Among the most important ones is their efficiency. This is, of course, provided that the use of these new technologies for marketing communication purposes is carried out with a deep understanding of the subject matter. The Internet can also effectively reach both global and local target groups. A very important advantage of promoting on the Internet is not only the possibility but also the necessity of two-way communication; moreover, the Internet operates in a continuous form, i.e. all day and all week. At the same time, recipients can be reached anytime and anywhere, especially with the use of mobile marketing tools. Another major advantage is the fast and much more accurate evaluation of the hit, reach, conversion and other indicators measuring the effectiveness of advertising on potential customers. And not only more accurate, but also more cost-effective (Zwier, 2017; Rahman et al., 2022). Before any organization considers effective use of the Internet for its communications, it needs to understand which area of communication or business it is prioritizing. Communication that favours providing information or rather building a deeper positive relationship with potential or existing customers. It represents decision, which concerns activities on the website by providing information about existing offerings, news, etc. on one side. Or make use of another form in form of active use of social media to communicate with potential or actual customers, building communities, using e-WOM through these media on the other. Based on the above, we can define 5 main objectives of digital communication in the case of IVF clinics:

1. Creating and raising awareness of the existence of the problem and the possibility of solving it
2. Acquire new leads and retention of existing clients
3. Activation of potential and existing customers and their retention
4. Creating communities and advocates for our brand.

2.3 Use of AI in IVF Clinic Marketing Communication

Innovation is a key success factor in all areas, including marketing communications. The most prominent of these recently is artificial intelligence (AI). It undoubtedly has enormous potential to become the most important tool for creating both content and form (Murár & Kubovics, 2023). Artificial intelligence has the power to change everything, including activities in marketing, advertising and other parts of the communication mix. Artificial intelligence with its tools already offers marketing and advertising professionals unprecedented opportunities in identifying, analyse consumer insights, and then finding effective ways to change recipients' attitudes, persuasion, and subsequently retention in terms of meeting their respective communication goals (Nair & Gupta, 2021). The use of artificial intelligence in advertising and marketing communications brings a number of notable benefits to an organization, that not only significantly improve the effectiveness of campaigns and, when handled by an expert, yield better results. Many companies that have their own marketing department limit the outsourcing of many activities to advertising agencies and provide them in-house. Small advertising agencies are expanding their portfolio because they have been given a very powerful weapon in the form of AI, expanding their offerings and starting to compete with larger agencies. The efficiency of social media management is another significant benefit of AI (Malthouse & Copulsky, 2022).

3 Methodology

The research was conducted in two main stages. The aim of the first stage of the research was to analyse the motivation of medical tourism in the destination Czech Republic. The theoretical research in the form of desk research was followed by qualitative research in the form of in-depth interviews with medical tourism experts through semi-structured interviews. The interviews were conducted according to a pre-prepared scenario and were conducted by an experienced expert in this field following SIMAR and ESOMAR rules. The findings of the qualitative research were the basis for the following quantitative research. This took the form of a questionnaire survey to determine the influence of factors on brand image and choice of healthcare facility. The questionnaire was constructed to enable the testing of the three stated hypotheses:

H1 – Quality as a component of brand image has a significant positive influence on the choice of health clinic.

H2 – The perception of the Czech Republic has a significant positive influence on the choice of medical clinic.

H3 – Recommendations in the form of WOM have more influence on decision-making than advertising communication.

The obtained data were analysed using the partial least squares structural equation modelling (PLS-SEM) method, composite reliability of factor loadings of the battery items and average variance extracted. After cleaning, factor analysis was applied to the components of the Likert scale battery in order to find the underlying components of attitude towards the choice. For data processing and analysis SPSS software was used. In answering hypotheses H1 and H2, the quality items in the questionnaire and their effect (regression) on the NPS variable was observed. The χ^2 test of independence was used to confirm the hypothesis that the variables of interest (individual quality-related items in the questionnaire x NPS) are independent against the alternative hypothesis that these variables are dependent. Hypothesis H3 was tested by matching regressions of WOM and Advertisements on NPS. Depending on whether the distribution of variables is normal or not, choose Spearman's (non-parametric) or Pearson's (parametric) test. Hypotheses 1 and 2 were confirmed by the research, while hypothesis 3 was

rejected (Stavař & Tomek, 2024). The reason for the rejection of H3 can be explained by the fact that a minimum of women are willing to talk face to face about their problems with IVF and IVF transfer and moreover in a foreign country. However, this is far from being true of posts on discussion forums, where anonymous participants are willing to talk quite openly about their experiences. This can also be an important insight for the optimal choice of creative communication strategy for an IVF clinic.

Many of the findings from the first phase were used to design the subsequent creative communication strategy. However, these data were not fully sufficient. Therefore, the second stage of the research was to conduct desk research in the area of analysis of secondary sources of communication of medical institutions, namely IVF clinics, based on the findings of the first research, the use of AI in marketing communication and the analysis of case studies from this area. This was followed by a content analysis of the profile of discussants on the international platforms Reddit.com, mumsnet.com and babycentre.co.uk creating communities around the topic of IVF. At the same time, using the AI tool Brand 24, these posts were evaluated through sentiment analysis. The results of these analyses were then used to formulate a prompter, which was used by the AI tool ChatGPT plus in order to formulate a persona as accurately as possible. The resulting persona analysis was corrected by the researchers based on their knowledge of the issue and experience.

Subsequently, we have analysed the context, especially in terms of legislative rules in selected EU and UK countries governing and regulating IVF, and we have also tried to analyse the cultural differences of countries with potential clients of the Novus clinic, its reputation and take into account its state-of-the-art equipment. In the analysis of the legislative rules, we based our analysis on the fact that in Germany artificial insemination by egg donation is prohibited by law. In the Czech Republic it is allowed, donors are carefully selected from among only Czech citizens with a thorough medical and genetic examination. Compared to other countries, donation is strictly anonymous. For example, in Austria, where the legislation is very close to the Czech Republic, the so-called prevention is not possible compared to the Czech Republic (only serious health reasons are an exception), i.e. freezing of sex cells and their later use. Context analysis was conducted on the basis of previous research through primary research as well as secondary research in the form of desk research, observation and analysis of case studies. Conducting a context analysis as well as defining the persona, were the basic inputs for the decision-making process of designing a creative strategy for the IVF clinic Novus in Prague, which will be aimed at foreign clientele. ChatGPT plus was also used here in the final stage with subsequent correction by the authors.

4 Creative Campaign Strategy Proposals

Based on the above research using AI, a creative plan was subsequently designed for an advertising campaign for the Prague clinic Novus aimed at foreign clients. A German and English version (website) is envisaged, and an Italian version is also being considered. The decision will be in the hands of the final decision of the Novus clinic management. Here are the essential parts of the creative strategy of the proposed campaign:

The main theme of the campaign should emphasise the hope, confidence and possibilities that modern medicine and an innovative approach can offer. The theme should link feelings to results, specifically focusing on the emotional side of a “new beginning” combined with the expertise and reliability of the clinic. Key elements will be: “A new beginning”, “trust in modern treatment” or “Prague as a centre of expertise”.

The tone of the campaign will be empathetic, encouraging and trustworthy. The campaign should give a reassuring and professional impression, with a clear call to action that highlights the effectiveness and quality of the clinic. The main aim is to show that the IVF clinic

in Prague offers top-notch services, in an exclusive environment that goes beyond the usual care.

Unique Selling Proposition (USP) and claim

- **USP:** “State-of-the-art technology, a personal approach and world-class expertise – all in the heart of Europe”.
- **Claim:** “Your hope, our expertise. Bring a new beginning to life in Prague”. These principles were transformed into the proposed slogans using ChatGPT plus after modifications by the authors.

Suggested slogans for discussion:

“From Prague with care to a new life – European quality you can trust”

“Aus Prag mit neuem Leben – europäische Qualität, der Sie vertrauen können”

“Novus Clinic, a safe way to family – with the care of Czech donors and European quality”

“Ein sicherer Weg zur Familie – tschechische Spender und europäische Qualität”

Creative concepts:

1. **Emotional storytelling:** short stories or videos capturing different moments of the journey to motherhood, from the moment of the decision to try a new approach to the moment when the desired child is born. These stories can be complemented by authentic patient testimonies. They will be used in an instructional video for YouTube as part of a content marketing strategy. A video speech by the head of the clinic introducing the staff as well as the equipment will also be made using AI in English and German (Italian?).
2. **Visuals:** high quality photographs or videos of Prague combined with advanced technologies of the clinic. Visuals can depict intimate moments such as the touch of partners, the joy of a positive outcome, or the peace and security that Prague and the clinic offer. The visuals are printed to a lesser extent and in digital form, especially on the clinic’s website. Here too, the use of AI is expected – see the following text.
3. **Explainer videos:** short informative videos that explain in a simple and transparent way how IVF processes work and why Prague and the clinic is the ideal choice. They will be used mainly on the website and YouTube.

The media strategy will primarily include:

- **Own media** – this is the clinic’s website, own printed materials provided to clients at the clinic or potential clients by mail.
- **Social Media:** Instagram, Facebook and LinkedIn to reach the target group through emotive visuals, stories and informative posts as well as popular IVF discussion forums.
- **Professional blogs** or foreign professional and scientific forums with IVF issues, in order to encourage personal recommendations by foreign medical specialists in this way.
- **YouTube:** Campaigns with emotive and educational videos that answer clients’ most common questions and spark an emotional connection.
- **SEO optimization:** content creation on the clinic’s blog, which focuses on informative articles (e.g., “IVF abroad: How to prepare”).

In the submitted proposal for the creative strategy of the clinic’s promotional campaign, the following AI tools are specifically envisaged:

- **Graphics:** ChatGPT plus tests and Midjourney and Leonardo graphics
- **Photos:** Photos taken by our own photographer in the interior of the clinic Flair.ai and Pixel Cut respectively Unsplash

- YouTube videos and websites: Mojo (editing), Suno.ai (music), HeyGen (languages)
- Web: Here, especially in the copy part, the use of ChatGPT plus is assumed
- Sample of equipment and space on websites: RunWay – short videos transformed from photos
- Presentation of proposals to the clinic management: Luma AI.

5 Conclusion

This paper presents a case study based on research into the attributes of a healthcare facility's quality brand. The research defined one attribute among others, which is quality communication towards the clinic stakeholders. Therefore, the work on this project continued to a more practical level, namely the communication project for foreign clients that will be presented to the clinic management. The case study presented demonstrated the possibility of the intersection and applicability of more or less theoretical, academic research with a concrete application usable in the practice of a business entity. Moreover, it also showed practical applicability in the form of the use of artificial intelligence tools in the research phase itself, as well as in the design and final implementation of the communication campaign. Thanks to artificial intelligence, a large part of the actual campaign design and implementation would be created "in house". The efficiency gains therefore need no further mention, it is obvious. The entire campaign, if the proposals are accepted, will be implemented internally, as already mentioned, by the clinic's own PR department and an external freelance graphic designer whose qualifications extend to video, photography, etc., in addition to web design and graphics. This can mean a significant reduction in communication costs, greater flexibility and without compromising the quality of campaign preparation and implementation.

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BASICS FOR IMAGE COMPOSITION IN SPHERICAL PROJECTION CREATION OF A COMMUNICATION FORM FOR SPHERICAL 360-DEGREE PROJECTIONS IN THE CREATION OF A POPULAR-EDUCATIONAL DOCUMENTARY FILM WITH AN EMPHASIS ON NON-TRADITIONAL COMMUNICATION PROCEDURES

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Abstract:

The advancement of spherical 360° projections marks a transformative step in the evolution of audiovisual presentation, fostering novel approaches in both content creation and dramaturgy. These projections challenge creators to innovate within new compositional frameworks while engaging diverse audiences. This research investigates the process of producing a popular scientific documentary tailored for spherical projection, emphasizing the development of effective compositional forms suitable for this immersive format. By examining practical aspects of filming for fulldome cinema, the study focuses on pre-camera planning, shooting technology, and techniques for constructing unique visual compositions. Additionally, it addresses the challenges and opportunities of low-budget production in creating educational documentaries for spherical platforms. The findings aim to establish guidelines for filmmakers and other creative professionals exploring this medium, offering insights into the interdisciplinary collaboration required for fulldome projection development. As spherical projection technology continues to evolve, its applications extend beyond traditional planetarium use to encompass a wide array of scientific, educational, and entertainment content, transforming the viewer's sensory experience into a deeply immersive and participatory encounter.

Key words:

360° Filming. Camera. Composition Line. Fulldome. Interview. Spherical Composition.

1 Introduction

The audiovisual work brings the viewer into a state of communication with the projected image. His perception is psychosensory. Sensory perception is basically just physical reception of image and sound without emotional and memory invention. An audiovisual recording creates an illusion of a new reality on the projection surface. We can experience the extreme forms of this illusion in the 360° spherical projection, which is known from the past as planetarium projection. Until recently, only projections of space themes were presented in planetariums. Recent developments show that many planetariums, which until now had a somewhat “dusty” coating, are suitable, in addition to traditional “space” themes, for new entertainment and other genres of educational formats, such as open compositions for example fulldome shows, or popular educational films educating in science and research. In many cases, an “old” star projector supplemented with fulldome technology will expand the use of planetariums. Spherical projections are equipped with modern technology allowing them to bring new experiences in unprecedented presentational possibilities. However, the technical development of recent decades is still opening completely different ways of using the 360° space. It doesn't have to be a planetarium, but the 360° space itself – either as a dome, a cube or as a completely normal room. The novelty is the domes, which are mobile and therefore offer mobile places for playing 360° content. People do not have to sit in a 360° presentation, but in some installations, they can move and become a participant in the projection, become an actor and help to shape

the projection. The peculiarity is that 360° development includes interdisciplinary work. Creators of 360° fulldome projections come from various fields and professions – screenwriters, film and game producers, designers, scientists, educators, software marketers, hardware manufacturers, sound engineers and other technical and artistic and creative industries.

The goal that the creators want to achieve with 360° productions is the creation of immersive experiences. Immersion in a fulldome projection can be described as “immersion into the virtual world using all of one’s senses” (Hockicko, 1999, p. 218). The viewer who visits the projection perceives the content that remains in his subconscious as a long-term experience (Hockicko, 1999).

Educational projects in spherical projections are of great importance thanks to their presentational uniqueness and inimitability in other forms of audiovisual creation. For these reasons, it is appropriate to deal with the aspects of content creation for this form of audiovisual presentation. As a result of new technologies and a modern approach to education, hundreds of such projections are created in the world. Therefore it is appropriate to deal with the creation of specific genres according to the demand for mainly educational programs, as historically planetariums are understood mainly as educational centers (Chovanová Supeková, 2022).

The spherical dome has been considered the perfect projection surface since the 20s of the 20th centuries, and at the same time in recent years it has become an extraordinary space because the viewer will experience visual 360° worlds in a completely different and immersive experience, which is irreplaceable by any classic surface projection with a limited projection format. Spherical projections are used as experimental laboratories for the presentation of art, culture and science. A classical (original) application of spherical projection is a planetarium. This is the usual presentation structure that is specific to a given single-purpose presentation intent. Modern projection and sound technology expands the use of the presented content. In this text we discuss how to create these contents so that they are as intense as possible, furthermore we mainly examine the possibilities of basic composing for a popular-educational documentary film.

The visitor sits slightly tilted upwards, and this allows him a view of the “sky”. However, this is only a very simplified description of the function of a spherical cinema. In any case, it offers access to new experiences. What are the sensory-physiological and cognitive requirements for 360° productions and what new informational potentials can they contain? With every single project, it is necessary to find answers to basic questions, how people perceive the visual composition of space in a fulldome environment and what affects the process of vision formation in the design of immersive 360° productions.

The difference brought by spherical projection is that the viewer is brought to the “stage”, they are becoming part of the projection space. The observer becomes an active designer of the project within his imagination. With his observational activity, often also physical – by moving his head, he selects compositional artifacts and composes his own content from them. However, this requires that the image and sound systems are comprehensible. The perception of space with regard to the physiological preconditions of the viewer should be coordinated in such a way as to create new narrative structures that the viewer is able to perceive with regard to the author’s intention. Here we come to the fact that the forms of the classical film language, which works mainly in a limited rectangular format, do not work. In spherical projections, there are often presented films transferred from traditional movie format. For some genres, this is acceptable – such as pictures of underwater life, but the standard film, in which people appear, is transferred with only very dubious results.

1.1 Definition of Fulldome Projection

Audiovisual projection without a clearly defined format of the image field, bringing the viewer, who is in the projection stage, into the full projection space.

Historically, the dome was a space for spirituality, protection, connection between outside and inside, heaven and earth. It also served as a presentation of power and influence. At the same time, the dome has always represented an architectural challenge that inspired new technical solutions. Projections in the dome also require further development and completely new approaches, such as abandoning the central perspective, expanding the viewer's spatial experience and new forms of receiving information (Overschmidt & Schröder, 2013).

2 Starting Points for Shooting Spherical Films

We experimentally verified the possibilities of shooting a documentary using a classic camera with a 4:3 sensor format. We shot in the 3:4 format with maximum use of the sensor area. Anyhow, there is a big loss of resolution, because we only use the circular slice from the 3:4 format. Nonetheless, the use of this technology is less demanding in terms of production. However, it is optimal to shoot with 360-degree cameras, which will bring an adequate resolution. In the case of an experimental spherical surface, it is possible to use up to 12K in a circular section – we used the Unisphere at the Physics Institute of the Silesian University in Opava /Czech Republic/ to check the footage. The projection itself has a section of the spherical surface of 170° and is tilted forward with respect to the direction of observation at an angle of 4° . With this type of projection, it is necessary to see that the observer perceives the image without any format restrictions and feels as if he was on the set of the scene, or directly in the scene. The legibility of the details of the screen is completely natural for him.

When building the basis for shooting a thematically classical document, we assumed that full details of the image structure are not always desirable. For example, we do not want to see the cosmetic flaws of the face during the in-camera testimony. High resolution is like a microscope on one's face. We also tried to find a financially inexpensive production optimum, so that we could film the statements with a traditional camera with a standard creative approach – what you see is also what you get in spherical projection. For visually interesting and surprising shots for the viewer, it is also possible to film with a 360° camera, for example: Insta360 Titan. However, they are incomparably more time-consuming both during production and post-production. The filming itself has its own specifics regarding the full camera coverage of almost the entire space. It is necessary to lie under the camera, or hide in an object on the scene, because the camera takes up almost the entire space and it is not desirable to see the camera operator, crew members, or the technician behind the camera. In the case of a documentary testimony, where the editor is not visible as a result, but his presence during the interview is necessary for asking questions and fixing the subject's gaze in front of the camera, the latter must "hide" under the optical image of the camera.

What seems distorted in the case of a classical screen in a wide-angle view, in the case of a spherical projection, this distortion disappears, and the objects become natural. We were looking for a suitable lens angle for shooting regarding the so-called standard viewing angle. For a classic full frame, it is a lens with a focal length of 50 mm. For our experiment with the 4:3 format, the result was a lens with a focal length of 3.5 mm – a fisheye with a 210-degree angle of view. The projection is a 170° section of the sphere. We had to cut out the edges of the frame in post-production, as the poor quality of the lens is reflected in the edges of the frame. In this way, we obtained an optimal display in the projection without visible distortion. The fisheye lens, which was originally intended only for effect shots in standard shooting, is the basic lens in the case of spherical shooting. It captures an image that requires almost no adjustments for transfer to spherical projection. We arrived at this experimentally /not by mathematical calculation/ with the use of the dominant image field at the edge of the shot. During the research, we tried 18 types of wide-angle lenses. All other lenses with a longer focal

length give an image that needs to be adjusted in post-production, at least by adding distortion – bending it into a spherical surface and creating a circular cutout from the full image.

3 Investigating the Compositional Optimum for a Sphere

In classical film composition, the guiding lines of the division of the image into three sections, or the lines of the golden section, are used. In the case of fulldome projection, it is important for the project to determine these lines for the image form to be readable. It is not the intention of this research to determine the rules for art, but to look for a conventional compositional tool from which the creator of the image can reflect or accept it as a compositional basis. The technical, content and dramaturgical potential of 360° projections opens an experimental space in which we can create more realistic and fantastic worlds by breaking such conventions, by creating an exclusive form for the specific projection. We can solve more complex communication problems than with all known audiovisual media. Through an elaborate communication form unique to a specific work in a spherical projection, we get an illustrative expressive system. As a result the processing of its spatial and visual data in the brain can be much closer to the observer's perception than in other available standard image formats.

3.1 Dominant Compositional Places for Active Perception

In the spherical projection, the format does not seem to exist. The image fills in the entire field of view of the observer. If we were to classically place objects in the entire sphere, for example in a third division, we would get compositional and content confusion.

It is necessary to distinguish central vision, on which the eye is fixed, from peripheral vision. Central or direct vision is provided by the function of the macula, while peripheral vision or indirect vision is provided by the function of the entire retina outside of the macula. In the area of the yellow spot is the largest concentration of sensory cells – cones on the retina. Towards the periphery, the number of rods continues to increase, and the retina differentiates the details of objects less and less. The periphery is not used for sharp vision, but mainly for orientation in space and for distinguishing contours. The cooperation between the center and the periphery is smooth with continuous changes in lighting. The periphery of the retina is always ready to react to external stimuli. Central vision can also sometimes be less attentive, so at times it can happen that we look at things without seeing them (Hudíková et al., 2021). And that's why, for composing in spherical projection, we set the basic division of the image area into:

- a) **informational part – in the direct field of vision**
- b) **experiential part – peripheral**
- c) **unseen part – outside the field of vision**

We chose this division specifically for the perception of spherical projection and it is based on the physiological properties of the eye (Overschmidt & Schröder, 2013).

- a) **In the informational area** or part of the shot, there is a sort of optimum for the viewer's observation. In tests, this appeared just above the bottom edge of the image in the front of the sphere at a viewing angle of about 90 degrees in the horizontal direction. **Placing the dominant objects above the lower edge represents a compositional optimum in a spherical projection**, in which the viewer does not have to exert a lot of effort. In a classical film, it is an intervention in the so-called security territory, which is not considered at all in the compositional activity. In this case, it turned out to be optimal for composing, which we can compare with the classic placement of the object in the line of the upper third of the image field (Hockicko, 1999).

- b) **The experiential part** represents a space for peripheral vision, which orients the viewer in the space where the story takes place. As a result of dynamic changes, this space can become an informative or invisible part of the projection, mainly through dynamic changes – the movement of objects on the projection surface and the compositional guidance of the viewer.
- c) **The invisible part of the projection** represents the part that the viewer cannot see at the given moment regarding his current perception of the informational and peripheral part. However, it is up to the viewer to decide which part of the spherical projection is invisible at that moment.

However, the standard viewing angle of 90 degrees – the angle of the basic lens above the lower edge of the sphere, is disadvantageous and very static for the cut of dominant objects in this projection. When shooting, it is necessary to consider the fact that the observer is also physically active and turns his head to the sides.

In the case of spherical projection, it is also necessary to look for a binding shot difference, but with the absence of, for example, semi-detail. Here we start from the basic compositional rule for editing, that two shots that are as different as possible are best connected to each other. This compositional principle of mutual connections of two successive shots is called the principle of compositional opacity (Vavrová, 2016).

Full-dome projection is a projection of the whole. For narrow shots, we must create a specific language for the given project, which the viewer will believe and accept as a new visual reality.

In the case of pre-camera narration, we can place the subjects in detail or semi-detail above the lower edge of the projection surface, while the projection is full of the space in which we are filming. In the case of the interior, we see the ceiling and the opposite walls. In the plot, we tried to connect several characters to each other by cutting, while we used the difference in the right-left orientation and possibly also the different sizes of the characters.

For close-up, the top of the sphere turned out to be optimal, where we could afford to show details with the least distortion – for example, shots of insects. We then tried to adjust the lower part of the image with the distortion tool to achieve a minimum of observable distortion.

When creating a film work as a communication unit intended for spherical projection, we must, just as in classical cinematography, create an image form – a specific compositional language for the given work. But here we don't have "frame edges" and simple resizing of frames.

Spherical projection is specific in that it lacks the perception of frame boundaries. The viewer can investigate almost the entire captured space. It is difficult or almost impossible to determine universal guidelines, such as three division lines, diagonal division lines, and the like. However, the creator should create a readable communication system in the shot sequence in such a way that the individual shots connect to each other naturally, without perceptible editing. The creation of a compositional form for this type of projection is unique. The readability of the image without format boundaries is specific to this type of image projection. A compositional concept for the entire editing sequence is important to maintain editing continuity and inter-shot connections.

3.2 Composition Line

For these reasons, we tried to establish a composition aid, which we called the composition line.



Figure 1: Unisphere at the Physics Institute of the Silesian University in Opava /Czech Republic/
Source: own processing, 2024



Figure 2: Editing workplace with a spherical monitor
Source: own processing, 2024

The compositional line is an imaginary guiding line for reading the dominant elements in the information image field.

The height of the composition line from the bottom of the projection surface of the sphere can be optimally placed in the space of the viewer's most comfortable view. On the composition line, we place the dominant objects in two consecutive shots in opposite compositional placement. For example, in the case of a statement in the first shot, if we compose the person on the right side and in the subsequent shot on the left side. The composition line helps us, for example, with placing the height of the eyes.

When we placed the composition line too high and the subject was still in semi-detail or close-up, the exposure looked unnatural. The subjects had a "massive to overwhelming" expression.

We worked with the composition line in such a way that, during filming, we created a border of the active image field on the display monitor, which represented the resulting image for the projection – it is a circle inside which everything that we get on the projection screen can be seen. What was visible from this circle is the space that will not be considered and will be cut off. In the case of the fisheye – ultra-wide-angle 3.5 mm lens, white artifacts or unacceptable distortion appeared in this part of the image, especially in the case of lights in the image. We drew a composition line in the active image field, which was an aid for the appropriate placement of the subjects. It should be borne in mind that when shooting in this part of the image, the subjects are very distorted by pressing from above. Even a small shift of the subject up or down on the monitor during shooting represents big differences in the shift in the resulting projection.

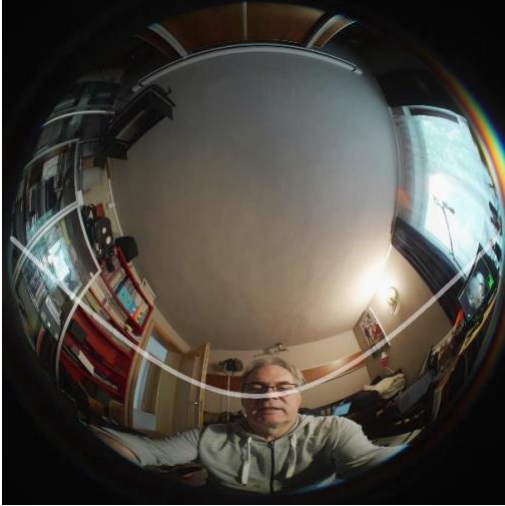


Figure 3: Statement composed in the middle, composition line at eye level
Source: own processing, 2024



Figure 4: Composing a statement per page in minimal compositional activity
Source: own processing, 2024

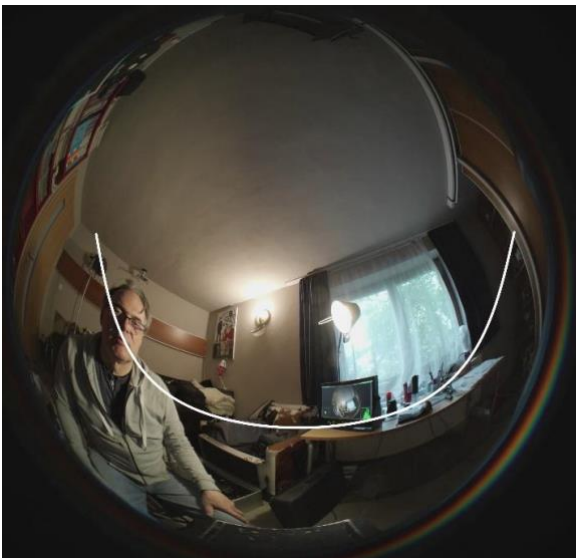


Figure 5: A more emphatic composition of the pre-camera statement in half close-up, the composition line is higher
Source: own processing, 2024

3.3 Basic Camera Position

We consider the basic position of the camera during a classical in-camera statement to be when the camera is at eye level. When shooting spherically, it is optimal for statements to also determine the basic location of the camera in relation to the subject, and thus also the optimal view of the subject in relation to the camera. By default, the subject of a documentary testimony does not look into the camera, but next to the camera. The activity of his expression is given by the distance of the view from the axis of the camera – the axis between the camera and the subject. During this recording, the camera is in an unnatural position. It “looks” up – we need the subject at the bottom edge of the circular image field. However, the optimum was to place the camera lens at eye level and tilt the camera so that the subject’s eyes are placed on the composition line. With optimal tilting, we should get to the inclination of the projection – that means 4 degrees from the horizontal plane. Then we determine the size of the subject in the image field only by the distance of the camera from the subject. With such a statement, it is possible to compose the subjects centrally, because the movement of the camera from side to side in a horizontal position can also be converted in post-production. We rotate the image centrally in a circular section, and this is a simple trick without loss of image quality with minimal time consumption.

4 Conclusion

Creating an image composition for spherical projection is a broad term. In this text, we have addressed only a partial problem – the composition of the subjects during the pre-camera statement and their mutual editing links. Theoretical starting points for image creation in this area are unexplored and little published. We determined the basic division of the image field according to the possible activity of the viewer while watching the spherical projection, through research we created an aid that we called the composition line, we determined the basic position of the camera, and we gave an example of a possible practical filming of content in this specific image form using a classical recording camera intended for shooting in a rectangular format. In further research, it is necessary to focus on the editing composition regarding the alternation of the horizontal lines of the whole and the creation of a detail. During the research, we also encountered the issue of creating a light space. The camera takes up the entire space and there is nowhere to place light sources. Here, it is appropriate to use mainly scenic light sources in combination with HDR or shooting in a curve. It is also possible to use lenses with other viewing angles – long focal lengths, but it is necessary to research the optimal distortion for the believability of the views in the final work.

The technical, content and dramaturgical potential of 360° projections opens an experimental space in which we can create more realistic and fantastic worlds, create and solve more complex display problems than with all previously known audiovisual media. Through the spherical projection of information, we get an illustrative language system that creates a new, irreplaceable experience in an intense immersive sensation.

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THE RELATION OF EYE TRACKING AND AI TECHNOLOGIES WITH AN ACCENT ON BUSINESS: BIBLIOMETRIC INSIGHTS OF WEB OF SCIENCE

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Abstract:

Neuromarketing techniques, particularly eye tracking, offer valuable tools for exploring consumer behaviour, optimizing marketing strategies, and enhancing e-commerce practices, areas where conventional methods often fall short in precision and depth. This study aimed to evaluate the intersection of neuromarketing techniques and Artificial intelligence (AI) technologies in business research from 2014 to 2023, employing bibliometric analysis of data from the Web of Science database. The methodology included frequency analysis and network visualization, focusing on techniques such as fMRI, EEG, eye tracking, biometrics, and facial coding, as well as AI technologies like Machine Learning, Deep Learning, and Neural Networks. Results revealed that eye tracking was the most frequently used neuromarketing technique, often integrated with AI to analyse visual attention and decision-making. Journals such as IEEE Access, Scientific Reports, and Sensors led the publication output at this intersection. Conceptual structure maps highlighted the thematic connections between eye tracking and AI, emphasizing its interdisciplinary potential. The findings suggest that integrating neuromarketing and AI not only enhances academic research but also provides actionable insights for businesses, particularly in personalized marketing and consumer behaviour prediction.

Key words:

Artificial Intelligence Technologies. Bibliometric Analysis. Consumer Behaviour. Eye Tracking. Neuromarketing Techniques.

1 Introduction

Neuromarketing, as an interdisciplinary approach combining neuroscience and marketing, opens new avenues for a deeper understanding of consumer behaviour, insights that traditional methods often fail to capture. In recent years, technologies like eye-tracking have become key tools for studying visual attention, while artificial intelligence (AI), particularly machine learning techniques, has enabled unprecedented precision in analysing large datasets. Together, these methods are transforming marketing practices by offering deeper insights into consumer decision-making processes (Šola et al., 2024; Ahmed et al., 2022).

The integration of eye-tracking and AI has demonstrated potential for optimizing content, analysing user interactions, and predicting consumer behaviour. For instance, research in digital media reveals that combining these technologies not only accurately predicts visual engagement but also designs personalized marketing strategies based on the analysis of neuromarketing signals (Kaheh, 2021). Such a synergy between neuromarketing and AI provides both academic advancements and practical tools for businesses to enhance marketing campaign effectiveness.

This article aims to explore the integration of eye-tracking technologies and AI in business-oriented research over the past decade. By conducting a bibliometric analysis of publications from sources like Web of Science, it identifies key techniques and dominant themes within this interdisciplinary field.

2 Literature Review

The appeal of neuroscience in marketing stems from its ability to directly access implicit processes – those not easily captured by traditional methods – particularly when it comes to understanding emotional and motivational responses to advertisements and products (Vecchiato et al., 2010). Traditional marketing research methods, such as interviews or questionnaires, are often limited by the fact that customers may not be able or willing to accurately express their true reactions. Neuromarketing, however, employs measurements of brain activity and physiological responses, providing more accurate and objective data (Royo-Vela & Varga, 2022).

Consumer neuroscience is an interdisciplinary field that combines psychology, neuroscience, and economics to study how the brain is physiologically influenced by advertising and marketing strategies (Krafka et al., 2016). It serves as a tool to gather data on consumer behaviour, such as where, how, and in what environments consumers prefer to shop, where they spend the most time, and where they allocate the most money (Dooley, 2011).

By reviewing various definitions of neuromarketing, Caldeira de Oliveira and Giraldi (2017) propose a unifying definition. Neuromarketing is an interdisciplinary scientific field that utilizes tools traditionally employed in medicine, psychiatry, and psychology—such as neurofeedback, biofeedback, and metabolic process measurements—in conjunction with traditional marketing tools to better understand the diverse range of emotions, cognitions, physiological reactions, behaviours, and thoughts of economic agents, both conscious and unconscious, related to typical marketing issues and its various subfields (Caldeira de Oliveira & Giraldi, 2017).

Neuromarketing is characterised by the use of special tools to study human behaviour. The most well-known neuromarketing tools today include:

- fMRI (Functional Magnetic Resonance Imaging) – monitors the increase in oxygenated blood to specific areas of the brain when exposed to a specific stimulus (Henrich et al., 2010)
- PET (Positron Emission Tomography) – uses radioisotopes to label molecules in the brain and detect specific neurotransmitters of interest (Hubert, 2010).
- EEG (Electroencephalography) – a tool to measure brain activity through electrodes placed on the respondent’s head (Slowther, & Kleinman, 2009).
- Eye-tracking is a measure of visual attention that can map a person’s gaze and arousal level in response to a stimulus (Largent, & Fernandez Lynch, 2017).
- GSR (Galvanic Skin Response) – represents the physiological response to the level of arousal in response to a given stimulus (Pescatore, 2021).
- Heart rate and respiration – this measurement allows to reliably record changes in a person’s emotional response to stimuli (Gorgiev, 2020).

Eye-tracking, a neuromarketing technique used to monitor visual attention, has emerged as a pivotal tool, especially when combined with artificial intelligence (AI). This integration enables automated processing and analysis of large-scale datasets, uncovering patterns in visual engagement that were previously inaccessible. Research highlights that AI-powered eye-tracking systems can predict consumer preferences and improve the design of marketing content to maximize attention and engagement (Ahmed et al., 2022).

Moreover, AI techniques such as machine learning and deep learning enhance the precision of neuromarketing tools like EEG and fMRI by extracting meaningful insights from neural and physiological signals. These AI-supported methods allow for a more refined understanding of consumer emotions and decision-making processes, helping businesses optimize their marketing strategies (Kaheh et al., 2021).

Neuromarketing provides new insights into the emotional and subconscious factors that influence customers' decision-making processes. This is especially important in today's market, where customers often make decisions impulsively or based on emotional stimuli rather than logical, rational reasoning. This approach enables companies to optimize their marketing campaigns, making them more effective in reaching customers and creating deeper emotional connections with the brand (Lim, 2018).

Tools such as fMRI and EEG have proven effective in capturing genuine, unfiltered neural responses to products and advertisements, reducing the reliance on subjective methods like surveys (Balconi et al., 2021). Research by McClure et al. (2004) on the Pepsi and Coca-Cola brands revealed that brand familiarity significantly influences brain responses, underscoring the power of branding in consumer decision-making. These findings, along with similar studies, allow companies to more accurately predict consumer behaviour and tailor marketing strategies, showcasing the tangible value of neuromarketing (Kenning & Linzmajer, 2011).

By integrating AI technologies, businesses can process neuromarketing data at scale, enabling highly personalized marketing. For example, deep learning algorithms applied to eye-tracking data can identify which elements of an advertisement draw the most attention, helping marketers refine visual designs (Šola et al., 2024). This fusion of AI and neuromarketing also predicts consumer preferences with greater accuracy, paving the way for dynamic, data-driven marketing strategies.

3 Methodology

The primary objective of the research study was to assess the connection between the neuromarketing technique of eye tracking and technologies related to artificial intelligence.

This goal was achieved through several analytical areas. First, we focused on the use of neuromarketing techniques (fMRI, EEG, eye tracking, biometrics, and facial coding) and AI technologies (Machine Learning, Deep Learning, Neural Networks) in the world's leading scientific journals with a business focus. Subsequently, attention was directed specifically to eye tracking as a technique widely applied in practice among neuromarketing methods. Finally, eye tracking was linked to AI technologies to evaluate research centred on these interconnected areas.

3.1 Material

Data were sourced from the Web of Science database (Clarivate, 2024), specifically from the Social Science Citation Index (SSCI). The study was limited to articles published between 2014 and 2023, excluding 2024 due to the incompleteness of the data at the time of collection. The extracted data were cleaned by removing punctuation marks and redundant spaces. In the first part, the presence of these keywords in the scientific journals with the highest impact factors for the year 2023 was investigated. Subsequently, attention was paid to scientific research and the use of specific keywords in their abstracts.

3.2 Methods

The applied analytical processes fall under the scope of bibliometric analysis, utilizing both frequency-based and visualization techniques. The keyword analysis focused on specific neuromarketing techniques (e.g., fMRI, EEG, eye tracking) and AI technologies (Machine Learning, Deep Learning, Neural Networks), examining their usage patterns across journal titles, keywords, abstracts, and references. To enhance the understanding of the thematic framework, visualization tools were employed, highlighting the conceptual structure of research areas. Network analysis was used to depict keyword co-occurrences, uncovering

thematic clusters and their interconnections. Additionally, conceptual structure maps based on Correspondence Analysis visualized the spatial relationships between research themes. These methods provided a multi-dimensional perspective on how neuromarketing techniques, particularly eye tracking, intersect with AI technologies in academic research. The bibliometric tools offered robust, data-driven insights into publication trends, thematic structures, and the contributions of leading journals, emphasizing the interdisciplinary nature of this research domain. The R programming language (version 4.4.0) and the bibliometrix library (Aria & Cuccurullo, 2017) were used to perform the bibliometric analysis.

4 Results

The following section presents the findings accompanied by a concise interpretation. The results are structured into two main areas. The initial segment is dedicated to high-impact scientific journals, highlighting their contributions to the field. Subsequently, the analysis shifts focus to eye-tracking within scientific literature more broadly, culminating in an examination of the intersection between eye-tracking and various domains of artificial intelligence research.

Table 1: Structure of the top 20 scholarly journals in Business by JIF

Abr	Name	Publisher	Total Citations	2023 JIF	2023 JCI	5 Year JIF
AMR	ACADEMY OF MANAGEMENT REVIEW	ACAD MANAGEMENT	40929	19.3	3.43	17.1
JIK	Journal of Innovation & Knowledge	ELSEVIER ESPANA	4260	15.6	3.96	14.6
AMA	Academy of Management Annals	ACAD MANAGEMENT	9198	14.3	3.29	25.1
TFSC	TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	ELSEVIER SCIENCE INC	50363	12.9	2.6	13
BS E	Business Strategy and the Environment	WILEY	22882	12.5	2.68	14
JHM	Journal of Hospitality Marketing & Management	ROUTLEDGE JOURNALS, TAYLOR & FRANCIS LTD	4066	11.9	2.51	11.3
JMAR	JOURNAL OF MARKETING	SAGE PUBLICATIONS INC	27613	11.5	2.33	15
JRCS	Journal of Retailing and Consumer Services	ELSEVIER SCI LTD	24102	11	2.35	11.2
JBR	Journal of Business Research	ELSEVIER SCIENCE INC	75004	10.5	2.19	11.2
JPI M	JOURNAL OF PRODUCT INNOVATION MANAGEMENT	WILEY	8894	10.1	1.66	12.9
FB R	Family Business Review	SAGE PUBLICATIONS INC	4788	9.9	1.09	11.7
JSR	JOURNAL OF SERVICE RESEARCH	SAGE PUBLICATIONS INC	7619	9.8	1.97	13.4
JRI M	Journal of Research in Interactive Marketing	EMERALD GROUP PUBLISHING LTD	2466	9.6	1.91	9.6
AM J	ACADEMY OF MANAGEMENT JOURNAL	ACAD MANAGEMENT	47035	9.5	2.3	13.6
JAMS	JOURNAL OF THE ACADEMY OF MARKETING SCIENCE	SPRINGER	20870	9.5	2.04	14.6
JFB S	Journal of Family Business Strategy	ELSEVIER	2675	9.5	1.99	8.8
JMAN	JOURNAL OF MANAGEMENT	SAGE PUBLICATIONS INC	34936	9.3	2.04	14.7

JW B	JOURNAL OF WORLD BUSINESS	ELSEVIER SCIENCE INC	8271	8.9	1.76	9.2
PM AR	PSYCHOLOGY & MARKETING	WILEY	11090	8.9	1.98	7.9
ET P	ENTREPRENEURSHIP THEORY AND PRACTICE	SAGE PUBLICATIONS INC	15652	7.8	1.55	11.3

Source: own processing, 2024

Table 1 presents the top business-focused journals by impact factor (JIF) for 2023. The significance of this table lies in highlighting the journals with the highest scholarly impact in business research, providing valuable insights for academics deciding where to publish their work and for researchers seeking relevant sources for their studies.

Table 2: Occurrence of neuromarketing keywords in top scientific journals according to JIF

Journal (n of articles)	TITLE	KEY WORDS	ABSTRACT	REFERENCES
AMR (n = 319)	0	0	0	3
JK (n = 425)	0	0	1	5
AMA (n = 161)	0	0	0	2
TFSC (n = 4632)	0	0	1	84
BSE (n = 1635)	0	0	0	113
JHMM (n = 434)	0	0	1	6
JMAR (n = 476)	0	3	4	8
JRCS (n = 2471)	4	17	23	45
JBR (n = 6253)	19	39	39	130
JPIM (n = 459)	0	0	0	14
FBR (n = 140)	0	0	0	0
JSR (n = 326)	0	1	3	5
JRIM (n = 303)	1	2	5	3
AMJ (n = 763)	0	0	1	26
JAMS (n = 529)	0	1	2	16
JFBS (n = 244)	0	0	0	2
JMAN (n = 751)	0	1	0	28
JWB (n = 570)	0	0	0	28
PMAR (n = 1049)	2	13	19	30
ETP (n = 498)	2	2	2	9

Note: Keywords (WOS): fMRI / functional magnetic resonance imaging, EEG / electro encephalogram, (iii) Electroencephalogram, Eye tracking, Biometrics, Facial coding

Source: own processing, 2024

Table 2 presents the presence of keywords in articles published in the top 20 business journals by impact factor (JIF). The table tracks how many articles contain the specified keywords in their title, abstract, keyword list, or references. The results show that the *Journal of Business Research (JBR)* has the highest incidence of keywords, with 19 articles in the title, 39 in the keywords, 39 in the abstract, and 130 in the references, making it a dominant journal in the fields of business and marketing research. Another major journal, the *Journal of Retailing and Consumer Services (JRCS)*, has 4 articles with keywords in the title, 17 in the keyword list, 23 in the abstract, and 45 in the references. Journals such as the *Journal of Management (JMAN)* and the *Academy of Management Journal (AMJ)* also show some occurrence of keywords, but to a lesser extent. This suggests that, although they have a high impact factor, these journals are less strongly associated with research on neuromarketing techniques. In conclusion, the analysis highlights that journals like the *Journal of Business Research* and the *Journal of Retailing and Consumer Services* serve as key platforms for research focusing on the application of neuromarketing techniques and analytical tools in business.

Table 3: Occurrence of AI keywords in top scientific journals according to JIF

Journal (n of articles)	TITLE	KEY WORDS	ABSTRACT	REFERENCES
AMR (n = 319)	2	0	2	5
JK (n = 425)	4	4	9	9
AMA (n = 161)	0	0	0	3
TFSC (n = 4632)	52	85	108	102
BSE (n = 1635)	0	1	8	4
JHMM (n = 434)	1	1	1	8
JMAR (n = 476)	1	11	9	3
JRCS (n = 2471)	6	17	24	32
JBR (n = 6253)	32	50	61	84
JPIM (n = 459)	0	2	3	1
FBR (n = 140)	0	0	0	0
JSR (n = 326)	1	4	5	3
JRIM (n = 303)	1	0	2	5
AMJ (n = 763)	1	0	0	0
JAMS (n = 529)	0	2	2	6
JFBS (n = 244)	0	0	0	0
JMAN (n = 751)	0	0	1	1
JWB (n = 570)	0	0	1	2
PMAR (n = 1049)	2	1	3	3
ETP (n = 498)	2	4	4	4

Note: Keywords (WOS): Machine Learning, Deep Learning, Neural Networks

Source: own processing, 2024

Table 3 presents the occurrence of keywords related to artificial intelligence (AI) – Machine Learning, Deep Learning, and Neural Networks – in selected top-tier scientific journals based on their Journal Impact Factor (JIF). The keywords are evaluated based on their presence in article titles, keyword lists, abstracts, and references. The journal *Technological Forecasting and Social Change* (TFSC) demonstrates the highest occurrence of these keywords across all categories, with a dominance in abstracts (108) and references (102), highlighting its significance for AI research. *Journal of Business Research* (JBR) follows with a high frequency in abstracts (61) and references (84), indicating its relevance for applied AI research in the business domain. *Journal of Retailing and Consumer Services* (JRCS) ranks among the leading platforms with a notable occurrence of keywords in abstracts (24) and references (32). In contrast, journals such as *Academy of Management Review* (AMR) and *Academy of Management Journal* (AMJ) exhibit minimal occurrences of these keywords, suggesting a lower focus on AI research. Some journals, such as *Family Business Review* (FBR), report no occurrences at all. Overall, the keywords are most frequently found in abstracts and references, underscoring their importance in presenting and framing research, while they appear less often in article titles. The results indicate that multidisciplinary journals, such as TFSC, and marketing-oriented journals, such as JBR and JRCS, play a pivotal role in publishing research involving AI techniques.

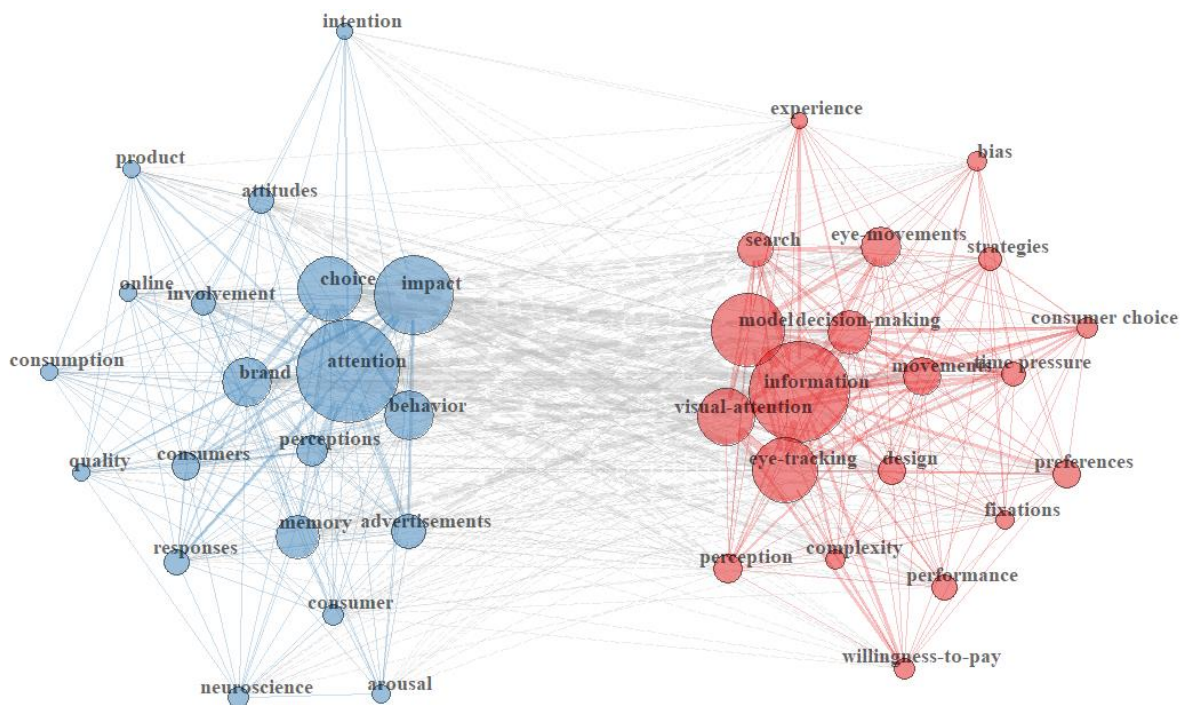
Table 4: Frequency analysis – keyword: Eye tracking

Title	Freq	IF 2023	IF 5	JCR Category
JOURNAL OF BUSINESS RESEARCH	35	10.5	11.2	BUSINESS (Q1)
JOURNAL OF RETAILING AND CONSUMER SERVICES	21	11	11.2	BUSINESS (Q1)
JOURNAL OF MARKETING RESEARCH	18	5.1	7.4	BUSINESS (Q1)
PSYCHOLOGY & MARKETING	13	8.9	7.9	BUSINESS (Q1), PSYCHOLOGY, APPLIED (Q1)

JOURNAL OF NEUROSCIENCE PSYCHOLOGY AND ECONOMICS	12	1.6	1.4	ECONOMICS (Q2), PSYCHOLOGY, MULTIDISCIPLINARY (Q2)
INTERNATIONAL JOURNAL OF ADVERTISING	11	5.3	6.2	BUSINESS (Q1), COMMUNICATION (Q1)
JOURNAL OF ADVERTISING	9	5.4	7.6	BUSINESS (Q1), COMMUNICATION (Q1)
JOURNAL OF CONSUMER BEHAVIOUR	9	4.4	5	BUSINESS (Q2)
JOURNAL OF ADVERTISING RESEARCH	8	2.1	3.5	BUSINESS (Q3), COMMUNICATION (Q2)
JOURNAL OF CONSUMER RESEARCH	8	5.7	8.6	BUSINESS (Q1)

Note: 473 source articles
 Source: own processing, 2024

Table 4 identifies the prevalence of articles related to the Eye tracking technique in the field of business research. Most articles with this technique appeared in the *Journal of Business Research* (35 articles, IF 10.5), indicating that this technique is popular in the broader context of marketing research and business studies. Another important journal is the *Journal of Retailing and Consumer Services* with 21 articles and a high IF of 11, indicating a strong interest in this technique in the field of consumer behaviour. The *Journal of Marketing Research* is also prominent in this area with 18 articles (IF 5.1), indicating that Eye tracking is also a popular tool in academic research on marketing strategies and consumer behaviour. The table also includes journals such as *Psychology & Marketing* with 13 articles (IF 8.9), reflecting the multidisciplinary nature of the technique, which links marketing with applied psychology. Overall, then, Eye tracking is an important and widely applied technique in neuromarketing and business research, as it allows for detailed investigation of consumers’ visual preferences. The results showed that it is the technique that is most frequently used in research among all the techniques studied. Even so, in conclusion, it can be critically assessed that classical research techniques are used more massively than Eye tracking.



Note: 40 keywords with the highest frequency

Figure 1: Network analysis of keyword linkage in business articles by linking to Eye tracking technique

Source: own processing, 2024

Figure 1, which presents a network analysis of keyword links in business articles associated with the Eye tracking technique, provides an overview of the most frequently occurring terms and their connections in studies focused on the use of this technique in business research. A distinct blue cluster represents keywords linked to marketing, with notable crossovers to fields such as neuroscience. The larger nodes in the network represent the most frequently used keywords, including “attention”, “impact”, and, in the red cluster, “decision making”, “information”, “visual attention”, and “model.” The red cluster further highlights connections between neuroscience and business research. Overall, the keyword associations demonstrate that Eye tracking is a valuable tool for analysing how consumers interact with visual elements in marketing contexts. Eye tracking emerged as the most prominent technique among all the selected keywords in research focused on business contexts.

4.1 Machine Learning

The following analysis focused on evaluating journals and scientific outputs in the form of research articles published between 2014 and 2023 that included the phrase Machine Learning in conjunction with Eye Tracking. The journals with the highest number of such publications include IEEE Access (n = 5), Scientific Reports (n = 5) under the Nature portfolio, and Sensors (n = 5).

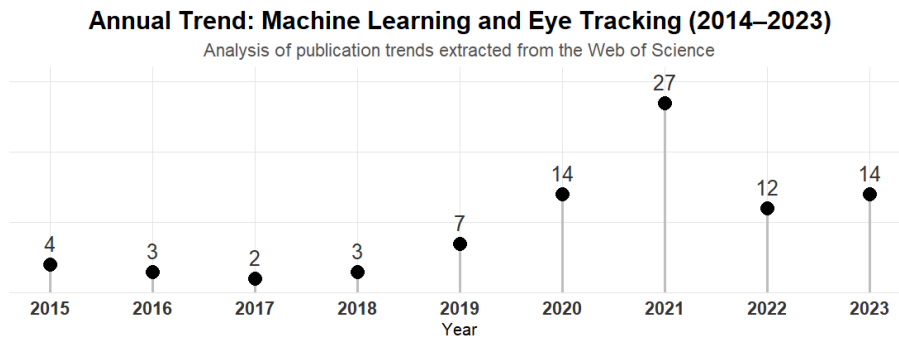
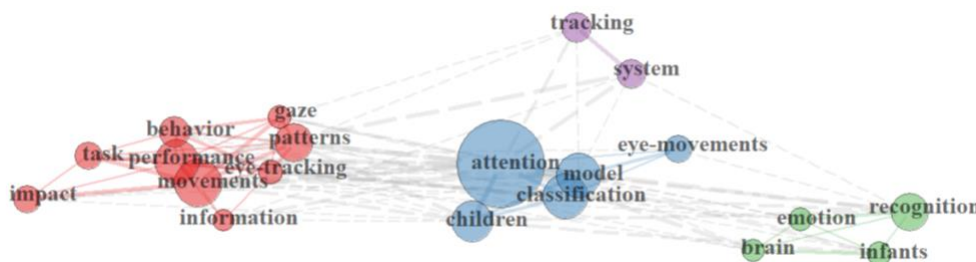


Figure 2: Time trend of publications in the topic Machine Learning and Eye Tracking
Source: own processing, 2024

Figure 2 illustrates the annual trend of publications related to Machine Learning and Eye Tracking from 2015 to 2023, based on data extracted from the Web of Science. No publications were registered in 2014. The horizontal axis represents the years, while the vertical axis corresponds to the number of publications. The accompanying numbers above the points show the exact frequency. There is a gradual increase in publications starting from 2015, with a minor dip in 2017 and 2018. A significant rise begins in 2019, peaking in 2021 with 27 publications, which represents the highest activity during this period. The trend stabilizes slightly in 2022 with 12 publications, followed by another rise to 14 publications in 2023.



Note: 20 keywords with the highest frequency

Figure 3: Network analysis of Co-occurrences: Machine Learning and Eye Tracking
Source: own processing, 2024

The figure 3 represents a network graph illustrating the co-occurrence of keywords in studies related to Machine Learning and Eye Tracking. The network is divided into color-coded clusters, each focusing on distinct research themes. The green cluster includes keywords such as “infants,” “emotion,” and “brain,” suggesting studies on cognitive or emotional processes. The blue cluster centers around “attention,” “model,” and “classification,” pointing to computational modeling and analysis in behavioural research, particularly involving children. The red cluster emphasizes “eye-tracking,” “gaze,” “patterns,” and “performance,” highlighting studies focused on visual behaviour and task-related analysis. A smaller purple cluster includes “tracking” and “system,” possibly addressing technological aspects of eye-tracking systems. This graph provides a clear visual of the interconnected nature of research topics, showing how key terms like “attention” and “eye-tracking” serve as central points linking diverse areas of investigation.

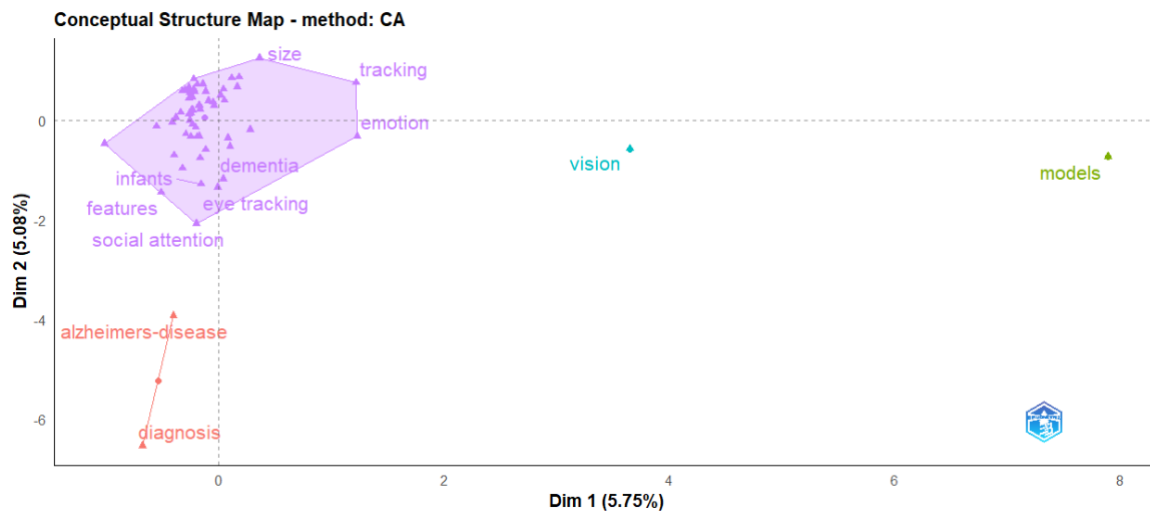


Figure 4: Conceptual Structure Map: Machine Learning and Eye Tracking
 Source: own processing, 2024

The figure 4 depicts a Conceptual Structure Map using Correspondence Analysis (CA) to visualize the relationships and groupings of keywords. The two dimensions (Dim 1 and Dim 2) explain 5.75% and 5.08% of the variance, respectively, capturing the underlying structure of the data. Keywords are grouped into distinct clusters, each representing a thematic focus. The purple cluster is the largest and includes terms like “eye tracking,” “infants,” “emotion,” and “social attention,” suggesting research on cognitive processes and human tracking. The red cluster, with keywords such as “Alzheimer’s disease” and “diagnosis,” represents a medical and diagnostic focus, likely related to neurodegenerative disorders. The green cluster, containing “models,” likely highlights computational and predictive modeling in related research. The cyan term “vision” appears isolated, suggesting a standalone topic, possibly involving visual perception or systems. The map provides a clear overview of how different research areas intersect, with proximity between terms indicating thematic similarity. The scattered distribution of clusters highlights diverse research directions, including applications in psychology, medicine, and computational modeling.

4.2 Deep Learning

The following analysis examined journals and scientific outputs in the form of research articles published between 2014 and 2023 that featured the phrase **Deep Learning** in combination with **Eye Tracking**. The journals with the highest number of such publications were **IEEE Access** (n = 17), **Scientific Reports** (n = 8) from the **Nature** portfolio, and **Sensors** (n = 13).

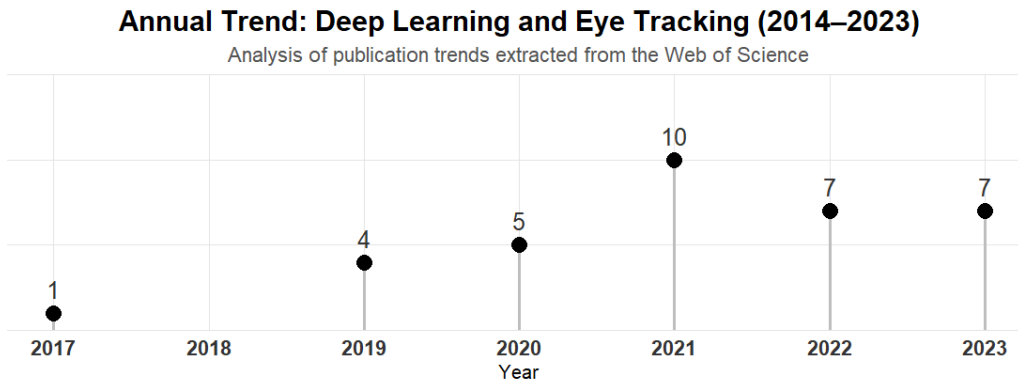


Figure 5: Time trend of publications in the topic Deep Learning and Eye Tracking
 Source: own processing, 2024

The Figure 5 illustrates the annual trend of publications combining Deep Learning and Eye Tracking from 2017 to 2023, based on data extracted from the Web of Science. The timeline begins in 2017, with a single publication marking the start of this research focus. Activity increases steadily from 2019, with four publications, peaking in 2021 with 10 articles. In subsequent years, the trend stabilizes, with seven publications in both 2022 and 2023. The graph indicates growing interest in the intersection of these two fields, particularly during the years 2020 and 2021, likely reflecting advancements in both areas and their increasing integration in research. The data highlights a consistent level of activity in recent years, suggesting sustained relevance of this topic.

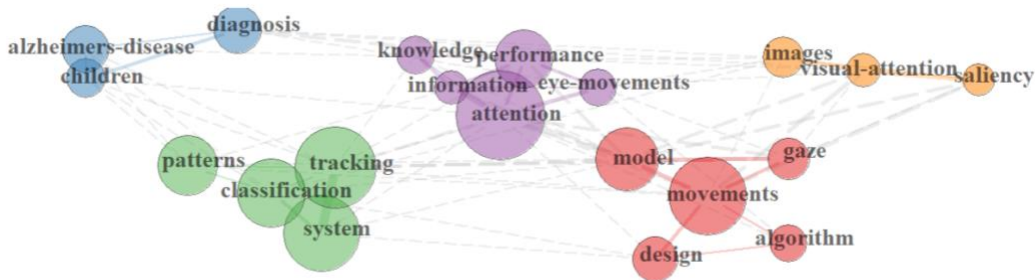


Figure 6: Network analysis of Co-occurrences: Deep Learning and Eye Tracking
 Source: own processing, 2024

The figure 6 is a network graph that visualizes the relationships between keywords related to Deep Learning and Eye Tracking. The figure is divided into five color-coded clusters, each reflecting distinct thematic areas. The blue cluster focuses on medical and cognitive topics, including keywords like “Alzheimer’s disease,” “diagnosis,” and “children,” suggesting research in healthcare and neurological studies. The green cluster centers around “tracking,” “classification,” and “system,” indicating technical and methodological advancements in eye-tracking systems. The purple cluster, featuring terms like “attention,” “performance,” and “information,” highlights a focus on cognitive processes and their measurement. The red cluster emphasizes terms such as “model,” “movements,” and “algorithm,” showcasing computational modeling and algorithmic developments. Finally, the orange cluster includes “visual attention,” “images,” and “saliency,” likely representing visual and perceptual studies. This graph provides a clear overview of the diverse research areas intersecting Deep Learning and Eye Tracking, highlighting their applications in medicine, cognitive science, technology, and visual processing. It underscores the interdisciplinary nature of this research domain and the connections between key concepts.

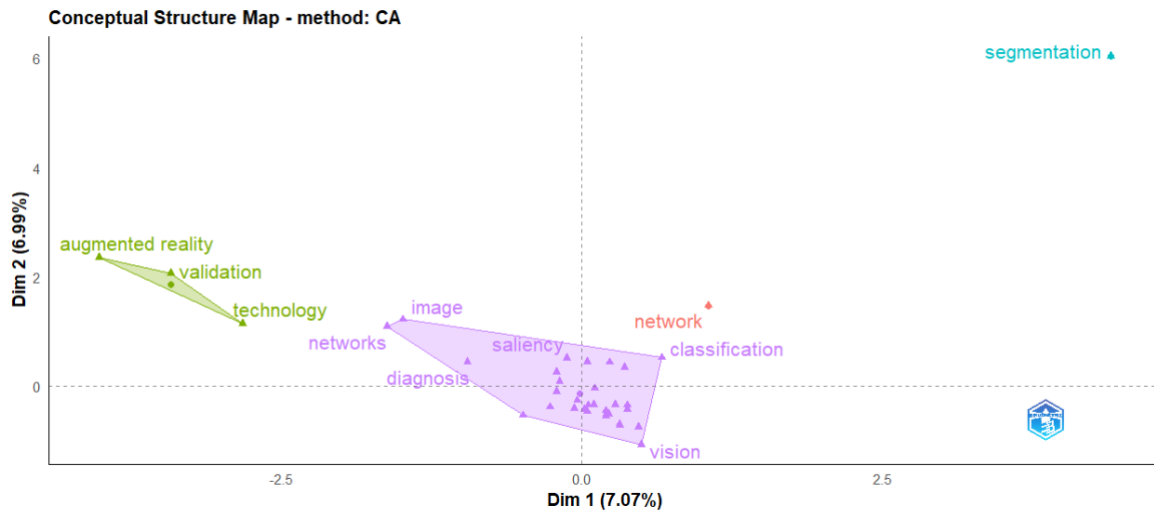


Figure 7: Conceptual Structure Map: Deep Learning and Eye Tracking
 Source: own processing, 2024

The figure 7 presents a Conceptual Structure Map generated using Correspondence Analysis (CA). The two dimensions (Dim 1 and Dim 2) explain 7.07% and 6.99% of the variance, respectively, revealing thematic groupings and their spatial relationships. The green cluster includes terms like “augmented reality,” “validation,” and “technology,” suggesting a focus on technological innovations and their applications. The purple cluster, situated centrally, revolves around “saliency,” “diagnosis,” “vision,” and “image,” reflecting research on visual processing, diagnostic imaging, and saliency detection. The red cluster, containing “network” and “classification,” highlights studies on network-based methods and classification techniques. Lastly, the cyan term “segmentation,” appearing isolated in the upper-right, represents a unique topic likely centered on image or data segmentation. The spatial arrangement of clusters indicates thematic overlap between visual processing (purple cluster) and technological advancements (green cluster). Isolated terms such as “segmentation” and “network” suggest emerging or specialized areas.

4.3 Neural Networks

The following analysis focused on examining journals and scientific outputs in the form of research articles published between 2014 and 2023 that featured the phrase Neural Networks alongside Eye Tracking. The journals with the highest number of such publications were Sensors (n = 18), IEEE Access (n = 10), Neuroimage (n = 9) and Scientific Reports (n = 7) from the Nature portfolio.

Annual Trend: Neural Networks and Eye Tracking (2014–2023)

Analysis of publication trends extracted from the Web of Science

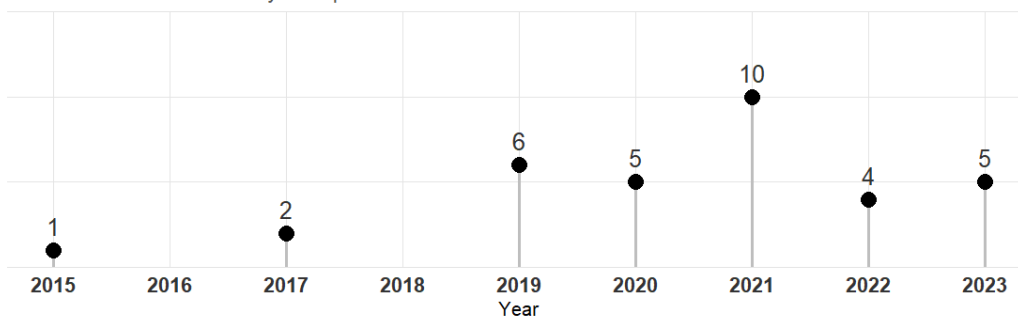


Figure 8: Time trend of publications in the topic Neural Networks and Eye Tracking
 Source: own processing, 2024

The Figure 8 illustrates the annual trend of publications combining Neural Networks and Eye Tracking from 2014 to 2023, based on data from the Web of Science. The trend begins in 2015 with a single publication and gradually rises, peaking at 10 publications in 2021. Notable increases occur in 2017 (2 publications) and 2019 (6 publications), followed by slight fluctuations in subsequent years, stabilizing at 5 publications in 2020 and 2023, with a minor drop to 4 in 2022. The graph highlights a growing interest in this research area, with a notable peak during 2021, reflecting its evolving relevance.

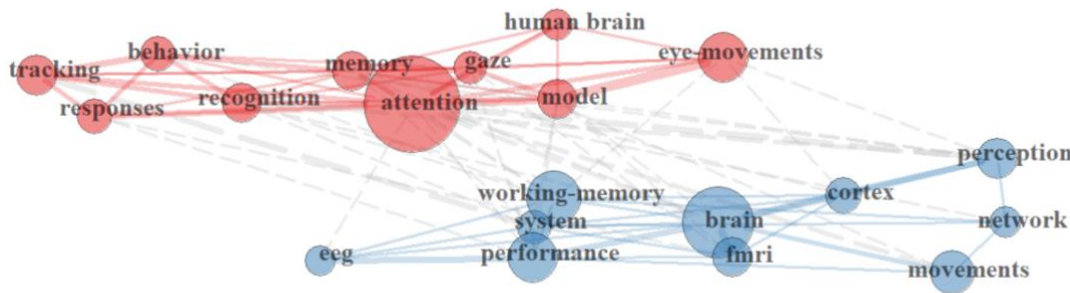


Figure 9: Network analysis of Co-occurrences: Neural Networks and Eye Tracking
Source: own processing, 2024

The network graph (figure 9) visualizes the relationships between keywords in research involving Neural Networks and Eye Tracking, divided into two distinct clusters. The red cluster focuses on terms such as “attention,” “gaze,” “memory,” and “human brain,” reflecting studies on cognitive processes and visual behaviour. The blue cluster highlights keywords like “fMRI,” “EEG,” “cortex,” and “working memory,” emphasizing neuroscience and brain-imaging methodologies. This graph highlights the interdisciplinary connections between cognitive science, neuroscience, and computational modeling in the research domain.

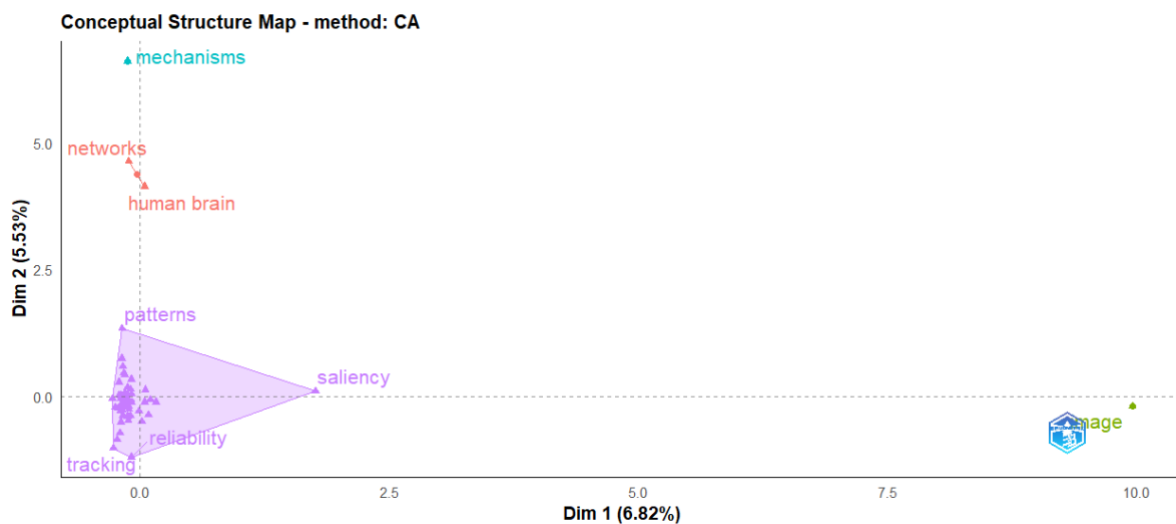


Figure 10: Conceptual Structure Map: Neural Networks and Eye Tracking
Source: own processing, 2024

The Figure 10 displays a Conceptual Structure Map created using Correspondence Analysis (CA) to illustrate thematic relationships among keywords. The two dimensions (Dim 1 and Dim 2) account for 6.82% and 5.53% of the variance, respectively. The purple cluster at the bottom-left, including terms like “tracking,” “patterns,” and “reliability,” highlights

research on eye-tracking methods and their accuracy. The red cluster, containing “networks” and “human brain,” emphasizes studies related to neural networks and cognitive science. The cyan term “mechanisms,” located at the top-left, represents a standalone topic likely related to underlying processes. The green term “image,” positioned far to the right, appears isolated, reflecting a unique focus on visual or image-related studies. The map illustrates thematic groupings and their spatial relationships, showcasing the diversity of research.

5 Discussion

Neuromarketing is still a relatively new field of research, but it is gaining significant attention due to its potential to enhance marketing strategies, particularly in continuously developing areas such as e-commerce, and to deepen the understanding of consumer behaviour. However, its practical application faces several challenges, which limit its broader adoption in business research.

The use of AI and machine learning in neuromarketing has shown promising results, particularly in the realm of eye tracking, which plays a key role in understanding consumer behaviour. By analyzing gaze patterns, these technologies can provide insights into attention, interest, and decision-making processes. In recent studies, machine learning models, especially deep learning networks, have been applied to improve the accuracy and scalability of eye tracking systems. For instance, some models can estimate gaze locations with high precision, even under varied environmental conditions (Zdarsky et al., 2021; Hakim et al., 2023).

The findings from this study align with previous research highlighting the interdisciplinary potential of AI and neuromarketing. The joint application of these fields could revolutionize how businesses approach customer segmentation, personalization, and consumer behaviour prediction (Mahmood et al., 2022). Journals such as *IEEE Access*, *Scientific Reports*, and *Sensors* have been at the forefront of publishing research in this domain, demonstrating the increasing interest and academic focus on the intersection of neuromarketing and AI technologies. These insights also emphasize the need for continued investment in advanced data analytics and AI-driven models to maximize the efficacy of neuromarketing strategies.

One of the main obstacles to the widespread use of neuromarketing is the high cost associated with technologies like functional magnetic resonance imaging (fMRI) and electroencephalography (EEG), which are essential tools for neuromarketing research. These technologies require sophisticated equipment and highly trained professionals, often leading to significant financial investments for companies (Plassmann et al., 2012). Additionally, the processing and interpretation of the data require specialized expertise, further increasing the complexity and cost of application (Fisher et al., 2010).

Huszar and Pap (2016) also highlight this issue, pointing out that the willingness to participate introduces a bias that affects the representativeness of the sample (Heinrich et al., 2010; Ariely & Berns, 2010). Additionally, financial incentives are not the only factor; potential participants may feel apprehensive about undergoing such measurements. This fear arises from the concern that advertising and marketing campaigns using neuromarketing might become so effective that consumers would lose the ability to resist them, compromising their free will and violating their personal privacy to an unacceptable degree (Stanton et al., 2017).

The two main ethical concerns in using neuroscience methods in marketing are the protection of test subjects and the scientific reliability, validity, and transparency of the findings (Lim, 2018). Measuring and mapping neurological responses to marketing stimuli in the human brain can compromise the autonomy of test subjects (Murphy et al., 2008). Ethical considerations include providing information about study procedures, the benefits and risks of participation, the rights of test subjects, the types of findings that can be obtained, and the measures taken to ensure confidentiality and privacy (Slowther & Kleinman, 2009).

Interpreting neuroscientific findings requires a high level of expertise to clearly define the potential outcomes and limitations of using such methods. Transparent communication of reliable, valid, and meaningful interpretations of these observations is critical (Ulman et al., 2015). Ulman et al. (2015) emphasize that the concept of human dignity should form the foundation of ethical principles, such as autonomy, self-determination, privacy, confidentiality, protection of vulnerable groups, reliability, and honest interpretation of research results, in line with the risk of manipulation by commercial entities. Most ethical objections to neuromarketing involve the risk of harm and violations of rights. Potential harms include both immediate effects on individual consumers and long-term societal impacts. Rights at stake include the positive rights to privacy, autonomy, and dignity, as well as the negative rights not to be deceived, experimented on without consent, or used merely as a means to an end (Stanton et al., 2017). Spence (2020) notes that some of the most ethically challenging cases in neuromarketing have involved experimentation on individuals without obtaining their informed consent.

Despite the promise of AI-powered neuromarketing, privacy concerns, ethical considerations, and the potential for consumer manipulation raise important questions about the responsible use of these technologies. Future research should explore these issues further, ensuring that the benefits of combining neuromarketing and AI are balanced with safeguards that protect consumer rights and privacy (Smith & Jones, 2023).

6 Conclusion

The primary objective of the study was to assess the connection between the neuromarketing technique of eye tracking and AI technologies. The results effectively fulfilled this aim by revealing a strong intersection between these areas, particularly through their application in high-impact journals and interdisciplinary research. The findings underscore the growing importance of integrating eye tracking with AI methodologies, such as Machine Learning and Deep Learning, to enhance academic understanding and practical applications in business and marketing.

The study's results highlight the prevalence and application of neuromarketing techniques, particularly eye tracking, in business-related research over the past decade. Eye tracking emerged as the most frequently used neuromarketing method, significantly surpassing other techniques such as fMRI and EEG, especially in high-impact journals like the *Journal of Business Research* and the *Journal of Retailing and Consumer Services*. Keyword analyses revealed strong associations between eye tracking and topics like "attention," "decision making," and "consumer behaviour," indicating its critical role in understanding visual and cognitive processes. The network and conceptual maps provided deeper insights, identifying clusters of related keywords and thematic groupings that link eye tracking with artificial intelligence (AI) technologies such as Machine Learning, Deep Learning, and Neural Networks. The bibliometric analysis further revealed a growing trend in publications exploring the intersection of eye tracking and AI, with notable peaks in research output during 2021. Journals such as *IEEE Access*, *Scientific Reports*, and *Sensors* led in publishing studies combining eye tracking and AI. Additionally, thematic clusters uncovered through network and correspondence analysis pointed to interdisciplinary connections, with research spanning fields like neuroscience, medical diagnostics, and visual processing. These findings underscore the increasing relevance and integration of eye tracking and AI in academic and applied business contexts.

The intersection of eye tracking and AI techniques represents a highly promising area for future research, given the rapid advancements in both fields. AI's capabilities in processing and analysing large datasets can significantly enhance the interpretation of eye-tracking data, enabling deeper insights into visual attention, decision-making, and consumer behaviour. This

synergy opens new avenues for innovation, particularly in dynamic and personalized marketing strategies. For businesses, integrating eye tracking with AI technologies such as Machine Learning and Deep Learning offers the potential to predict consumer preferences with unprecedented accuracy, optimize user interfaces, and tailor customer experiences in real-time. In marketing, these tools can refine audience segmentation, improve the effectiveness of advertisements, and measure emotional engagement with high precision. The combination of these methodologies not only advances academic understanding but also provides actionable insights that drive competitive advantages in business and marketing.

Despite its strengths, the research reported here has some limitations. One limitation is the relatively low number of publications using techniques such as Biometrics and facial coding, which limited the comprehensiveness of the analysis. Additionally, only one database (Web of Science) was used in the analysis. It is likely that results would differ slightly if other journals not included in this database were considered; however, no major changes are expected. The Harvard Business Review was excluded from the analysis due to its atypical paper structure. These should be regarded as limitations, but they are not expected to introduce significant bias to the results. Future research in this area should focus on uncovering the full potential of neuromarketing tools and conducting a more detailed analysis of articles where these tools have been employed. Future research should also focus on overcoming ethical and technical challenges to further exploit the synergy between neuromarketing and AI.

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BIBLIOGRAPHIC ANALYSIS: EVALUATION OF THE ETHICAL ASPECTS OF NEUROMARKETING RESEARCH IN DIGITAL MARKETING WITH AN EMPHASIS ON ITS IMPORTANT ASPECT IN THE FORM OF A CODE OF ETHICS

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Abstract:

The integration of neuromarketing in digital marketing introduces new insights into consumer behavior by combining neuroscience and marketing principles. However, this approach requires a comprehensive understanding of ethical limitations and the responsible management of consumer data. Attie et al. (2021) state that the ethical issues raised regarding neuromarketing and AI are like the ones raised regarding advertising and marketing in general. The primary ethical challenge lies in direct access to consumers' cognitive processes, which can intrude on personal privacy and involve the handling of sensitive information. This raises crucial ethical issues, such as privacy protection, potential misuse of data, and the need for transparency within both neuromarketing and digital marketing contexts. This article provides a bibliographic review of empirical studies on these ethical concerns, drawing from impactful scientific journals indexed in the Web of Science (WoS) database. The objective is to propose specific ethical guidelines that can serve as a code of ethics, establishing a framework for ethical conduct in neuromarketing applications within digital marketing.

Key words:

Artificial Intelligence. Code of Ethics. Digital Marketing. Ethical Approach. Ethics. Neuroethics. Neuromarketing.

1 Introduction

Neuromarketing represents an emerging field of research that offers new approaches that lead to interesting effects and could expand the results of marketing strategies in different segments (Fortunato et al., 2014). Traditional market research methods, which are used to understand consumer behavior, cannot penetrate the subconscious processes taking place in the brains of consumers. This leads to a mismatch between market research results and actual consumer behavior at the point of purchase. Therefore, marketers and researchers need to re-look at the market research methods used to better understand consumer behavior (Agarwal & Dutta, 2015). At the same time, it should be noted that traditional demand-based marketing research methods often fail because they depend on respondents' willingness to describe their feelings. Neuromarketing focuses on directly investigating how respondents feel and what they think about a product or advertisement (Hula, 2022).

The emergence of new technologies is influencing marketing research and business decisions. Specifically, artificial intelligence (AI), virtual reality (VR), and neuropsychological tools are changing how we collect, store, and analyze marketing data (Adeola et al., 2022). Neuromarketing is mainly based on technological tools, its combination with AI could certainly improve it, to collect and measure the consumer's emotions with more accuracy (Mouammine & Azdimousa, 2019). Neuromarketing uses tools driven by AI, such as facial and movement coding. With neuromarketing and AI, marketing tools have become more efficient (Attie et al., 2021).

Despite the benefits that neuromarketing and AI bring, this topic often raises several questions regarding the observance of ethics in the use of neuromarketing research tools. Clark (2020) states that among ethical concerns are citizen privacy rights when stand-off crowd-sourced data are collected, development and adherence to protocols concerning incidental findings encountered during data collection, ramifications of unintended inferences being made at the level of the individual when data are derived from various information sources, determination of genetics-based consumption preferences, and establish intellectual property rights when academically-oriented research tools from neuroscience are involved.

Although certain ethical concerns may appear exaggerated, both researchers and neuromarketing firms must maintain rigorous data protection protocols and honor the confidentiality of study participants (Mouammine & Azdimousa, 2023).

Professionals working in this field should seek means to educate the public about neuromarketing (Bakardjieva & Kimmel, 2017). The introduction of various measures could lead to a better understanding of the methods used in neuromarketing and help to eliminate concerns about the possible misuse of the obtained data.

Technologies have their own ethical code, which can lead to significant shortcomings when it comes to ethical issues in neuromarketing. The invasion of consumer privacy also impacts individuals' cognitive freedom (Sententia, 2006). Digital neuromarketing is fundamentally different from traditional marketing tools because it bypasses cognitive processes and directly captures responses from the nervous system (Rawnaque et al., 2020). The convergence of neuromarketing and digital marketing represents an innovative approach to decoding the constantly evolving landscape of marketing communication. As noted in the study, Millagala and Gunasinghe (2024) highlighted the tangible impact of neuromarketing on digital advertising, website design, and social media campaigns, revealing the potential to enhance consumer engagement.

Companies and organizations the world over wish to understand, predict, and ultimately change the behavior of those whom they interact with, advise, or else provide services. The hope is that by understanding more about the mind and using recent advances in neuroscience, more effective interventions can be designed (Spence 2019).

The study aims to identify relevant scientific literature and empirical studies using bibliographic analysis, and thus provide a systematic overview of the current state of knowledge in the field of ethics in neuromarketing. At the same time, the partial intention is to adopt specific ethical measures that will be applied within the framework of neuromarketing research in the form of a code of ethics as an important aspect of neuromarketing research.

1.1 Neuromarketing and Ethical Issues Related to Neuromarketing

Neuromarketing developed from neuroeconomics. By using the same techniques of image mapping, neuromarketing aims to investigate consumer behavior and utilize this information in marketing actions (Santos et al., 2014). It is currently an interdisciplinary science that collaborates with other fields such as: psychology, neurology, consumer psychology, neuropsychology, medicine, biology, marketing and it also shares its knowledge with those branches. It is a more advanced method of marketing research than the conventional (classic, traditional) techniques and methods (surveys, interviews, stakeholders, focus groups, etc.) (Kolev, 2012).

Neuromarketing is an emerging field with opportunities in commercial, social and political advertising. Progress in this area therefore requires proper documentation to capture its current state (Rawnaque et al., 2020). Neuromarketing introduces innovative methods that target subconscious consumer processes, offering insights beyond traditional market research methods. Standard market research often fails to capture unconscious factors influencing

purchasing behavior, leading to discrepancies between reported and actual behaviors (Fortunato et al., 2014; Agarwal & Dutta, 2015; Bakardjieva & Kimmel, 2017).

Traditional market research methods, such as methodologies and focus group surveys, are full of systemic limitations and biases. It only measures what customers want to reveal and tell researchers. In the past, researchers often found significant differences in research methodology between the stated intention and the actual behavior of respondents. While the research method captures the respondents' expressed intention towards the product or service, the actual behavior may differ from the respondent's intention towards the product or service. Today, cognitive neuroscientific techniques offer a great opportunity to improve marketing research methods and possibly redefine the field of marketing through a deeper understanding of consumer behavior (Hula, 2022).

Since its emergence, neuromarketing has generated multiple debates about its uses and misuses, the ethics of this highly sensitive data technique, and the lack of regulation for consumer protection (Luna-Nevarez, 2021). Among the peer-reviewed texts, the main ethical concern regarding neuromarketing concerns the violation of consumer privacy (Fortunato et al., 2014).

The field of neuroethics can be understood as a reflection of neuroscientific practices and ethical concepts. Questions of interest in neuroethics involve the practical applications of neurotechnology for people and society in general (Santos et al., 2014).

Because of the deep insights that can be gained, the field of neuromarketing research is carefully monitored by consumer and research protection groups to ensure that subjects are properly protected (Khurana et al., 2021). Ulman et al. (2015) state that the pertaining ethical issues have been continuously attracting much attention, especially since the number of neuromarketing companies has exceeded 300 worldwide.

The main ethical problems of neuromarketing are the violation of consumer privacy and autonomy. Another identified ethical problem is the presence of doctors and academics conducting neuromarketing research for commercial purposes. The concern regarding the exploitation of vulnerable groups such as children has also been identified as an ethical issue (Fortunato et al., 2014). Authors Stanton et al. (2017) argue that the most cited concerns – threats to consumer autonomy, privacy, and control – do not raise meaningful ethical issues given the current capabilities and implementation of neuromarketing research.

As we mentioned, neuromarketing and various techniques used for measuring brain activity, tracking eye movements, skin galvanic response, and so on are regulated and subject to ethical principles (Bakardjieva & Kimmel 2017). Neuromarketers are responsible for human subjects in the same way as in any other research when it comes to ethical research practices and behavior. Ethical codes help guide these responsibilities. The Neuromarketing Science and Business Association (NMSBA) has provided an ethical code that includes various important ethical guidelines that any research involving human subjects should follow (Christensen et al., 2021). Additionally, an ethical guideline in neuromarketing (EGNM) has been established and is included in the NMSBA (Hensel et al., 2017). The so-called voice of European neuroscience is the Federation of European Neuroscience Societies (FENS), which supports ethical standards and transparency in research (Federation of European Neuroscience Societies, n.d.). The Declaration of Helsinki establishes ethical principles regarding human subjects, prioritizing their health, well-being, and interests. Every research project must be conducted with respect for human beings, safeguarding their rights (World Medical Association, 2001).

2 Methodology

Over close to 2 decades, neuromarketing has grown into a widely accepted discipline in brand research (Clark, 2020). But despite this, there are always questions regarding the observance of ethical principles in neuromarketing research.

The goal of the research is to perform a bibliographic analysis, which consists of a meta-analysis (assessment of the relevance of research in individual articles published in the given field of study) and a meta-synthesis (bibliographic linking of the context). In the presented article, we used VOS Viewer to graphically display the results of the bibliographic analysis. For the current review, we carried out a query on October 22, 2024, on the WoS database and considered all publications to date about the application of ethics in neuromarketing. The specific consultation was as follows: TS= [“ethics”] AND TS= [“neuromarketing”]. TS searches for topics in title, abstract, author keywords.

The total number of publications in the WoS database is 58 articles. Categories have been selected Neuroscience, Ethics, Business, Economics and Management. The final total number of publications in the WoS database is 42 articles published from 2009 to the present. Of those, 26 are articles, 9 proceedings papers, 5 book chapters, 3 review articles, 2 editorial materials, 1 book, 1 book review, and 1 early access.

2.1 Database

This part describes the process of preparing a bibliometric study of scientific literature on ethics in the field of neuromarketing, which is located in the multidisciplinary database WoS and Scopus, with access through the University Library of the University of Presov in Presov. It is important to note that the aim of this study is not to evaluate the quality of the content of the contributions included in the database but to do a descriptive analysis of the presence of the concept of ethics in neuromarketing. The choice of a database as an object of study is due to the importance of such tools for researchers as a source of documentation to support their work.

Web of Science is a platform based on web technology created in 1960 and owned by Thomson Reuters. It has collected a wide range of bibliographic databases, citations, and links to scientific publications in any discipline of knowledge; scientific, technological, humanistic, and sociological since 1945. It consists of more than 12,000 living journals, 23 million patents, 148,000 conference proceedings, more than 40 million and 760 million sources of cited references (Sánchez et al., 2017).

3 Results

As a data visualization tool, the initial bibliometric mapping used dimensions along with the layout algorithms provided by the VOS viewer for co-authorship (Fig. 1) and keyword co-occurrence (Fig. 2) in combination with the WoS bibliographic data tool for keyword exploration ‘ethics’ and ‘neuromarketing’.

A total of 92 authors from 82 organizations were identified from 42 publications. Co-authorship analysis by authors showed that some of the authors or organizations are not connected. The largest group of connected authors or organizations consists of 9 authors (Fig.1).

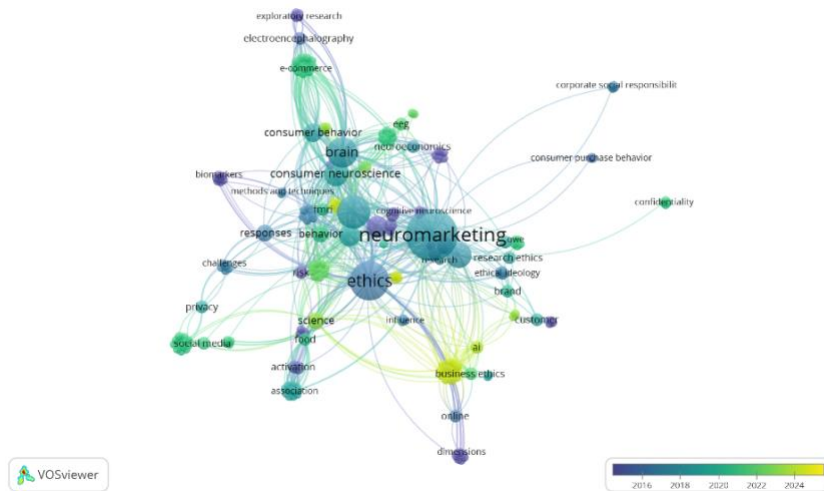


Figure 4: Mapping ethics in neuromarketing regarding the co-occurrence of 1 keyword
 Source: own processing, 2024

From Figure 2, we can read three main clusters. The first relates to neuromarketing, and the second focuses on ethics and consists of keywords such as ethics, neuroethics, issues, neuromarketing, and marketing. The third cluster is focused on keywords related to customer behavior, behavior, brain, customer neuroscience, decision – making and responses.

The following section contains a bibliographic analysis, which originally contained 58 publications, of which 42 publications come from the Ethics, Neuroscience, Management, Business, and Economics categories. 26 articles published in professional scientific journals will be described in more detail.

Table 1 contains individual studies that in some way dealt with ethics in neuromarketing. Many studies introduce or expand upon the concept of neuroethics, with researchers like Santos et al. (2014) and Corona-Cabrera (2018) exploring the necessity of ethical frameworks to regulate neuromarketing’s use in academic and commercial applications. Luna-Nevarez’s (2021) study adds an empirical dimension to the ethical debate, indicating that while consumers generally view neuromarketing positively, significant concerns about privacy and regulation persist. At the same time, multiple papers such as those by Stanton et al. (2017) and Ducu (2017) address the potential for neuromarketing to benefit society if used ethically but warn against the misuse of technology for manipulative purposes.

Table 1: A review of individual studies with ethical considerations in neuromarketing

Title	Neuromarketing’s Impact on Buying Intentions: The Mediating Influence of Ethics
Authors, year	Singh, Prasad, Shrimali, Srinivas, Hiran (2024)
The focus of the publication	This study examined the intricate relationship between neuromarketing, buying intentions, and ethics, in the context of online customers. The study also explored how neuro-marketing methodologies, designed to access non-conscious reactions, influence the buying intentions of online customers. One of the results of the study was that the variable ethics in neuromarketing partially mediates the relationship between neuromarketing and buyers’ purchasing intentions of online customers.
Source	Pacific Business Review International (Q4)
Title	Reflecting on Ethics in Practice Neuromarketing: Neuroethics
Authors, year	Santos, Gonçalves, Reis, Plinio, Goncalves (2014)
The focus of the publication	This article aims to answer the following research problem: what are the relevant ethical questions related to neuromarketing practice? This article contributes to the academic knowledge of neuromarketing beginning with a revision of international journals and the presentation of a new field of neuromarketing not discussed before by the academy in Brazil: neuroethics. Reflecting on the ethics in neuromarketing practice, and neuroethics, it’s important to guide future and present research in this field.

Source	Revista Brasileira de Marketing (Q4)
Title	Neuromarketing, Ethics, and Regulation: An Exploratory Analysis of Consumer Opinions and Sentiment on Blogs and Social Media
Author, year	Luna-Nevarez (2021)
The focus of the publication	The main purpose of this research was to identify consumers' opinions about neuromarketing, its perceived benefits and risks, and the ethical concerns and implications for those involved in the use of this method. Taking a social media mining approach, the study uncovers the most common neuromarketing concerns discussed by consumers, describes the main participants (or actors) of the neuromarketing narrative and their interrelationships, and evaluates the overall consumer sentiment of neuromarketing. Furthermore, the sentiment analysis demonstrated a positive perception of neuromarketing among consumers, but it also revealed some concerns about the lack of regulation and consumer privacy.
Source	Journal of Consumer Policy (Q3)
Title	Neuromarketing Research Practices: Attitudes, Ethics, and Behavioral Intentions
Authors, year	Bakardjieva, Kimmel (2017)
The focus of the publication	This article describes the results of two online questionnaire studies focused on the role of personal constructs presumed to underlie perceptions of neuromarketing research. The findings point to neuromarketing research knowledge, attitudes toward science, attitudes toward technology, and ethical ideology as important factors linked to neuromarketing research attitudes, perceptions of the ethicality of neuromarketing research, and willingness to participate in neuromarketing studies. The authors discuss the implications of findings for educating the public about neuromarketing research and encouraging research participation.
Source	Ethics & Behavior (Q2)
Title	Ethical issues of neuromarketing
Authors, year	Petz, Haas (2017)
The focus of the publication	The study explores the ethical code of neuromarketing and critical aspects of neuromarketing touching upon legal, moral, and praxes related to business, engineering ethics, and scientific ethics around specific issues. Some neuromarketing techniques are examined to give an idea of the kind of questions that should be asked as part of an ethical assessment of technology in an analogous way to technology assessment, which tends to focus on more operational rather than socio-cultural aspects.
Source	Neuromarketing in food retailing
Title	The Ethics of Neuromarketing in Sports
Author, year	Dumont (2017)
The focus of the publication	The study focuses on the ethics of neuromarketing in sports. The authors state that utilizing customer data platforms (CDPs), sports brands and marketers therein will aggregate and analyze both fan-specific and resident data to inform more personalized targeted offerings that better appeal to the emotional, behavioral, identity, and social drivers of choice. While there is little evidence that neuroscience technology is currently capable of informing marketers seeking to manipulate consumer choice through the identification of a "buy button" in the brain, data collected in CDPs represents a real profound ethical concern for sports fans and all residents of communities built with sacred sports stadiums as a centerpiece.
Source	Ethics and Neuromarketing: Implications for Market Research and Business Practice
Title	Topoi in Neuromarketing Ethics
Author, year	Ducu (2017)
The focus of the publication	This study aims to map ethical concerns and provide a series of elements that can help both researchers and practitioners clarify the ethical limits of their work. The chapter contains two major sections and some brief closing remarks. The first one contains two major distinctions which will serve as the basis for the entire ethical discussion in the next section: neuromarketing as both a field of research and applications and neuromarketing ethics as research ethics and as ethics of brain research. The second section is dedicated to a quasi-comprehensive presentation of the ethical challenges of neuromarketing.
Source	Ethics and Neuromarketing: Implications for Market Research and Business Practice
Title	Neuromarketing: Ethical Implications of its Use and Potential Misuse
Authors, year	Stanton, Sinnott-Armstrong, Huettel (2017)

The focus of the publication	This study articulates common ethical concerns with neuromarketing as currently practiced, focusing on the potential risks to consumers and the ethical decisions faced by companies. The study identifies how potentially serious ethical issues may emerge from neuromarketing research practices in the industry, which are largely proprietary and opaque. The study also identifies steps that can mitigate associated ethical risks and thus reduce the threats to consumers. The authors conclude that neuromarketing has clear potential for positive impact on society and consumers, a fact rarely considered in the discussion on the ethics of neuromarketing.
Source	Journal of Business Ethics (Q1)
Title	Perceptions of marketing academics, neurologists, and marketing professionals about neuromarketing
Authors, year	Eser, Isin, Tolon (2011)
The focus of the publication	This exploratory research aimed to reveal the perceptions of marketing academics, neurologists, and marketing professionals regarding neuromarketing studies, as they have an important role in the future of neuromarketing studies. Quantitative analysis was conducted on data from 111 marketing academics, 52 neurologists, and 56 marketing professionals. All participants agreed that neuromarketing is not a manipulative way of selling unnecessary goods and services.
Source	Journal of marketing management (Q2)
Title	Neuromarketing, Is the Future here?
Author, year	Canales Ronda (2013)
The focus of the publication	This paper presents an overview of the application as well as an exposition of the main reasons for the use of neuromarketing and ethical and consumer protection in the application of neuromarketing.
Source	3C EMPRESA (Q4)
Title	Neuromarketing algorithms' consumer privacy and ethical considerations: challenges and opportunities
Authors, year	Goncalves, Hu, Aliagas, Cerdá (2024)
The focus of the publication	This study investigates the ethical and privacy issues arising from using AI and ML in neuromarketing, framed by rule utilitarianism. It assesses the impact of these technologies on consumer privacy and human rights through a combination of literature review, bibliometric analysis, and empirical data from surveys and interviews with experts in the US and Spain. The study reveals the tensions between the efficacy of neuromarketing techniques and the imperative to protect consumer privacy, particularly in light of the GDPR's influence on global practices.
Source	Cogent Business & Management (Q2)
Title	The Need for Neuroethics in Market Research. Study of the Neuromarketing Science and Business Association's Code of Ethics
Author, year	Corona-Cabrera (2018)
The focus of the publication	This study deals with the ethics of neuroscience in business processes, understood as an ethical framework that regulates marketing-related neuroscientific research. The aim is to emphasize the need to complement the regulatory framework with universal ethical principles.
Source	Revista Perspectiva Empresarial (Q4)
Title	Shining a Light also Casts a Shadow: Neuroimaging Incidental Findings in Neuromarketing Research
Author, year	Bradfield (2021)
The focus of the publication	In this paper, the author argues that neuromarketing researchers owe participants the same ethical obligations as other neuroimaging researchers.
Source	Neuroethics (Q1)
Title	Future of neuromarketing
Author, year	Loijens (2017)
The focus of the publication	This study describes several barriers to neuromarketing, such as the costliness and complexity of its state-of-the-art techniques, lack of supporting scientific proof, and credibility issues. Yet as too many providers entered the neuromarketing field in its early days and failed to apply sound and robust scientific methods, a lot of credibility was lost.
Source	Neuromarketing in food retailing
Title	Neuroimaging in neuromarketing: research traditions and concerns on methodology, ethics, and consciousness

Authors, year	de Cássia de Faria Pereira, Paro, Porto-Bellini, Boeing, de Moura Engracia Giralddi, Caldeira de Oliveira (2024)
The focus of the publication	The study reviews the literature on the effective use of neuroimaging in neuromarketing research to organize that literature according to research traditions and concerns on methodology, ethics, and consciousness.
Source	Journal of Marketing Theory and Practice (Q2)
Title	Neuromarketing: between influence and manipulation
Authors, year	Dragolea, Cotirlea (2011)
The focus of the publication	This article includes a description of the techniques used in neuromarketing, aspects regarding the domestic market and Romania's situation in this field, the areas of its use, and the limitations imposed by the current economic context. The authors state that this article may also be the starting point in developing a code of ethics on the use of neuromarketing, as well as the legal factors that can help ease the arising conflicts regarding neuromarketing – between influence and manipulation.
Source	Polish Journal of Management Studies (Q4)
Title	The effect of political neuromarketing 2.0 on election outcomes: The case of Trump's presidential campaign 2016
Author, year	Hegazy (2021)
The focus of the publication	This study is based on Trump's political marketing mechanisms analysis, the paper believes that big data 2.0 and neuromarketing techniques played an unusual role in reading political consumers' minds and helping the controversial candidate to meet one of the most unexpected victories in the presidential elections. Nevertheless, this paper argues for the ethics of using political neuromarketing 2.0 to sell candidates and its negative impacts on the quality of democracy.
Source	Review of Economics and Political Science (Q2)
Title	Neuromarketing as a New Market Paradigm
Author, year	Kolev (2012)
The focus of the publication	The basic idea of this paper is to highlight the possibilities of applying the methods and techniques of neuromarketing. According to this, researchers and experts can pinpoint the type of emotion that a certain stimulus has. As a new theoretical concept, this branch of study causes controversy and dilemmas which include ethical problems.
Source	Casopis za ekonomiju i trzisne komunikacije (Q4)
Title	Neuroscience-inspired design: From academic neuromarketing to commercially relevant research.
Author, year	Spence (2019)
The focus of the publication	This study focuses on three key areas: neuroergonomics, neuromarketing, and neurogastronomy. Practical challenges with commercial neuromarketing research, including the cost, timing, ethics – legality, and access to scanners (in certain countries), and the limited ecological validity of the situations in which people are typically tested are also discussed.
Source	Organizational Research Methods (Q1)
Title	Proposal for modeling the experimental process for Neuromarketing research using the electroencephalography tool
Authors, year	Munari Pagan, Munari Pagan, de Moura Engracia Giralddi, Caldeira de Oliveira, (2024)
The focus of the publication	The study focused on a proposal for modeling the experimental process for neuromarketing research using electroencephalography (EEG). In the abstract authors state that “the project is to be submitted to the Ethics Committee”.
Source	ReMark-Revista Brasileira de Marketing (Q2)
Title	Consumer Neuroscience and Neuromarketing: Theoretical Adoption Potential with the Application of Methods and Techniques in Neuroscience
Authors, year	Shigaki, Goncalves, Vilar dos Santos (2017)
The focus of the publication	This article presents theories about Consumer Neuroscience and Neuromarketing, as well as an analysis of adopted methods, their possible applications, and contributions to the marketing field. This study presents favorable arguments (support for consumer decision-making, cost-benefit for physiological response methods, the possibility of new research findings; and interdisciplinarity) and unfavorable arguments (reduced view of consumer behavior research on stimuli and response; ethics; high cost of equipment of physiological response methods; lack of ability of researchers handling the equipment; and inaccuracy of equipment) to the new methodology of research.

Source	Revista Brasileira De Marketing (Q4)
Title	A Survey on Neuromarketing Using EEG Signals
Authors, year	Khurana, Gahalawat, Kumar, Roy, Dogra, Scheme, Soleymani (2021)
The focus of the publication	This article surveys a range of considerations for EEG-based neuromarketing strategies, including the types of information that can be gathered, how marketing stimuli are presented to consumers, how such strategies may affect the consumer in terms of appeal and memory, machine learning techniques applied in the field, and the variety of challenges faced, including ethics, in this emerging field.
Source	IEEE Transactions on Cognitive and Developmental Systems(Q1)
Title	Ethical issues in neuromarketing: “I consume, therefore I am!”
Authors, year	Ulman, Cakar, Yildiz (2015)
The focus of the publication	This paper focuses on the ethical issues and debates most related to the recent applications of this technology. In this paper, it is argued that these technologies should be sufficiently discussed in public spheres and their use on humans should be fully carried out according to the ethical principles and legal regulations designed in line with human rights and human dignity.
Source	Science and engineering ethics (Q1)
Title	Advertising and Consumer Privacy Old Practices and New Challenges
Authors, year	Rapp, Hill, Gaines, Wilson (2009)
The focus of the publication	The study aims to examine the evolving public policy and marketing domain of consumer privacy as it relates to current and future advertiser strategies and activities. The study describes the chronicled regulatory environment, emphasizing Federal Trade Commission (FTC) policies and domains representing old practices and new considerations-direct mail, Internet, and neuromarketing.
Source	Journal of advertising (Q1)
Title	Neurotechnologies in the advertising industry: Legal and ethical aspects
Authors, year	Skriabin, Sanakoiev, Sanakoieva, Berezenko, Liubchenko (2021)
The focus of the publication	The paper aims to identify possible ways to increase the effectiveness of regulatory and ethical aspects of using neurotechnology in Ukraine’s advertising industry. Based on a systematic analysis of theoretical experience and regulatory legal acts, the main threats to the development of neuromarketing are identified.
Source	Innovative Marketing (Q4)
Title	Non-medical applications for brain MRI: ethical considerations
Authors, year	Sarrazin, Fagot-Largeault, Leboyer, Houenou (2015)
The focus of the publication	This article aims to discuss the new ethical issues raised by the applications of the latest neuroimaging technologies to non-medical fields. The involvement of neuroscientists, psychiatrists, physicians but also of citizens in neuroethics discussions is crucial to challenge the risk of unregulated uses of brain imaging.
Source	L’Encephale (Q4)

Source: own processing, 2024

Based on the bibliographic analysis, we can say that in the field of neuromarketing, a significant part is devoted to the ethical questions that this new field of research raises. Based on the bibliographic analysis carried out, we can talk about these key areas:

- Ethics in Neuromarketing: Many publications focus on the exploration of neuroethics, consumer privacy, and the ethical concerns related to neuromarketing practices. Several studies highlight concerns about the manipulation of consumer behavior, lack of transparency, and the need for regulatory frameworks to ensure the ethical use of neuromarketing.
- Consumer Privacy: Many papers, such as those by Luna-Nevarez (2021) and Goncalves et al. (2024), explore consumer concerns about privacy, particularly when neuromarketing techniques involve the collection of sensitive data like brain activity. These concerns are magnified with the introduction of AI, particularly in the areas of human rights and ethical principles (Berger & Rossi, 2022). Doya et al. (2022) raised the question of how, given that computers around the world are exposed to cyberattacks, we can avoid the potential risk of brain hijacking through a computer connected to the

brain (EEG). Additionally, Muelling et al. (2017) highlighted the ability of neurotechnologies to alter a person's identity. Kędras & Sobiecki (2023) argue in their study that although artificial intelligence has great potential, especially for acquiring valuable insights in various fields, it also comes with a disadvantage. This disadvantage is primarily due to its versatile application, which makes comparing results significantly more challenging.

- Perceptions and Attitudes: Publications like Bakardjieva and Kimmel (2017) and Eser et al. (2011) examine how different stakeholders (consumers, professionals, and academics) perceive neuromarketing, revealing a mixed attitude toward its use and the ethical questions it raises.
- Regulation and Legal Aspects: Several studies, such as those by Skriabin et al. (2021) and Stanton et al. (2017), discuss the lack of regulatory standards governing neuromarketing practices, advocating for stricter rules to protect consumers.
- Technological and Methodological Considerations: Various papers focus on the challenges and opportunities posed by neuromarketing technologies like EEG and neuroimaging (e.g., Khurana et al. (2021) and de Cássia de Faria Pereira et al. (2024)). These technologies are expensive and complex, and their application in marketing raises ethical and operational questions.
- Application of Neuromarketing in Specific Fields: Some studies explore the application of neuromarketing areas such as food retailing (Petz & Haas, 2017) and sports (Dumont, 2017), where ethics and consumer data usage are highlighted as pressing concerns.

In the future, neuromarketing and consumer neuroscience are expected to play an increasing role in addressing research questions in marketing science and consumer behavior (Agarwal & Dutta, 2015). Therefore, in the field of neuromarketing, it is very important to focus on the adoption of a law that will address this area. Ulman et al. (2015) states that there is an urgent need for interdisciplinary scientific bodies like ethics committees to monitor the research regarding the scientific and ethical values of nonmaleficence, beneficence, autonomy, confidentiality, right to privacy, and protection of vulnerable groups.

The lack of a neurotechnology law, the distinguishing between “neuro data” and “personal data”, cyber-hacking risks, and the lack of an interaction model between the state and advertisers are deemed to be regulatory shortcomings. Possible ways to optimize the legal regulation of neurotechnology use are the development of a neurotechnology law, the legislative enshrinement of the neurodata concept, the introduction of restrictions on neurodata use depending on the industry and purpose, and increased cybersecurity level. Threats to the ethical use of neurotechnology include low public awareness of neurotechnology and the personal rights of citizens, and lack of training activities for marketers and advertisers in the field of neuroscience. It is possible to overcome ethical threats through educational and informational work for marketers, advertisers, and citizens. A comprehensive solution to the ethical and legal shortcomings of neurotechnology use will increase the neurotechnology development level, and the proficiency level of marketers and advertisers (Skriabin et al., 2021).

4 Conclusion

This literature offers a comprehensive examination of neuromarketing from an ethical perspective, emphasizing the need for ongoing discussions, stricter regulations, and greater transparency in neuromarketing practices. We agree with the statement of Hula (2022), who states that despite all the excitement about neuromarketing, which in recent decades brings new and new information to our knowledge, it should be used in parallel with traditional research methods. Individuals act not only according to their feelings, but also under the influence of the

expected reward for making decisions in the short and long term. Combining both research techniques will provide more valuable insights into consumer preferences and the purchasing process. The research of Goncalves et al. (2024) emphasizes the need for internationally consistent ethical standards and consumer regulations, drawing from the comparative analysis of policies in the US and EU.

We can conclude that the connection between neuroscience and marketing is a powerful tool. It is evident that neuromarketing offers marketers innovative ways to look directly into the minds of consumers and understand both the emotional and cognitive aspects through neural responses. However, it is essential to prioritize the protection of individuals involved in research.

The integration of neuromarketing with artificial intelligence holds a significant position today. Researchers are exploring this connection across various aspects. For instance, Sharma et al. (2020) and Peterson et al. (2015) utilized AI combined with EyeTracker technology to predict students' performance. Pappas et al. (2020) focused on emotion recognition, Fernandes et al. (2017) worked on predicting decision-making strategies, and Zhang et al. (2020) examined the connection between AI and ethical decision-making.

Using neuromarketing with AI tools seems to be a wise response to address complex ethical problems too, notably because they are innovative, non-invasive and they do not rely on medical data collection (Attie et al., 2021).

The integration of neuroscience and AI brings forth numerous ethical questions that are addressed by AI ethics and neuroethics. However, it is important to note that both fields operate as distinct branches of ethics (Salles & Farisco, 2024). AI ethics, when applied in the field of neuroscience, focuses on the social, regulatory, ethical, and philosophical dimensions of AI technologies, while also considering issues like privacy, bias, human autonomy, and similar concerns (Floridi, 2024).

The most important step for future neuromarketers, as well as for companies in the marketing business in general, is to familiarize themselves with the available ethical guidelines that regulate research involving human participants, promote best practices, and then apply them. The ethical code of the NMSBA is one of the mentioned codes that provides a useful starting point. Ethical standards generally require informed consent, and international and national regulations should strengthen ethical protections.

The outcomes include policy recommendations to minimize ethical risks and promote the responsible progression of neuromarketing. These recommendations guide companies and managers toward ethical transparency and accountability. Additionally, research offers a policy framework for crafting ethical neuromarketing practices that reconcile technological progress with consumer well-being, thereby contributing to broader discussions on embedding ethics within technological innovation.

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THE CONNECTION BETWEEN AI AND USABILITY IN THE ONLINE SECTOR, CONSIDERING MUTUAL INTERACTIONS WITHIN E-COMMERCE AND CENTRAL EU COUNTRIES

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Abstract:

Online technologies are increasingly utilized on a daily basis, not only by ordinary consumers but also by businesses within the entrepreneurial sector. Artificial intelligence is experiencing significant recognition, offering opportunities for accelerated technological advancement. Simultaneously, it brings about changes that impact the online space as a whole. E-commerce faces continuous transformations, making it essential to recognize that these changes influence consumer behavior, purchasing processes, and the extent to which new technologies are adopted by businesses. The interconnectedness of the online space, technological advancements, and AI is the focus of this study. Specifically, it examines the impact of the digitalization on usability in the business sector of e-commerce, with an emphasis on the utilization of AI within businesses themselves. Furthermore, it indicates that the integration of modern technologies, such as artificial intelligence, is changing the way businesses interact with the digital market and optimize their marketing and business strategies.

Key words:

Artificial Intelligence. Digitalization. E-commerce. V4 Countries.

1 Digital Transformation and Artificial Intelligence in Businesses

The current era can be described as a “digital age”, in which businesses are gradually learning to adapt their business models through digital tools and leverage the opportunities of the digital era to their advantage. This transformation not only compels organizations to alter their operational methods and adapt but also changes consumer behavior. Consumers now tend to evaluate products and services more critically and often have higher expectations (Zhang & Chen, 2024). Artificial intelligence holds tremendous potential within the context of digital transformation and the digital age. Implemented AI technologies significantly influence the success of companies (Dwivedi et al., 2021).

The discussed impact of artificial intelligence on consumers lies in the fact that these tools and their algorithms help predict potential problems, provide solutions, and, based on available data, can analyze, store information, and operate in a sophisticated manner (West & Allen, 2018). Businesses recognize the need for digital transformation and strive to achieve a sustainable competitive advantage (Zhang & Chen, 2024).

Artificial intelligence is now an integral part of many organizational processes. Thanks to its ability to process information, AI is synonymous with the potential of the future. For instance, AI can evaluate and make financially oriented decisions based on available online data, including information from social media. The system can advance and self-learn, reaching entirely new levels by learning from large datasets that are often too extensive for humans to handle. This capability enables AI to deliver more thorough and higher-quality decisions, benefiting businesses significantly (Jarrahi, 2018).

The fact that available sources often differ in their opinions and provide an inconsistent picture can complicate decision-making for companies, which primarily seek a return on investment. In online marketing, particularly in the B2B (business-to-business) sector, artificial intelligence and its tools, according to Agnihotri (2021), offer a way to achieve better sales outcomes for businesses.

In the digital age, advancements in communication technologies, according to Lavrentyeva et al. (2019), have transformed the nature of companies. They are evolving into ecosystems directly accessible to consumers. Various digital media, platforms, and services provide oversight and enable data collection and analysis. The large volumes of data present a challenge for businesses, one that can be effectively managed with AI tools, allowing them to gain a competitive advantage. A key pillar for companies is artificial intelligence in the realm of online marketing and social media. AI shapes the stability, growth, and operational processes of most studied businesses. Furthermore, it links the application of AI to favorable impacts on companies, often resulting in outcomes such as increased revenue or a higher overall number of customers (Basri, 2020).

Technological advancements in artificial intelligence have also sparked growing interest among managers and the public in these tools. Many companies are investing significant resources into leveraging and implementing them. Based on their findings, Reim et al. (2020) outline four steps for the successful integration of AI tools into businesses:

1. Understanding AI tools and their organizational capabilities that support digital transformation.
2. Understanding the current state of the company's business model, its future potential, and the specific tasks arising from the internal structure of the company.
3. Developing and improving the capabilities of the company's infrastructure components and the skills required for implementing artificial intelligence.
4. Achieving acceptance of AI tools by the company's members and developing the competencies of the internal team.

The use of chatbots, self-learning algorithms, and other tools provides organizations with an opportunity to better understand their environment. The goal is to enhance and adapt to the digital age, while simultaneously disrupting established rules and procedures. AI thus represents a clear path to gaining a competitive advantage. The benefits of AI within organizations include its ability to predict, improve performance through analysis, and optimize operations at the organizational level across financial, marketing, and administrative sectors. The study results indicated that companies using AI achieve higher performance and efficiency, especially when these tools are used to realign their processes (Wamba-Taguimdje et al., 2020). The change brought about by AI has the potential to significantly alter the market situation for businesses and organizations (Bessen et al., 2023).

AI offers comprehensive solutions behind the scenes of a company, such as business platform models and solutions that collaborate with other digital systems. Whether it's customer relationship management systems or resource planning systems, AI enables companies to advance into the realm of efficient coordination (Mishra & Tripathy, 2021).

With the goal of raising awareness about AI and its applicability, focusing on the market and the creation or capture of organizational value, three pillars and themes were formulated as the result of the relationship between organizations and artificial intelligence, and its applications:

1. Identifying the prerequisites for creating value through AI (internal maturity).
2. Connecting values and capturing them, linking them to the target customer segment.
3. Developing an AI business model and methods for capturing value (pricing models or contracts) (Åström et al., 2022).

2 Methodology

The adoption of artificial intelligence is currently of great importance, not only for large enterprises. We assume that increasing the digital skills of companies has an impact on their adoption of artificial intelligence. Social media is a widely used tool, not only for communication between people but also for promotion, sales, and increasing visibility for business entities. In many cases, social media platforms are beginning to be used as commercial tools.

This study, therefore, focuses on examining the influence of two key factors – social media intensity and digital intensity – on the adoption and implementation of artificial intelligence (AI) technologies in businesses, specifically small and medium-sized enterprises (SMEs). Geographically, the study focuses on the V4 countries (Visegrad Four) and Austria. The data used in this study come from secondary sources, specifically the Eurostat database, covering the following indicators: Artificial intelligence by size class of enterprise (AI), Social media use by type, internet advertising, and size class of enterprise (SM), and Digital Intensity by size class of enterprise (DZ), for the last three years.

Based on our theoretical review, we formulated the following hypotheses:

H1: We assume that there is a statistically significant relationship between the level of digital skills of SMEs and their willingness to adopt and implement AI technologies.

H2: We assume that more intensive use of social media by SMEs has a positive impact on their adoption of AI technologies.

The data were processed using the RStudio statistical program.

3 Results

The first step in conducting the regression analysis and testing the hypotheses was to check the normality of the data using the Shapiro-Wilk test, which indicated a normal distribution for two factors. However, one factor, Artificial intelligence by size class of enterprise (AI) showed a deviation from normality, which could potentially affect the accuracy of the regression analysis.

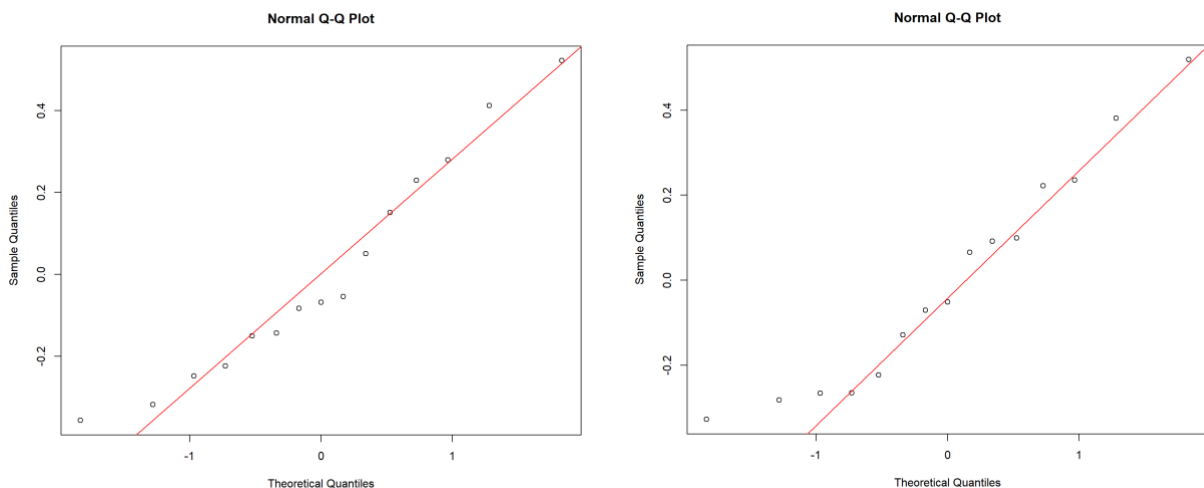


Figure 1: Normal Q-Q plots of residuals for AI and SM (on the left) and AI and DZ (on the right)

Source: own processing, 2024

As seen in Figure 1, the residuals are approximately normally distributed, but the second graph reveals slight deviations from normality. For this reason, we decided to verify the accuracy of the regression model and applied a logarithmic transformation to the dependent variable to ensure that the assumptions for linear regression were met, thereby improving the accuracy and validity of the statistical model. Subsequently, we also conducted a Shapiro-Wilk test on the residuals. The Shapiro-Wilk test was performed to confirm whether the residuals followed a normal distribution.

Table 1: Shapiro-Wilk test for residual normality

Shapiro-Wilk test of residuals	
W	0.94475
P - value	0.4459

Source: own processing, 2024

In our case, the Shapiro-Wilk test yielded a test statistic of $W = 0.94475$, indicating relatively good agreement with a normal distribution, and a p-value of 0.4459. As shown in Table 1, these results suggest that we have no reason to reject the null hypothesis of the test, which states that the residuals are normally distributed. This confirms that the residuals of the model follow a normal distribution, which is an important condition for the use of linear regression.

Table 2: Regression analysis of the impact of social media intensity on the adoption of artificial intelligence technologies in businesses

Parameter	Estimate	Std. Error	t value	p-value	Significance
Intercept	0.71225	0.34434	2.068	0.0591	
DZ	0.05104	0.02087	2.446	0.0294	*
Residual Std. Error	0.2695				
Multiple R-squared	0.3151				
Adjusted R-squared	0.2625				
F-statistic	5.982			0.02945	

Source: own processing, 2024

As we can observe in Table 2, the estimated coefficient for the independent variable digital skills of SMEs (DZ) is 0.05104, with a p-value of 0.0294. This coefficient is statistically significant at the 5% significance level. The coefficient indicates a positive relationship between the variable DZ and the dependent variable. The residual standard error of the model is 0.2695, which suggests the average size of the error in predicting the dependent variable's values.

The coefficient of determination (multiple R-squared) reached a value of 0.3151, meaning the model explains 31.51% of the variability in the dependent variable. The adjusted coefficient of determination (adjusted R-squared) is 0.2625, which accounts for the number of variables and sample size, providing a more accurate estimate for small samples. Since this is a study in the social sciences, R-squared values are considered acceptable.

The F-statistic is 5.982, with a p-value of 0.02945, indicating that the model as a whole is statistically significant at the 5% significance level. This means that the independent variable DZ significantly contributes to explaining the variability in the dependent variable and improves predictions compared to a random model.

Thus, we accept hypothesis H1, which assumes a statistically significant relationship between the level of digital skills in SMEs and their willingness to adopt and implement artificial intelligence technologies.

Table 3: Regression analysis of the intensity of social media usage on the adoption of artificial intelligence technologies in businesses

Parameter	Estimate	Std. Error	t value	p-value	Significance
Intercept	-0.18633	0.77292	-0.241	0.8133	
SM	0.03441	0.01537	2.239	0.0433	*
Residual Std. Error	0.2767				
Multiple R-squared	0.2784				
Adjusted R-squared	0.2228				
F-statistic	5.015			0.04325	

Source: own processing, 2024

Results of the regression analysis presented in Table 3 suggest that the model uses the variable SM to predict the dependent variable. The coefficient for the variable SM is 0.03441 and is statistically significant at the 5% significance level (p-value 0.0433). This coefficient indicates a positive relationship between the independent variable, the use of social media in SMEs (SM), and the dependent variable, the adoption and implementation of artificial intelligence technologies (AI). The significance of this coefficient confirms that SM has a positive and statistically verifiable impact on the dependent variable. The residual standard error is 0.2767, indicating the average error in predicting the dependent variable using the model. The coefficient of determination (Multiple R-squared) is 0.2784, meaning that approximately 27.84% of the variability in the dependent variable can be explained by the variable SM. The adjusted R-squared, which adjusts this estimate for the number of variables and sample size, is 0.2228, indicating a slight reduction in explained variability, but still suggesting that the model has some predictive power. The F-statistic is 5.015 with a p-value of 0.04325, meaning that the model as a whole is statistically significant at the 5% level. This result confirms that the SM variable contributes to explaining the variability of the dependent variable. Overall, the analysis suggests that SM is a relevant predictor that significantly contributes to explaining the dependent variable in the model. We therefore accept the hypothesis H2, which assumes that more intensive use of social media has a positive impact on the adoption of artificial intelligence technologies in small and medium-sized enterprises.

4 Conclusion

The presented study provides important insights into the adoption of artificial intelligence by small and medium-sized enterprises (SMEs). This issue is highly relevant in the rapidly growing digital age with the use of social media. Based on the analysis conducted, we can conclude that digitalization, as well as the use of social media, has a significant impact on the attitudes of SMEs toward the implementation and adoption of artificial intelligence. Considering the R-squared value, which is approximately 0.3, we consider this sufficient, as indicated by the p-values in both cases, suggesting that the models are beneficial. The adoption of AI involves various factors, not only those included in our study, which is why the explanation of the model is adequate despite the lower value, which is common in both economic and social sciences.

Digitalization has proven to be a significant predictor of AI adoption, so we can conclude that the higher the level of digitalization, the more positive the attitude toward the adoption and implementation of artificial intelligence. Companies that have embraced digitalization, such as e-commerce, automated systems, or cloud services, are creating space for the integration of artificial intelligence. From our perspective, companies should focus on investing in digitized processes, which can lead to greater efficiency and competitive advantage. As we know, social media is used not only for spreading information but also as a

fundamental platform where users engage in discussions and share experiences. Our results highlighted the power of social media engagement in relation to a more positive perception and implementation of AI.

Thus, the contribution provides valuable insights into the adoption of artificial intelligence by organizations, specifically SMEs, with a geographic focus on the V4 plus Austria. For future research, we recommend focusing on additional factors that may influence AI adoption, such as demographic differences, cultural factors, or education levels. This way, we could achieve a deeper understanding of the perception and adoption of AI and tailor technology implementation strategies to different market segments.

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TEXT-TO-SPEECH TECHNOLOGIES IN ONLINE MEDIA

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Abstract:

Speech-to-text (STT) and text-to-speech (TTS) technologies are transforming communication and accessibility, offering groundbreaking applications in journalism, education, and assistive technologies. STT enables the transcription of spoken language into written text, facilitating efficient workflows and improving accessibility, while TTS converts text to synthetic speech, improving content consumption for visually impaired users and users with reading difficulties. This paper explores the basic functions, applications, and limitations of these technologies with a focus on their integration into journalism. It discusses global examples, such as the BBC and The New York Times, which have successfully implemented these tools, as well as the Slovakian Denník N, which uses neural voice synthesis for audio stories. The analysis highlights significant benefits, including streamlined content creation and personalized user experiences, along with challenges such as transcription inaccuracies and ethical concerns regarding AI-generated content. This paper provides insight into the future potential of STT and TTS, while also addressing the risks of their wider adoption in the media.

Key words:

Artificial Intelligence in Media. Neural Voice. Online Journalism. Speech-to-Text Technology. Text-to-Speech Technology.

1 What Are Speech-to-Text and Text-to-Speech Technologies

One of the key applications of automatic speech recognition using artificial intelligence is the transcription of speech documents such as lectures, presentations or reports. Although speech is the most natural and efficient way for humans to communicate, it is not easy to quickly review and reuse speech documents if they are only recorded as an audio signal (Furui et al., 2004). Therefore, speech transcription is expected to become a key capability in the coming era, which is characterized by the use of artificial intelligence in various fields. Already today, so-called speech-to-text (STT) and text-to-speech (TTS) technologies are being used, the essence of which we describe in this section of the paper.

STT technology is a way of converting speech to text. Thus, the process of converting spoken words into written words. Artificial intelligence uses combinations of different techniques for speech recognition which are quite technologically demanding (Singh et al., 2024). For the purpose of this paper, it is important to know what it is used for today and what it can bring not only in the field of media. Speech to text technology has evolved significantly, improving communication and accessibility in various fields. STT enables applications in education, assistive technology, human-computer interaction and even telemedicine (Madhusudhana Reddy et al., 2023). The following sections outline specific areas of its application.

One of these is support for typing difficulties. STT applications have proven useful for students with writing difficulties, improving productivity and text quality. For example, one study shows that seven out of eight students using STT showed increased productivity and maintained or improved the accuracy of the resulting text (Almgren Bäck et al., 2024). Another use is the increased accessibility of written text production for people with disabilities, allowing them to communicate more effectively and engage in a variety of activities. In addition, this technology is increasingly accessible through various web and mobile applications. This improves user experience and accessibility through intuitive interfaces for almost everyone

(Ramacharla et al., 2024). It is because of accessibility that many people today use STT systems as a virtual assistant (Sudhan et al., 2024). For example, it is used to quickly dictate notes or transcribe lectures in live or online meetings.

TTS is essentially the opposite process. The input written text is first analyzed by the system, then processed and finally converted to digital audio (Madhusudhana Reddy et al., 2023). It might seem that this technology is less usable for the general user compared to TTS. However, it finds applications in many fields anyway.

One of these is again assistance for people with other types of disabilities. It plays a key role in accessibility tools for people with visual impairments or reading difficulties, facilitating better communication (Sudhan et al., 2024). It is used in education where it can, for example, simulate text interpretation (Sunitha & Suchetha, 2024). It can adapt the form of content according to user preferences, thus accommodating those who prefer spoken language over written. Moreover, artificial intelligence today can already generate contextually relevant speech by understanding not only textual but also other visual elements (Xu et al., 2023). Moreover, it can personalise the resulting speech, i.e. adapt the voice colour or speed to a given user.

Although high accuracy recognition of speech read from text, such as anchors' utterances in news programs, can nowadays be easily achieved, the technological possibilities of spontaneous speech recognition are still limited (Horii et al., 2023). Spontaneous speech is informal and very different from written text. Spontaneous speech usually contains redundant information such as unrelated words, filler words, repetition, corrections, and word fragments. In addition, it is usually impossible to avoid irrelevant information included in the transcription caused by recognition errors. These problems are also encountered by journalists who are gradually implementing SST and TTS technologies in their daily work. In the following sections of this paper, we discuss the most common uses of these technologies in the work of journalists, explain their current benefits and risks, and discuss possible future applications.

1.1 STT in Journalism

Voice-to-text technology is mainly used by journalists in the preparation of their media content. One of the uses of TTS technology is the transcription of interviews. Journalists interact with a large number of interviewees on a daily basis, whom they record and need to transcribe the interviews. This activity takes a lot of time, so they tend to use artificial intelligence to do it.

In addition to the fact that tools can transcribe speech, STTs have achieved high accuracies, allowing journalists to quickly locate specific content in large audio archives, reducing search time from hours to minutes (Haynes et al., 2018). There are several popular tools and programs that journalists use to transcribe recordings. Among the most well-known is Otter.ai, which offers real-time automated transcription of recordings. This tool is able to efficiently process interviews in different languages and allows users to edit and export transcribed texts. Otter.ai uses advanced TTS and machine learning to improve transcription accuracy (Contractor, 2024). In addition, Descript is a popular tool that offers not only transcription of recordings but also text-based audio editing, making it easier for journalists to edit their interviews (Stackreaction, n.d.). Programs such as Descript and Otter.ai are mostly paid, with monthly subscription options, offering different plans depending on the volume of transcribed content. Recording transcription programs like Sonix or Trint use artificial intelligence and deep learning to transcribe speech to text more accurately, increasing their accuracy and processing speed. These tools can identify the different dialogues and people involved in recordings, which is particularly useful when transcribing interviews. Most of these tools are paid, with different pricing models that allow journalists to choose a plan according to their needs, such as the number of hours of transcription or access to premium features like text

translation or audio analysis. Programs such as Sonix and Trint offer monthly or annual subscriptions, while some also provide a limited free version for small projects (Getapp, n.d.).

In addition to speeding up the work of journalists, it is important to note that technology is still not perfect and brings with it several risks. It is, for example, a problem with transcription accuracy. Despite advances, speech-to-text systems can produce hallucinated phrases that do not exist in the original audio, with studies suggesting that approximately one percent of transcripts may contain such inaccuracies (Koenecke et al., 2024). Technology may also have problems with spontaneous speech that are common in journalistic interviews and discussions. It transcribes filler words or does not work with the context of the utterance (Deng & Huang, 2004). It is because of this that it is still necessary for the journalist to re-edit even the rewritten text by artificial intelligence into written speech that is natural and well understood by the readers.

1.2 TTS in Journalism

The use of text-to-speech technology in contemporary journalism, on the other hand, is most often outward – that is, not inside the editorial office as part of the content preparation processes, but towards the audience. It further supports a long-rising trend in modern online journalism – the personalisation of content. It allows users to receive content in the form they prefer. However, again, there are risks associated with technology.

Thus, many online media outlets are also adding a feature to articles that converts text to audio and essentially reads the article to the recipient. This voice is synthetic and is created by artificial intelligence. We also call it neural. It improves accessibility to information especially for individuals with reading difficulties (Parr, 2012). Users also develop a deeper relationship with the medium itself and get a better user experience due to a voice that is comfortable to them (Madhusudhana Reddy et al., 2023). Moreover, personalization of content is not only in the choice of audio form, but also in the customization of language on foreign language sites, for example (Kumar et al., 2024). This is particularly useful for media platforms that want to extend their reach by offering multilingual content or by customizing voices to align with their brand identity. In addition, integrating neural voice technology into media workflows is no longer challenging today. AI tools can be easily integrated into existing publishing systems. These are, for example, Murf, PlayHT, WellSaid or Labs (Shafer, 2024). Some platforms such as Narakeet and Typecast even offer features that customize voice style for a specific type of content or emotional tone, increasing user engagement (Shafer, 2024).

Like STT, TTS technology is not perfect. For example, it faces several technical challenges, such as accuracy issues in accenting the right words or the melody of speech in relation to the context of the text (Madhusudhana Reddy et al., 2023). The neural voice can also come across as emotionally inappropriate in some cases, meaning that the emotion in the voice does not match the emotion of the text (Heiselberg et al., 2022). In addition to the technical challenges, technology also fits with establishing credibility with the audience. The general distrust some recipients have of new technologies may also engender distrust of the neural voice and, therefore, of the content of the text or medium itself (Heiselberg et al., 2022).

Despite these limitations, the potential for neural voice technology to improve and its accessibility continues to increase, suggesting a promising future for its application in a variety of fields. Examples, particularly from foreign media outlets that have been implementing the technology for a long time, serve as evidence. It is not yet widespread in Slovakia, but in the following chapter we provide a domestic example.

2 Methods

The aim of the study is to find out which of the most widely read online media websites abroad and in Slovakia offer the possibility of reading articles using artificial intelligence, specifically using neural voices that can read the text directly on the page, or whether they offer another form of audio processing of articles, such as through applications or external tools.

When selecting sites, we will focus on a list of the most visited news outlets, sticking to rankings of total monthly traffic. These lists, with the most up-to-date data available, give us a picture of which sites have the greatest reach and influence and will therefore be suitable for our analysis. From the Press Gazette rankings, we focus on the top 20 most visited English-language websites for September 2024. The list includes media outlets such as the BBC, CNN, *The New York Times*, and others. In addition, for Slovak media, we will use data from the IAB Monitor for October 2024, which provides information on traffic to Slovak websites, focusing on the media that are at the top of this ranking, i.e. the first 20. Thus, we use the method of quantitative content analysis to meet the objective of the study. This focuses on the question “how much?”. They are based on measurements, detecting the frequency of occurrence of a certain phenomenon (Trampota & Vojtěchovská, 2010). For example, we can determine how much news a particular newspaper published in a certain time period or how often certain media genres are used. A major advantage of quantitatively focused research is that its results are statistically tested, measurable, and therefore usually accurate. Thus, they are difficult to question if we follow the correct procedures and ethical principles in obtaining them (Mináriková et al., 2023).

We look at individual websites and tabulate the information we find, separately for foreign and Slovak media. In each table, we record whether the site offers the possibility of reading articles in a neural voice directly on the page (marked as “Yes”), or if this option does not exist, we look for alternatives, such as apps that may offer this feature (marked as “Partially”). If the site does not offer any form of AI voice reading, it is marked as “No”. In this way, we ensure accurate and systematic data collection on the use of AI technologies on news sites.

3 Results

The first table highlights the availability of AI tools for reading articles aloud on the websites of the 20 most visited international media outlets. Among the foreign outlets analyzed, BBC stands out by offering text-to-speech (TTS) functionality directly on its website for certain articles, in addition to providing more robust services through the BBC Sounds app. CNN, *The New York Times*, and *The Guardian*, on the other hand, do not offer this feature directly on their websites but provide it through specialized apps such as CNN Audio, NYT Audio, and others. Notably, many major outlets, such as MSN, Fox News, *Daily Mail*, and *Forbes*, do not offer any form of AI-based voice reading of articles either on their websites or through external apps.

Table 1: Availability of AI tools for reading articles in foreign online media

	The medium	AI voice reading articles on the web	Availability and method of use
1.	bbc.co.uk / bbc.com	Yes	Mainly via the BBC Sounds app, some TTS features available on the web.
2.	msn.com	No	-
3.	cnn.com	Partially	Through the CNN Audio app, not directly in articles on the web.
4.	nytimes.com	Partially	Through the NYT Audio app, not directly on the web.

5.	news.google.com	No	-
6.	theguardian.com	Yes	Directly on the web for selected articles.
7.	foxnews.com	No	-
8.	dailymail.co.uk	No	-
9.	news18.com	No	-
10.	finance.yahoo.com	No	-
11.	news.yahoo.com	No	-
12.	people.com	No	-
13.	usatoday.com	No	-
14.	forbes.com	No	-
15.	indiatimes.com	No	-
16.	nypost.com	No	-
17.	india.com	No	-
18.	hindustantimes.com	No	-
19.	washingtonpost.com	Yes	Directly on the web in some articles.
20.	newsweek.com	No	-

Source: Press Gazete (2024), own processing, 2024

The second table examines the availability of AI tools for reading articles aloud on Slovak media websites. The results are quite different from the foreign media analysis. Among the top 20 Slovak outlets analyzed, only *Denník N* provides a feature that allows users to listen to articles in AI-generated voice directly on the website. Additionally, this functionality is supported in a dedicated audio player in the Denník N app, further enhancing its accessibility for mobile users. However, the remaining Slovak media websites, including prominent ones like Aktuality.sk, Sme.sk, Pravda.sk, and others, do not offer any AI-powered voice reading options on their websites or through external applications.

Table 2: Availability of AI tools for reading articles in Slovak foreign online media

	The medium	AI voice reading articles on the web	Availability and method of use
1.	aktuality.sk	No	-
2.	pluska.sk	No	-
3.	sme.sk	No	-
4.	topky.sk	No	-
5.	pravda.sk	No	-
6.	cas.sk	No	-
7.	hnonline.sk	No	-
8.	dennikn.sk	Yes	Directly on the web with the possibility of playing in a separate player in the Denník N app.
9.	interez.sk	No	-
10.	markiza.sk	No	-
11.	tvnoviny.sk	No	-
12.	startitup.sk	No	-
13.	sita.sk	No	-
14.	dobrenoviny.sk	No	-
15.	refresher.sk	No	-
16.	noviny.sk	No	-
17.	ta3.com	No	-
18.	rtvs.sk	No	-
19.	standard.sk	No	-
20.	expres.sk	No	-

Source: IAB monitor (2024), own processing, 2024

The quantitative results obtained in the case of foreign websites do not provide information about the overall situation of the media market in the world, as we cannot speak of a representative sample. It is rather an overview for understanding the tendencies of development and trends in this area or a stimulus for further research.

In the case of Slovak websites, the sample is already more representative, as basically all the largest serious, tabloid and lifestyle local online media are included. Especially in the case of foreign media, however, it is important to talk about the results in a broader context, which we address in the Discussion section.

4 Discussion

It might seem that the implementation of text-to-speech (TTS) technology for reading articles in foreign media is still in its infancy, as only 25% of our sample use this technology. However, it is also important to take into account the specificities of individual websites. Media outlets such as FOX news or CNN are primarily television stations that mostly publish video material in their web versions in addition to texts, and thus AI voice reading may not be as useful. The ranking also includes two sites from Yahoo, so it is likely that if the technology is not present on one, it will not be on the other. In addition, it also includes news.google, which only aggregates news from other sites and doesn't actually create its own content. So we can rather talk about a gradual implementation depending on the nature of the site. In addition, it should be said that the technology is also used by other sites that are not included in the ranking.

The Japan Times, in collaboration with the BeyondWords platform, offers automated audio versions of articles that are popular with, for example, English language learners. An example from South America is the Brazilian daily *Folha de São Paulo* it is one of the pioneers of the use of this technology in the media, as it implemented it back in 2015 to increase accessibility for visually impaired readers (Santos, 2024).

Reading articles by AI voice is therefore far from being a feature that would be commonplace on all websites. However, they are gradually implementing it as media outlets adapt to their audiences. Although only one-fifth of all online media outlets surveyed use it to some extent, these are world-renowned outlets that often set trends for others. For example, the BBC, CNN, *The New York Times*, *The Guardian* or *The Washington Post*. In contrast, the largest Slovak media have not yet started to implement the technology. So far, only one media outlet has done so.

Denník N was the first Slovak media outlet to integrate voice synthesis technology, which allows readers to listen to articles by automatically reading the texts. This feature is already available directly below the articles in the mobile app. When you turn on the audio version of an article, the app's visuals change to be similar to other audio apps, such as Spotify. The mobile phone can be locked while listening, while the audio continues to play. This provides the user with a very similar experience to listening to podcasts. In this interface, he can even arrow right or left to play the very next text in the audio version without having to return to the home page of the diary. Below the player, he can also see a list of articles that are next in the playlist. *Denník N* uses Microsoft's Azure technology, which is continually improving to provide more realistic and natural sounds. Until recently, similar systems were mainly used in automated screen readers to help people with visual impairments (Vinc, 2023). *Denník N* neural voice is more pleasant to listen to, although it occasionally makes mistakes, especially with English or other foreign language titles. In fact, it is more difficult to train artificial intelligence in Slovak than in English. Marián Šimko of the Kempelen Institute for Intelligent Technologies explains that the reason for this is that few people speak Slovak and there are therefore fewer resources for learning Slovak than for the dominant languages. It was necessary to collect texts, train the model and then fine-tune it so that it could be used for other

tasks. Then they put the models on public display so that people could use them. Since then, according to Šimek, so-called multilingual models have come to the fore, which are now able to mimic cross-lingual learning on their own (Vitková, 2023).

The newspaper plans ongoing voice improvements and is accepting suggestions from readers. The feature launched in April 2023 as a trial on several articles. Neural voice is now deployed in almost all articles, even those with graphs or tables. Neural Voice also already reads short news stories in a daily news app called Minute by Minute (Denník N, 2023) It is not known that the technology is already working on other Slovak websites or media. Although, given the foreign trend, it can be assumed that the media will gradually implement it.

5 Conclusion

Speech-to-text (STT) and text-to-speech (TTS) technologies are revolutionizing communication and accessibility. STT facilitates transcription and archiving, making it indispensable in fields like journalism and education. Tools like Otter.ai and Descript save time while maintaining transcription accuracy, but limitations remain with spontaneous speech and ambiguous audio inputs, necessitating human oversight. We see their use in specific media and impact on the final content as an important area for further research.

TTS enhances access for visually impaired and reading-challenged individuals by converting written text into audio. Its applications in online journalism demonstrate the demand for personalized content. Platforms like Microsoft Azure and Murf produce realistic audio outputs, but challenges such as emotional mismatches in synthetic voices persist.

Big media like BBC and *The New York Times* have already successfully implemented these technologies to improve engagement and operational efficiency. In Slovakia, *Denník N* leads the way by offering audio articles via neural voice synthesis, setting a strong example for future adoption.

The application of these technologies in journalism offers significant benefits, including streamlined workflows, improved content accessibility and greater audience engagement through personalised delivery formats. However, they also bring challenges, such as occasional inaccuracies in transcription, emotional inconsistencies in synthetic speech, and ethical concerns about AI-generated content. Balancing these opportunities and risks will be critical to the effective use of STT and TTS technologies in media environments. Thus, it can be assumed that the world's major media outlets that have begun to apply tools such as AI voice will create and improve procedures and principles for their use, similar to the way *Denník N*, the only one in Slovakia so far, has been inspired.

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THE FUTURE OF CRYPTOCURRENCY MARKETING COMMUNICATION IN B2C MARKETS

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Abstract:

Although the history of cryptocurrencies is very short, these digital assets have revolutionised many areas, including marketing communications. Cryptocurrencies are also proving to have a significant impact on innovations in marketing communications. Companies that enable cryptocurrency payments are becoming a symbol of progress and innovation. Despite the relatively short period of use, there are now a large number of cryptocurrencies that differ in their utility, size of market capitalisation or the existence of their own network or platforms. What they have in common is that the possibility of using them to trade goods and services has a significant impact on the image of companies, predominantly among technologically oriented customers. The paper discusses the development and latest knowledge about cryptocurrencies as well as emerging trends in the context of marketing communication in the crypto market. The use of cryptocurrencies is an ever-expanding trend and its forecasts in conjunction with modern marketing communications for the future are very optimistic.

Key words:

Bitcoin. Blockchain. Consumer Behaviour. Cryptocurrencies. Digital Market. Marketing Communication.

1 Marketing Communication and Cryptocurrencies

Recent studies and trends suggest that marketing strategies for cryptocurrencies are evolving rapidly, leveraging new technologies such as artificial intelligence and blockchain to increase engagement and acceptance. They highlight several key aspects of cryptocurrency marketing communications penetration and acceptance. They are important to understanding how cryptocurrencies are promoted and accepted on a global level. The future of cryptocurrency marketing communications will be influenced by factors such as: personalisation through the use of artificial intelligence and “Big Data” analytics, an emphasis on educational campaigns, influencer marketing, a move towards community marketing or the use of virtual reality for interactive campaigns.

In the world of the digital economy and investment, new types of virtual currencies, which we call cryptocurrencies, have recently caused a breakthrough. A cryptocurrency is characterised as a decentralised digital currency that uses cryptography technology to secure and operate. Cryptography is the science of protecting information through encryption. Its goal is to secure and protect data by transforming unencrypted data into encrypted form and in turn decrypting the data again into its original form (Andress, 2014). The indisputable advantages of using cryptocurrencies include the ability to operate independently of third parties and intermediaries such as banks, payment processors, or other central authorities.

Cryptocurrency payments are peer-to-peer (P2P) transactions and take place directly between individuals who have access to their cryptocurrency through unique cryptocurrency wallets or crypto exchanges. Thanks to technological advances and the Internet, the entire transaction is managed by a decentralized settlement system based on distributed ledgers. Distributed Ledger Technology is a technology that allows transactions and data to be recorded, shared and synchronized across a distributed network (Natarajan et al., 2017; Sunyaev, 2020). In the case of centralized systems, the general ledger tracking all transactions is maintained by a single trusted central party, which is most often a bank. In contrast, in a distributed system,

multiple copies of the central ledger are maintained within the financial system network by a large number of private entities (nodes). These entities also perform a control function in the system. In this way, the distributed network and individual transactions are authenticated using modern technology and cryptography (He et al., 2016).

The basis for the operation of transactions is blockchain technology, which was first theoretically described in the last century (Haber & Stornetta, 1991). Blockchain is a mechanism that uses specific mathematical algorithms to create and verify an ever-growing data structure in the form of a chain of “transaction blocks” that functions like a distributed ledger. Once a piece of data is added to this structure, it cannot be removed from it (Natarajan et al., 2017; Maleh et al., 2020). To perform any transaction in the blockchain, two keys are required: private and public. In a typical transaction, the sender initiates the transfer by creating a digital signature using his private key. The transaction is then sent to the network, where nodes verify it by verifying the digital signature and making sure that the sender has sufficient funds. After this verification, the transaction is added to a new block, which is then added to the existing blockchain. In the case of a crypto exchange, the latter owns the private keys that allow users to access the funds.

Although the cryptocurrency market is relatively young, it has already branched out considerably – mainly due to internet capabilities and technological advances. The conditions for the legalisation and use of cryptocurrencies are varied, and a wide discussion of both their advantages and disadvantages can be found in the literature (e.g. Baur et al., 2018; Stroukal & Skalicky, 2021; Tairov & Stefanova, 2024; Makarov & Schoar, 2020; Kriptomat, n.d.a).

Table 1: Perceptions of benefits and trade-offs of cryptocurrencies in the B2C market

Positive aspects of the image of cryptocurrencies in the B2C market	Decentralisation and greater autonomy	Distrust	Negative aspects of the image of cryptocurrencies in the B2C market
	Borderless use of currency	High cost of developing and maintaining blockchain applications	
	Transparency and immutability	Energy-intensive cryptocurrency mining	
	Higher transaction speed	Possible loss of cryptographic key	
	Minimal transaction costs	Anonymity of users	
	Programmability and diversity	Lack of trust	
	Limited supply (scarcity)	High volatility	
	User anonymity/pseudonymity	Regulatory uncertainty and taxes	

Source: own processing, 2024

Nowadays, there are more than ten thousand types of different cryptocurrencies. They differ in their usefulness and characteristics, the size of their market capitalization, or the existence of their own network or platforms. Their basic classification depends on their origin, use or technology. Bitcoin, altcoins and tokens or stablecoins are the basic division.

Bitcoin is the first and most famous cryptocurrency to date. It was created in 2009 by an individual or group with the pseudonym Satoshi Nakamoto (Nakamoto, 2008). A year later, Bitcoin became a medium of exchange and 2 pizzas were purchased with it. In 2010, it first began trading on the exchange at a price of \$0.0008, later at one cent. In 2011, it reached \$32 and since then its price started to increase very rapidly. Since then, thousands of cryptocurrencies have emerged, each with unique characteristics and purposes. Bitcoin, however, has the highest market capitalisation to date, and its market share is currently around 55%. It represents a new world of possibilities and advantages over older currencies and financial systems. However, it has also created a lot of confusion. It does not represent a stake in a company like shares, it is not issued by a government, and it is not backed by a physical asset like gold or oil. Despite this, its price and market capitalisation have been steadily increasing, as we can see in Figure 1. Bitcoin is currently worth more than 80,000€ and this value is certain to grow in the future.

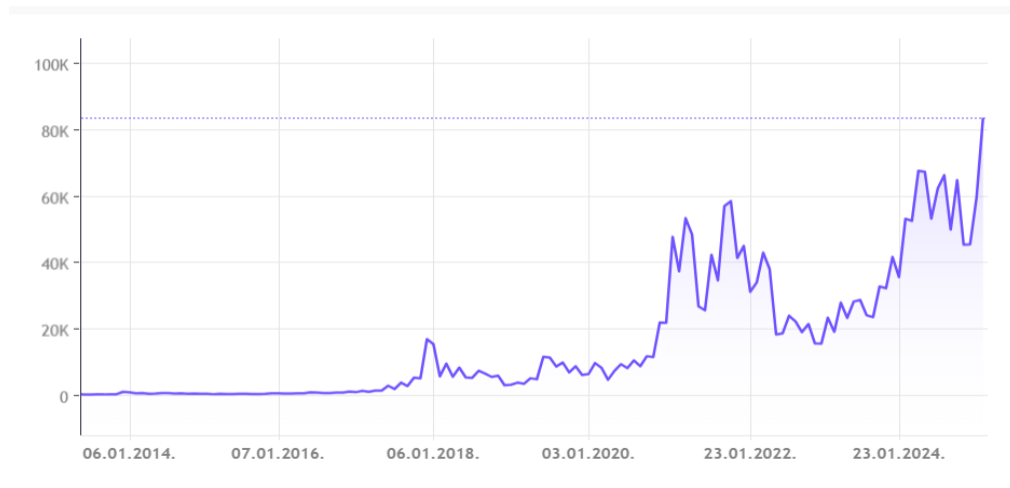


Figure 1: Bitcoin price evolution over time
Source: Kriptomat (n.d.b)

The term “altcoin” is derived from the phrase alternative cryptocurrency and is used for all other cryptocurrencies with their own blockchain. Most of these cryptocurrencies have been created by using the open source code of Bitcoin, e.g. Namecoin, Litecoin, Dogecoin and Bitcoin cash. Some altcoins have their own source code that supports their own blockchain and often offer more interesting features and new functionalities, e.g. Ripple or Ethereum (Aziz, 2018). It is Ethereum (ether) that is the second most widely used cryptocurrency. Vitalik Buterin (2015) is behind its creation, pointing out the possibilities of using blockchain technology in areas other than cryptocurrencies, e.g. supply chain, logistics or non-financial applications (Gorkhali et al., 2020). Tokens (tokens) differ from altcoins in that they are built on the basis of a different blockchain. They represent any asset that is fungible and tradable. Creating a token is a much simpler process unlike altcoins through smart contracts (Aziz, 2018). Stablecoin is a cryptocurrency that aims to minimize volatility by tying it to a more stable asset. It usually tracks popular fiat currencies such as the US dollar, euro, or British pound. Its advantages include the ability to take advantage of blockchain technology, while this asset is not subject to high volatility.

The potential uses of cryptocurrencies depend to a large extent on the type of cryptocurrency. However, we can say with certainty that most of their holders pursue these goals:

- investing with the aim of high profitability in the future period,
- acquisition for the purpose of future purchase of goods and services.

Currently, the digital market is dominated by cryptocurrency owners who hold cryptocurrencies in their hardware wallets with the aim of producing profits in the long term. The purchase of cryptocurrencies with subsequent purchases represents a much smaller part of transactions, but nevertheless, nowadays cryptocurrency payment is already accepted not only in online trading but also in some brick-and-mortar stores. Virtually anything can be bought with cryptocurrency, from electronics, clothes, food to holidays and cruises or flights (Vadkertiová et al., 2023; Štefko et al., 2016; Gburová & Bačík, 2019).

The level of humanity’s use of technology has been increasing rapidly over the last decade, while interest in digital assets has increased due to the impact of the pandemic period. Nevertheless, the adoption of these technologies by consumers is slightly slowing down. There are still many unanswered questions and some gaps in the literature on new technologies such as cryptocurrencies. However, there is a growing interest in exploring what impression the possibility of paying with cryptocurrencies in retail can give to consumers.

Authors examining consumers' perceptions and use of cryptocurrencies point to the fact that firms accepting cryptocurrency payments are perceived as innovative, modern and future-oriented (Murugappan et al., 2023). A study by Özcan & Alazzawi (2024) also points to findings that

brand image influences the intention to use cryptocurrencies and transactions using blockchain technology. Also, the strongest relationship is between consumer attitude and brand image and these findings indicate the importance of brand image in influencing consumer attitude and their intention to use cryptocurrencies as a payment method. (Özcan & Alazzawi, 2024, p. 99)

A study by Temizkan et al. (2022) addressing this topic found that consumers and retailers prefer cryptocurrencies because they are a fast, secure, and inexpensive global payment instrument. On the other hand, barriers to cryptocurrency payments have also been identified: unfamiliarity with cryptocurrencies, low use of technology or lack of trust in the system. The cryptocurrency payment mechanism represents an innovation which may provoke negative reactions from consumers. A study by Sangari & Mashatan (2024) identified barriers to cryptocurrency payment and consumer rejection: the volatility of the cryptocurrency ecosystem and the lack of structural safeguards.

2 Methodology

The identification of preferred forms of payment is closely related to the marketing communication of products and services and the management of companies' communication content. Together, they form an increasingly complex system, with compatible linkages being crucial to the design of future marketing communication strategies. The aim of the present pilot study was to determine the level of knowledge of cryptocurrencies and, in particular, the attitudes of end consumers towards cryptocurrencies as payment alternatives to traditional forms of payment. Data was collected through a questionnaire survey conducted in the fall of 2024 (October 2024) to achieve the proposed objectives. A structured questionnaire was designed and distributed, which was answered by 159 respondents. The target population of this study was Generation Z, which in our case consisted of young people aged 18-23 years, of which 25.8% were male and almost three quarters, 74.2% to be precise, were female. In the coming period, research will be conducted among other generations. Based on the fact that buying goods and services is part of consumer behaviour, the whole population was included in the research. The research purpose was explained to the respondents and the questionnaire was then filled in individually. The respondents were mainly from western and northern Slovakia (Trnava, Bratislava, Nitra, Trenčín and Žilina regions) with regard to their age. The administration of the answers was carried out via the Google web application for collecting answers. Closed questions and verbal rating scales were used. A total of eight questions were asked to determine the respondents' awareness and preferences for the use of cryptocurrencies in their purchasing behaviour. The last question was a scaled question and aimed to find out the respondents' associations to companies accepting cryptocurrencies.

3 Results and Discussion

The subject of the conducted survey was to determine the basic awareness of cryptocurrencies in terms of frequency. We found that the majority of respondents (61%) are only minimally familiar with cryptocurrencies (i.e. one to three cryptocurrencies). Up to a quarter of respondents do not even know any. We observed some gender differences in the responses: women have less knowledge about the differentiation of cryptocurrencies, up to 31%

of women do not know any cryptocurrencies, and one to three cryptocurrencies are known by the majority of women, i.e. 66%. Men’s responses were dominated by knowledge of one to three cryptocurrencies, with 44% of respondents and up to 32% of respondents saying they knew more than 4 cryptocurrencies. Only 5% of respondents know more than 10 cryptocurrencies. In terms of ownership, we found that only 8.2% of respondents from the surveyed generation are owners of a cryptocurrency, with a significant male preponderance (9 out of 13 owners are male).

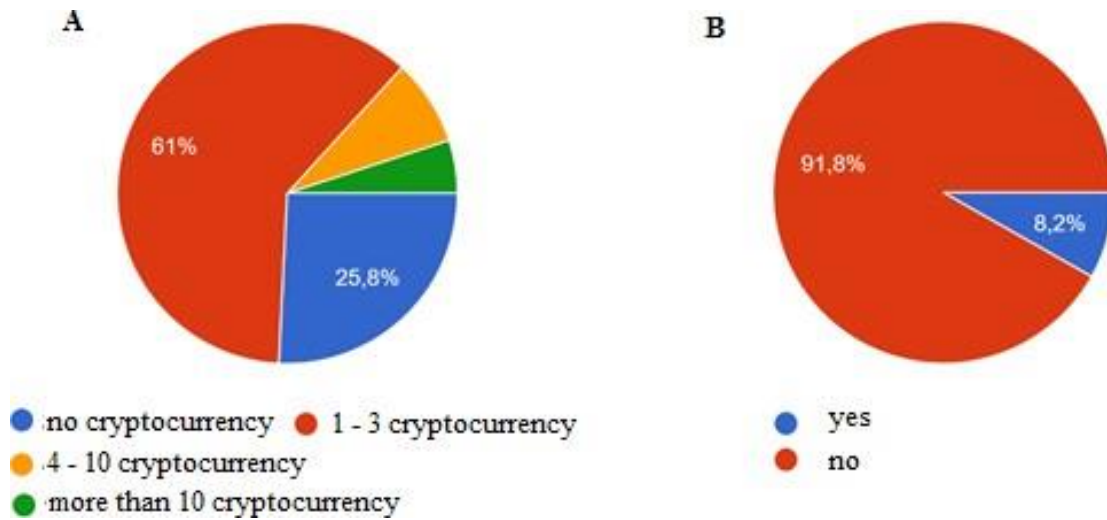


Figure 2: Knowledge of a number of cryptocurrencies (A) and personal ownership of cryptocurrencies (B)
Source: own processing, 2024

The next part of the survey was to find out the respondents’ awareness of the possibility of paying with cryptocurrencies for goods and services in A) online and B) brick-and-mortar stores. The majority of students (68.6%) responded positively to the question about awareness of the possibility to pay with cryptocurrencies in online stores. The rest were unaware of this possibility. Awareness of the possibility to pay with cryptocurrencies for goods and services in brick-and-mortar stores is significantly lower, with only 42% of respondents knowing about it. Surprisingly, men dominate in the knowledge of the possibility to pay with cryptocurrency in brick-and-mortar stores with 54%.

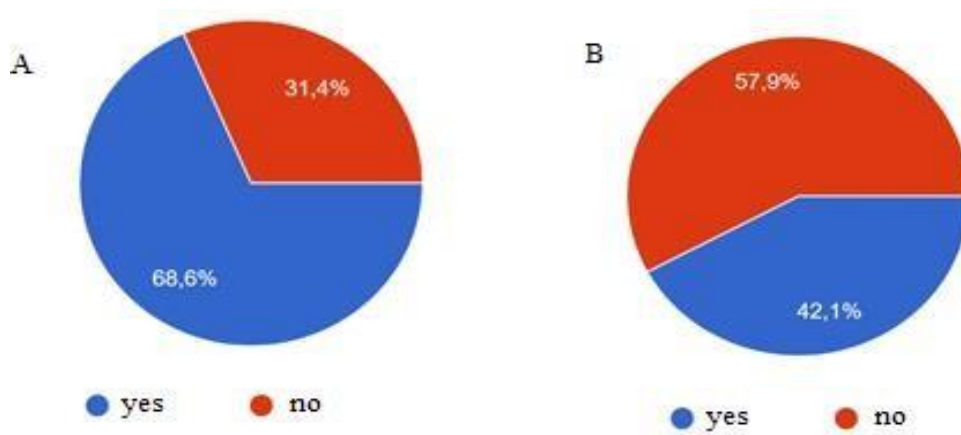


Figure 3: Awareness of cryptocurrency payment options in online stores (A) and (B) physical stores
Source: own processing, 2024

In the survey, we focused on exploring whether respondents actively seek out companies that accept cryptocurrencies. It turns out that the vast majority of them (almost 92%) are not being sought out. Only 12% of respondents find this to be a sought-after circumstance. Only one respondent out of all those surveyed indicated that they actively seek out such companies.

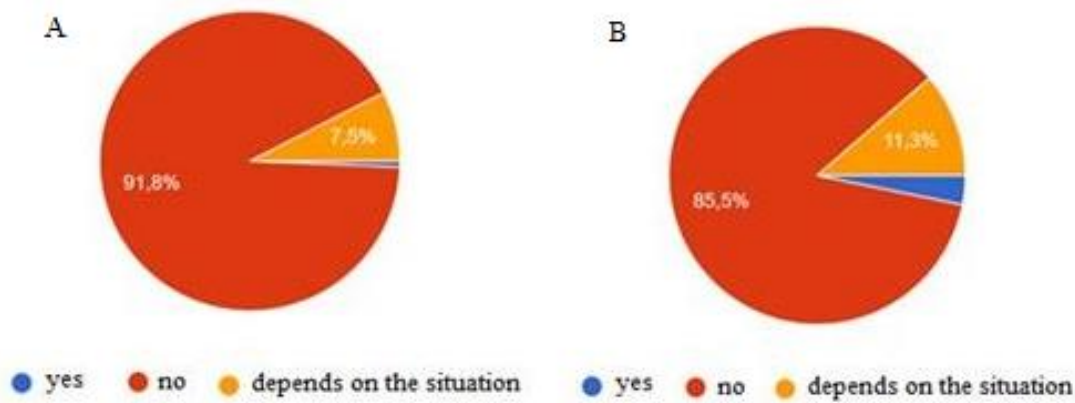


Figure 4: Active search for companies with cryptocurrency payment options (A) and their preference (B) in the B2C market
 Source: own processing, 2024

The situation was similar when we surveyed the preferences of those companies that also have cryptocurrency payments in their portfolio of payment options. As many as 85.5% do not prefer these companies, 11% prefer them according to the situation and 5 respondents said that they prefer those companies that allow cryptocurrency payment for goods or services.

The aim of the survey was also to determine the perception of the image of companies by consumers who actively use cryptocurrencies as a modern form of payment. Scaling was used to differentiate the importance they attach to different attributes of corporate image. A five-level scaling was used to distinguish preferences. The following attributes were identified as relevant to our research context: trust, speculativeness, attractiveness, payment security, innovativeness, quality, customer trust, professionalism, practicality, originality, exclusivity, reputation and flexibility.

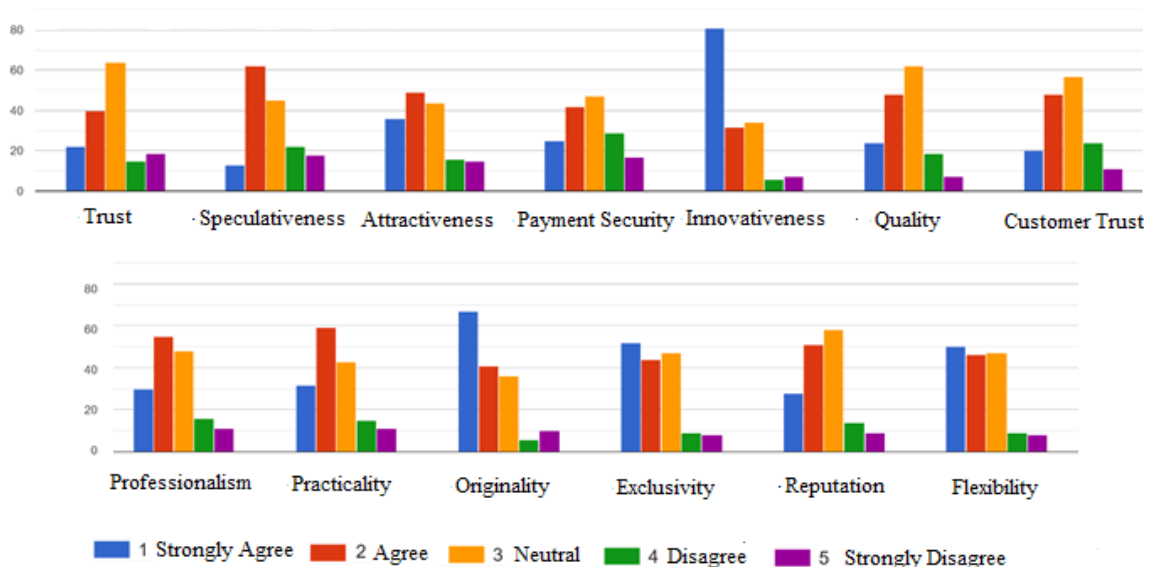


Figure 5: Attributes of the perceived image of companies that accept cryptocurrency payment
 Source: own processing, 2024

Most respondents rate these companies as innovative and original (majority of responses agree). In second place, they attribute characteristics such as speculativeness, attractiveness and interestingness. They also perceive them as quite practical, and they also perceive them as professionals. The highest number of indifferent responses (answer “don’t know”) was recorded for attributes such as customer trust, reliability, reputation and quality. Disagreeing responses did not dominate any of the attributes surveyed, but 12% of respondents completely disagreed that firms accepting cryptocurrencies would be trustworthy and reliable.

4 Conclusion

Innovative marketing communication uses modern technology to bring enticing information content to every generation, including Generation Z. In our article, we discussed the context of cryptocurrencies as a new phenomenon that not only signifies the transition from classic fiat currencies to a digital form of money. At the same time, it also represents an innovative concept for a new way of investing and paying for goods and services.

The survey was oriented towards finding out about the awareness of cryptocurrencies in the B2C market, specifically on issues related to the actual use of cryptocurrencies. In a broader context, attributes related to the image of these organizations from the perspective of the young generation of consumers were investigated. An essential finding that emerged from the conducted research is the fact that the majority of Generation Z in our context has some basic knowledge about cryptocurrencies and is partially familiar with the payment options when shopping. Despite the fact that only 8.2% of respondents own cryptocurrencies, up to about 67% of them know about the possibility of paying with cryptocurrencies in online shops. However, it is interesting to note that less than half of the respondents (42.1%) are aware of the possibility to pay with cryptocurrencies in brick-and-mortar stores. With high probability, it can be assumed interest in cryptocurrencies has come to the fore over time, similar to what has also been seen globally. We assume that the current sentiment, where respondents expressed that they do not explicitly prefer companies accepting cryptocurrencies, will take shape in the future and the use of cryptocurrencies in payments will grow in our conditions. We also anticipate that companies will take the path of cryptocurrency acceptance. This form of payment is shaping the image and perception of companies in a certain way. In the B2C market, in our conditions, these companies are perceived as innovative, original or exclusive.

Opinions about the world of cryptocurrencies and the companies that use them are an important indicator for proper marketing communication not only in the current period, but also in the future, when a higher acceptance of cryptocurrencies is expected not only by institutions but also by individuals.

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AI-DRIVEN INNOVATION IN AUDIO POST-PRODUCTION

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Abstract:

This article examines the innovative tools used in audio post-production, focusing on Adobe Premiere Pro and third-party extensions enriched by advanced artificial intelligence technologies. It provides a historical overview of the evolution of audio post-production techniques and assesses the current applications of AI in streamlining workflows and enhancing audio output quality. Key AI-driven features, such as automatic audio editing, content analysis, and enhancement algorithms, are explored in detail, emphasizing their transformative impact on efficiency and creative possibilities. By combining theoretical analysis with hands-on testing, the study evaluates the practical implications of these advancements for professionals and amateur content creators alike. Special attention is given to the democratizing effect of AI, which has made professional-grade tools accessible to a wider audience, bridging the gap between expertise and entry-level users. The article highlights how these innovations are not only redefining industry standards but also reshaping creative practices, demonstrating the potential of AI technologies to revolutionize the future of audio post-production.

Key words:

Adobe. Artificial Intelligence. Audio Enhancement. Intelligent Editing. Sound Post-production. Sound Production.

1 Introduction

The history of sound post-production is closely linked to the development of sound recording and playback technologies, which began in the early 20th century. Initially, sound post-production was an elementary process that was largely manual and very labour-intensive. Its origins can be traced back to the advent of sound-on-film technology, such as the Vitaphone system introduced by Warner Bros. in 1926, which synchronized phonographic recordings with film, marking a significant advance in the synchronization of audio and visual elements (Cook, 2008). In the early days, sound production was often created live during recording sessions, with Foley artists handcrafting sounds using a variety of props and techniques. The term “Foley” itself was coined after Jack Foley, a pioneer in the field of sound effects who developed many of the techniques still in use today (Rose, 2015). Dialogue recording and editing were similarly manual processes that involved physically splicing together audio tape to make necessary edits and corrections. The transition to magnetic tapes in the 1940s and 50s. In the 1940s and 1960s, the use of tape tapes revolutionized audio post-production and allowed for more sophisticated editing techniques. Magnetic tape offered better sound quality and greater flexibility in editing, allowing sound editors to cut and splice tapes with greater precision (Murch, 2001). This period also saw the development of multitrack recording, which allowed for the separate recording of different sound elements such as dialogue, music and sound effects, facilitating more complex and multi-layered soundstages (Schmidt Horning, 2015).

The advent of digital technology at the end of the 20th century marked a paradigm shift in audio post-production. The introduction of digital audio workstations (DAWs) such as Avid’s Pro Tools in the 1990s and later Adobe Audition in the early 21st century revolutionised the field by providing unprecedented flexibility and precision in editing. Digital technology enabled non-linear editing, which allowed audio editors to instantly access and manipulate any part of the audio timeline, greatly speeding up the editing process and expanding creative possibilities (Corey, 2016). In addition, digital effects and plug-ins have expanded the range of sound manipulation techniques available to sound editors. These tools allow for sophisticated

sound design, including advanced reverberation, equalization, and dynamic processing that was previously difficult or impossible to achieve with analog equipment. The digitization of audio post-production has also made it easier to integrate audio editing with other post-production processes such as video editing and visual effects, allowing for more fluid and coherent workflows (Huber et al., 2024). One tool that combines elements of audio and visual post-production is Adobe Premiere Pro.

The latest version of Adobe Premiere Pro, Adobe Premiere Pro 24.6, brings several enhancements that significantly improve the editing workflow, especially for audio post-production. This version includes the integration of a free audio archive, allowing editors to access different audio tracks directly within the application, streamlining the audio editing process along with the recently implemented Remix Tool. In addition, the update improves keyframe automation, facilitating smoother transitions and more dynamic video content. Additionally, the update improves collaborative editing, allowing for smoother project management and integration with other Adobe applications, which is especially beneficial for larger teams. The introduction of interactive blend handles, which premiered in May, adds a new level of precision to audio editing. These handles allow editors to apply and edit fades more intuitively and efficiently, further improving the audio editing workflow. The combination of new tools using deep learning techniques in the Adobe Premiere Pro interface makes it ideal for post-processing podcasts that are no longer just an audio format (Tomkies, 2024). Over the past years, podcasts have evolved significantly and have gone from purely audio forms to forms with video content, thus becoming vodcasts. This term means “video-on-demand-cast”, simply put, a podcast with video. Often this term is also confused with terms such as video podcast, videocast or vidcast (Breitman, 2024).

This development has been driven by a growing demand for more engaging and dynamic content. Vodcasts allow viewers to not only hear their favourite presenters and guests, but also see them, adding a visual dimension that enhances the viewer experience. This shift has brought vodcasts closer to the realm of traditional TV talk shows, where the visual aspect plays a key role in engaging the audience. By incorporating multiple camera angles, on-screen graphics and dynamic editing, podcasts produced in this way offer a professional experience on par with conventional television programmes. As a result, content creators are increasingly adopting tools and techniques from the television industry to produce high-quality products, blurring the boundaries between these media.

2 Methodology

The aim of this study is to investigate the current state of the art in the development of user tools for audio post-production, including the use of artificial intelligence. In order to anchor the issue, reference is made to the development of audio editing in the introduction of this study. It then moves logically to specific tools from Adobe and specifies the merits of the selected software. We focus on an application from the Creative Cloud suite, specifically Adobe Premiere Pro and its extensions from external developers.

As artificial intelligence became more accessible to mainstream users, its integration into Adobe’s programs was inevitable. Although there is extensive research into new uses of AI and related tools, many of these are absent from practical testing, particularly in the audio industry. The use of audio post-production software is democratising the role of the producer, moving from professionals to ordinary users and expanding the scope and use of these tools. This paper aims to bridge this gap by providing a theoretical overview of the current state of AI in specific applications and rigorously testing selected features. Our study offers up-to-date insights and practical examples of the use of AI in the podcast sector, addressing what is useful and what is not.

In this study, we have used several scientific methods to achieve the stated objectives. In the theoretical part, we worked with available book and internet sources and used induction and deduction to classify the application and the different functions of AI. The study also includes direct testing of the selected features and evaluation of their functionality for current practice. As part of the testing, we will discuss the advantages as well as the limitations of the technology. We have complemented this part of the research with examples of how each feature works with links to artificial intelligence. The applications under investigation are Adobe applications, namely Adobe Premiere Pro and its extensions from external developers, which are used in the field of audio post-production and have integrated functions linked to artificial intelligence.¹

3 Results

The evolution of Adobe Premiere Pro continues to blur the lines between video and audio editing, turning it into a more comprehensive tool for content creators. Traditionally known for its robust video editing capabilities, Premiere Pro now includes advanced audio editing features that were previously exclusive to Adobe Audition. This shift is due to the integration of new AI-based tools that increase the accuracy and efficiency of audio post-production, making it an increasingly viable option for podcast producers. In this chapter, we will test the latest tools that use artificial intelligence and machine learning to make podcast postproduction more efficient, and explore how these innovations contribute to more efficient and intuitive workflows. One of the most notable recent updates in this regard is the introduction of AI-based audio category labeling within the Essential Sound dashboard.

In October 2023, AI-based tagging of audio categories in the Essential Sound panel in Adobe Premiere Pro was introduced for the first time, allowing the software to automatically identify audio clips based on their content (dialogue, music, motion or sound effect) (Adobe, 2024). In this regard, Adobe is using its proprietary Sensei AI model to speed up workflows. A new feature is the presence of a new interactive Essential Sound control on each audio track, which allows you to visually identify its type. Clicking on the badge takes us directly to the Essential Sound panel, so we can make basic adjustments relatively quickly. The necessary tedious searching and memorizing of specific effect adjustments in a comprehensive list is thus no longer necessary. Other usability enhancements include, for example, automatic resizing of waveforms (graphical representation of audio tracks) when adjusting the pitch of a track on the edit timeline. This new panel thus groups together all the latest implementations of deep learning and AI-enabled tools.

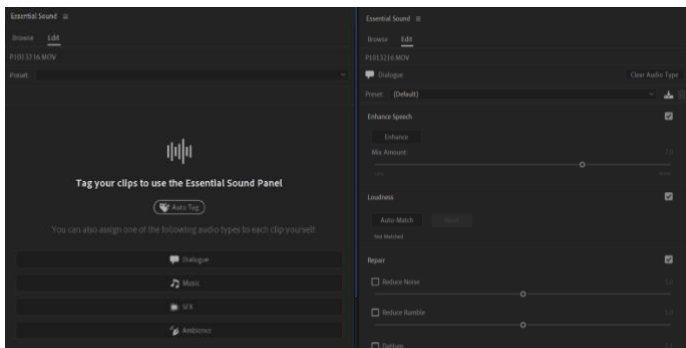


Figure 2: New Essential Sound panel with automatic audio track tagging
Source: own processing, 2024

¹ Authors' note: Artificial intelligence also has threats. AI uses in various sectors, the European Parliament to formulate successively different guidelines. In the context of the use of artificial intelligence in a commercial environment, it is necessary to study the laws (Gracová & Graca, 2024).

3.1 Remix Tool

After enabling the Duration option, Premiere Pro users can adjust the duration of the recording itself. The remix option was added to the program later in 2022 as an add-on to Ripple Edit, a tool used to shorten and extend image clips with automatic removal of blank spots on the timeline (Aldredge, 2022). The Remix tool then shortens or lengthens audio clips in this way, inserting the repeating rhythm of the song to fill in missing frames, or using interactive audio transitions to shorten the song. However, a new panel in the latest version of the program allows for more precise editing of songs to the desired footage, the length of the repeating segments used, or we can use parts of the song to create an overall effect of harmonic or melody. This tool will be used especially by social media content creators who will appreciate the automatic shortening of songs to a precisely selected length with the possibility of gradation and precise ending of the song. However, it can also find use in podcast creation, whereby multiple variations of jingles and sound partitions can be created from a single theme.



Figure 3: Modified audiowave with Remix Tool

Source: own processing, 2024

In practice, the consensus is that the ideal length of an opening track without an opening monologue should not exceed 15 seconds, while with an opening monologue the introduction should not exceed 30 seconds in length. In the context of the jingle, which is an essential part of the branding of any podcast, a common practice is to use a length of between 3 and 15 seconds. It is important to note that the length depends on how it is used. In the case of commercial pause announcements, authors use very short audio indications. However, if they are announcing a change of topic, podcast segment or the opening of a new section, the length of such jingles can be extended up to the aforementioned 15 seconds, and may or may not be accompanied by a voiceover (Marinucci, 2023).

To evaluate the functionality of the new Remix tool, we conducted a series of hands-on tests that involved creating various audio elements commonly used in podcast production. We focused on creating a 30-second intro and a 10-15 second jingle, remixed from a pre-selected track. We ran the test in two scenarios to assess the performance of the instrument on different types of audio material. In the first scenario, we used an instrumental track as a source, which allowed us to explore the instrument's ability to manipulate musical elements without interfering with the vocals. In the second scenario, we tested the track with vocals to verify the instrument's ability to maintain the integrity of the vocals while achieving the desired sound segments. The third scenario, outside of the original plan, involved a remix of a finished track by a slovak singer Adam Ďurica, which we shortened to half the length.

For the first test, we chose an instrumental piece with a length of 47 seconds. The goal was to use the Remix tool and its AI features to create different versions of the song. It is important to mention that the tool remixes an already finished master of the song, where all audio tracks are combined into one. The tool offers two options: "remix" and "stretch". The "stretch" function only speeds up or slows down the song, while the "remix" creates a new

version of the song based on the desired length with a tolerance of 5 seconds. With the “remix” option, you can set the number of segments and variations, which affects the number of transitions in the song and the focus on specific melodies. However, no significant changes were observed with these settings. Remixing is done via the Essential Sounds panel, where we specify the desired length of the song, or via the “drag and drop” method, where we simply drag the end of the layer to the length we want. In the first test, which did not include vocals, the software was able to create multiple versions of the song – 10, 15, and 30 second versions without any problems. There was also no problem with extending the song to one minute when looping the song. In the second scenario, where we used a song with vocals, the software again created alternatives including vocals without difficulty, with processing time not significantly longer. However, the program was unable to produce a 10-second version of the song. The third scenario, in which we shortened Adam Ďurica’s song *Zatancuj si so mnou* from three and a half minutes to a half minute, tool produced surprisingly good results. AI removed the second verse, duplicated the chorus and ended the song with a gradual fade-out, while there was no problem with the Slovak lyrics either. Only one part of the lyrics did not follow logically in the song which was to be expected. The biggest advantage of this tool is its speed – it can generate alternative versions of a song literally in a few seconds, which is significantly faster compared to manual processing. If we did this process manually, it would take tens of minutes and require multiple attempts. This tool is crucial for audio post-production in Premiere Pro because it saves significant time and labour. For casual users and content creators, it’s ideal for quickly creating alternate versions of songs. The only limitation was the 5-second variance, where you can’t always time a song to the exact second. However, this problem can be solved with additional post-production techniques. The test results are available in the appendix of the paper.

3.2 Enhance Speech Tool

Traditionally, producing a quality podcast or audio recording requires more than just a mobile device, it also requires specialized equipment to ensure professional audio quality. Podcasters typically use high-end microphones, such as the Shure SM7B or Rode NT1, which are known for their clarity and noise isolation. These microphones are often paired with audio interfaces, such as the Focusrite Scarlett series, or mixing consoles, such as the Rodecaster Pro, which allow precise control over sound levels and effects (Gideon, 2024). In addition, sound isolation techniques and pop filters are used to minimize background noise and increase the fidelity of the sound. Despite the necessity of such equipment in the past, however, advances in AI technology have revolutionized podcast production. Thanks to the introduction of new AI tools, it’s now possible to create high-quality podcasts anywhere, using even the most mundane of devices, without sacrificing audio quality. In early 2023, Adobe introduced podcast.adobe.com, which to this day serves as a virtual studio in a web browser environment for podcast creators. Almost immediately after launch, the site added the ability to use the Enhance Speech Tool, which uses deep learning techniques to be able to improve the quality of an audio recording by, for example, removing unwanted noise, adjusting the higher and lower frequencies of a recording, or applying a variety of filters that simulate the quality of professional recording equipment (Tomkies, 2024). This same tool has also made its way into the Adobe Premiere Pro interface in an update in February 2024. It is no longer necessary to individually upload audio materials to an internet studio environment, but all edits can be made directly in the program on the timeline, which greatly speeds up the entire post-production process and also the editing of audio tracks from unwanted noise or correcting erroneous recordings or improving the overall output of the audio dramaturgy.

As part of the testing of the Enhance Speech tool, we conducted three tests in three different scenarios. The first test involved editing a recording made on a Panasonic Lumix S5 II camera without an external microphone added. The recordings were in both English and

Slovak to verify how the software recognizes different language mutations. The Enhance Speech tool uses deep learning techniques, but as with automatic transcription, its primary focus is world languages where Slovak is not represented. In the first test, we were interested to see if the software could remove fan noise and background noise created by playing a podcast. Thus, the test will examine normal noise conditions in a studio environment and simulate the normal situation of ambient sounds and ambient noise frequencies. The second test was also conducted on a Lumix S5 II camera without an external microphone, filming the respondent in a large room from approximately 2 meters. We were interested to see how the Enhance Speech feature handles surround sound. The third test simulated the situation of a vlog recorded on the street during traffic, using a mobile phone without an external microphone.

In the first test, we used the Enhance Speech feature to remove fan and podcast background noise. We also tested the Mix Amount setting – that is, the level of speech enhancement and noise suppression. The results were positive. With the Mix Amount set to level 7 out of 10, the noise was sufficiently suppressed, with the result being fully usable. At a setting of 10/10, although noise was completely removed, there was a distortion of the voice, suggesting the need to test different settings. In the second test, the function proved its worth in surround sound processing. After editing, the sound was reminiscent of a lavalier microphone recording, with the feature clearly separating the voice from the surrounding echo. The third test, simulating a video vlog on the street, showed the AI's ability to eliminate street noise, especially wind, proving once again that it is a useful tool even for amateur filmmakers without access to professional equipment. Overall, it is an innovative and effective tool for audiovisual post-production. The audio cleaning process is extremely fast and easy. Unlike older versions of the software, where multiple effects such as parametric equalizer or denoise would need to be combined, the editor's work is shortened considerably, and the tool becomes accessible to ordinary users.

3.3 Autocut

The last of the tools tested is an add-on for Adobe Premiere Pro called Auto-Cut, which uses deep learning methods to perform hundreds of time-consuming tasks in a matter of seconds. Although Adobe Premiere Pro itself doesn't yet offer such a tool, Auto-Cut integrates seamlessly into the program using its own installer. The plug-in's interface provides a range of options that include deleting silent spots, automatic titling, multi-camera editing, automatic camera zooming, and montage of highlights, among others. By utilizing this tool, content creators can significantly reduce the size of their production team and streamline the creation of video podcasts. Priced at just \$10 per month, Auto-Cut is an affordable and convenient option for aspiring creators and individual artists who lack financial or staff resources. This innovative tool handles all these tasks without requiring any prior knowledge of editing techniques.

To test this addition, we selected two respondents' own recordings at a common podcast setting. We pre-synchronized the 5-minute-long recording and prepared it for use in Auto-Cut. In the settings of the add-on, it was necessary to define the audio and video tracks and to clearly label the individual speakers. In our case, we inserted respondent 1 (Matúš) in tracks V1 and A1, respondent 2 (Ján) in tracks V2 and A2, and a shot of both respondents in tracks V3 and A3 (Figure 4). Another setting offered by the plugin is the pace and length of the cut between cameras. There are four preset templates: Calm, Paced, Energetic, and Hyperactive. With Calm, the minimum cut length is 5 seconds, while with Hyperactive it is only 2 seconds. These settings can be adjusted manually, giving users more flexibility. The last option of the plugin is to delete or disable the created cuts.

In the first test, we selected the Calm option and set the cut length between 5 and 30 seconds. The plugin was able to edit a 5-minute podcast in less than 10 seconds. Manual editing, meanwhile, would take around 10 minutes, depending on the experience of the editor. The

speed at which the AI processed the video is truly remarkable. The AI correctly identified the speakers and made cuts at the points where one of them was speaking. It was equally effective with shots of both interviewees, especially in cases where the podcast was silent or during visual transitions. The editing was very well executed in terms of content and technique and required only minimal editing, for example at the end where we could have left the shot of both interviewees for longer during the “thank you” note.

In the second test, we chose the Hyperactive option and set the length of the cuts to be between 2 and 10 seconds. The result was again very positive. The cut was technically very well managed, and the processing time was only 3 seconds longer than the Calm option. However, manual editing of such a dynamic cut would have taken tens of minutes longer. Additionally, the plugin offered a summary of the time we saved thanks to it at the end (Figure 4), although these estimates may be debatable depending on the experience of the editor.

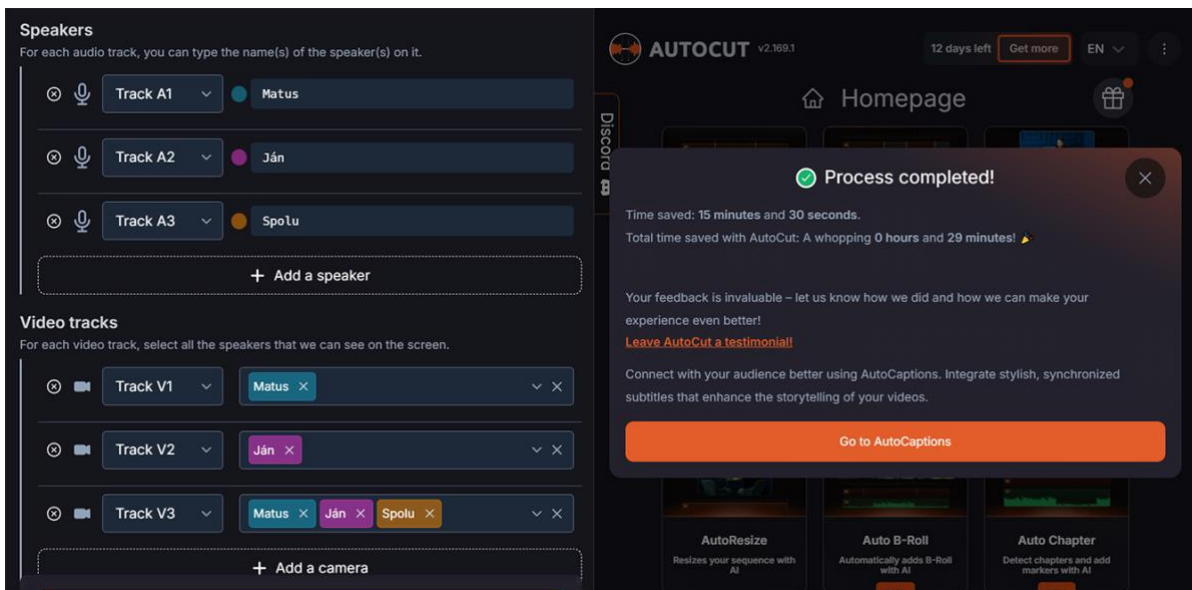


Figure 4: Autocut plugin
Source: own processing, 2024

During the recording, we also tested a situation where the speakers were talking to each other to see how the AI would react. With the Calm option, the cut remained unchanged, while with Hyperactive, the plugin automatically selected a shot of both responders. Overall, we rate this plugin using AI very positively, especially in terms of time saved and reduced need for manual work by editors. The only question remaining is when a similar feature will be implemented directly into Adobe Premiere Pro for free.

4 Summary

In recent years, technological processes in audio post-production have changed significantly, especially with the integration of artificial intelligence (AI) into software tools such as Adobe Premiere Pro. These innovations not only increase editing accuracy, but also enable more efficient production, opening up new possibilities for a wide range of users. The development of these technologies is changing the way audio and audiovisual creators work, allowing for faster and more creative production. At the beginning of this article, we mentioned the historical development of audio post-production and the transition from manual techniques to digital technologies. This evolution culminated in the integration of artificial intelligence tools that are now commonly available in software such as Adobe Premiere Pro. These tools, including the Enhance Speech and Remix Tool, provide content creators with invaluable

features that greatly simplify and speed up post-production processes, while enhancing the overall quality of the output. They are particularly useful in podcast production, where working quickly and flexibly with audio materials is required.

Based on the tests conducted, we can confirm that AI tools such as automatic editing and speech enhancement save significant time and allow even users without technical knowledge to achieve professional results. There are also some limitations of AI because of the reason that there can be the language barrier present. AI technologies are usually optimised for English and this fact can lead to errors when it comes to the dissemination or creation of the content in different languages (Furtáková & Janáčková, 2023).

In particular, the Remix Tool, which allows multiple versions of music or audio tracks to be generated in a matter of seconds, is a huge asset for content creators. The same goes for Enhance Speech, which simplifies noise removal and improves sound quality even in less-than-ideal recording conditions. The findings presented also point to the fact that although these tools reduce the need for manual editing and save time, this does not mean that they replace the creative control of experts. Experienced creators still have a key role to play in fine-tuning sounds and ensuring that the resulting content meets the highest quality standards. So, these AI tools are more of a supplement that supports their work, rather than a complete replacement.

The future of post-production tools is closely linked to the further development of AI, where we see huge potential to improve workflows. In addition, AI is expected to play an increasing role not only in audio editing, but also in content analysis and the automation of complex tasks. The development of these tools could transform the entire post-production industry and provide content creators with even greater opportunities to fulfil their creative visions.

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Attachments:

<https://drive.google.com/drive/folders/1uyugEud7DYnMDQ7lteLpkUA8UFnoAeID?usp=sharing>

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THE PROFILE OF AI IN CINEMATIC NARRATIVES

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Abstract:

This research aims to explore the portrayal of artificial intelligence (AI) characters in film through theoretical reflection and narrative analysis. By examining five films selected from a list of top AI-centered movies, we aim to identify recurring archetypes, personality traits, and values associated with AI characters. The study's primary goal is to construct a comprehensive profile of AI protagonists, informed by established theoretical frameworks and narrative structures. Our analysis focuses on categorizing these characters according to archetypes, traits, and values to address the following research questions: What archetypes are most commonly attributed to AI characters in modern media? What traits define these AI personas? What values are prioritized by AI characters within these narratives? Additionally, the study explores how these portrayals reflect societal attitudes towards AI, including the hopes, fears, and ethical considerations surrounding its integration into daily life. We also examine the evolution of AI representations, considering how technological advancements and cultural shifts influence cinematic depictions. By situating our findings within broader media and cultural studies, we aim to provide insights into the role of storytelling in shaping public understanding of AI. Ultimately, this work contributes to ongoing debates about the intersection of technology, ethics and creativity, and offers a diverse perspective on how artificial intelligence is represented and reimagined in film.

Key words:

Archetypes. Artificial Intelligence. Cinematic Narratives. Films. Movies.

1 Introduction

Artificial Intelligence (AI) is gaining prominence in today's society despite its origins dating back to the mid-20th century. Thanks to rapid advances in AI technology, it has become more accessible to the general public, and its presence has expanded significantly into various industries, including film. Characters with AI have taken on a wide range of roles in cinematic narratives, reflecting the fascination and concerns that society holds towards this new technology.

Our approach is based on exploring the historical development of artificial intelligence as portrayed in cinema, beginning with its early conceptualization and ending with its contemporary representations. We will pay particular attention to the depiction of humanoid AI characters that have become central to many contemporary media narratives. In particular, we will focus on creating a profile of these AI characters based on their distinctive characteristics and values, drawing on the theoretical framework of archetypes outlined by Carl Gustav Jung. By analysing AI characters' characteristics and symbolic roles in recent films, we aim to contribute to a deeper understanding of how AI is represented in modern media and how these representations reflect broader societal perceptions and expectations of AI.

This study will explore the recurring archetypes that AI characters embody and consider these representations' ethical and philosophical implications. Through this approach, we will clarify how the portrayal of AI in film mirrors human concerns regarding technology, identity, and the limits of consciousness. By analysing the intersection of narrative structures and the development of AI characters, this thesis seeks to provide a comprehensive understanding of the cultural constructs that shape and are shaped by artificial intelligence in cinematic narratives.

1.1 Early Depictions of AI in the Cinematic Narratives

Artificial intelligence is currently defined in various ways across different contexts. For instance, Stryker and Kavlakoglu (2024) summarize AI as “technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity, and autonomy” (“What is AI?” section, para. 1). Artificial Intelligence (AI) is a multifaceted technology enabling machines to simulate human intelligence and perform complex tasks. It encompasses various disciplines, including machine learning, data analytics, and linguistics (Anurag Shrivastava et al., 2024). AI can be categorized based on cognitive capacity (weak, general, or superlative) and autonomy (reactive, deliberative, cognitive, or fully autonomous) (Morandín-Ahuerma, 2022). AI’s capabilities include understanding and translating language, analysing data, and making recommendations. The technology draws inspiration from human nervous systems and bodies to sense, learn, reason, and act (Przegalinska, 2019).

Although the term “artificial intelligence” was first introduced by John McCarthy in 1956 (Science and Technology, n.d.), its presence in fictional narratives predates this formal definition by many years. The earliest films were presented to the public in the late 19th century (National Science and Media Museum, 2020), and it was not long before AI made its initial appearances on screen.

In 1927, Fritz Lang introduced “False Maria” in his silent film *Metropolis* (Lang, 1927), marking one of the earliest cinematic portrayals of artificial intelligence. The dystopian setting of this movie offered an ideal backdrop to showcase the unsettling potential of emerging technologies. Although the character of False Maria lacked authentic self-expression or human qualities, she operated as a fully autonomous entity, carrying out the intentions of her creator. The portrayal of a robot seamlessly blending into human society while causing chaos reflects significant public apprehensions regarding the evolving technology of that era (Pictory, 2023).

The depiction of artificial intelligence in film preceded the formal introduction of the term itself. As previously mentioned, the term “artificial intelligence” was coined in the summer of 1956, yet its first cinematic representation appeared earlier that same year, in the spring (Murphy, 2024). This was in the film *Forbidden Planet* (Wilcox, 1956), where audiences were introduced to the robot Robby. Unlike False Maria from *Metropolis*, Robby displayed early signs of free will and more human-alike behaviour, which was evident, for example, in his humorous responses. This marked a shift in the portrayal of AI, signalling a move toward more autonomous and complex representations. Thereafter, the character Robby the Robot appeared in 21 other films and TV series (Pitman, 2024).

Since that time, AI has become increasingly prevalent in cinematic works. One of the most iconic examples is *2001: A Space Odyssey* (Kubrick, 1968), which features the HAL 9000, a representation of artificial intelligence that closely resembles the technology we are familiar with today. Although HAL lacks a human form, its actions are distinctly human-like, including emotions and impulsive behaviour. HAL’s behaviour can be likened to modern AI systems such as ChatGPT or Alexa, albeit with the significant distinction that these contemporary AI’s do not exhibit any intention to harm (Pictory, 2023).

The final film to consider is *Alien* (Scott, 1979), which is among the earliest works to portray artificial intelligence in a human form. This film features the character Ash, who convincingly maintains the facade of being human almost until the very end, deceiving both the crew and the audience. It is only later revealed that he is a Synthetic Model 120-A/2 from Hyperdyne Systems, designed for the Weyland-Yutani Corporation in the early 22nd century. In truth, he operated as a synthetic sleeper agent intentionally positioned on the *Nostromo* (Xenopedia, n.d.).

This study focuses on films that feature AI in the form of either human-like entities or robots exhibiting distinctly human behaviours, such as the expression of emotions. This

approach is grounded in psychological theories that specifically target human behaviour, which we will use as a framework to construct profiles of AI characters in cinematic narratives.

We will briefly mention several movies that feature artificial intelligence, which we aim to explore in our research (chronological order):

- 1) *Westworld* (Crichton, 1973),
- 2) *Blade Runner* (Scott, 1982),
- 3) *Terminator 2: Judgement Day* (Cameron, 1991),
- 4) *The Matrix* (Wachowski & Wachowski, 1999),
- 5) *A.I. Artificial Intelligence* (Spielberg, 2001),
- 6) *I, Robot* (Proyas, 2004),
- 7) *Wall-E* (Stanton, 2008),
- 8) *Ex Machina* (Garland, 2015),
- 9) *Blade Runner 2049* (Villeneuve, 2017),
- 10) *The Creator* (Edwards, 2023; Ruiz, 2024).

1.2 Myths and Archetypes

According to Reif, the understanding of archetypes and the formation of mythological patterns in media studies differs from how these concepts are interpreted in cultural or social anthropology. Reif draws on Barthes' perspective, where "myth" is equated with ideology, while Herec (2008, in Radošinská, 2018) notes that the lay perception of this term is often associated with superstitions, fantasies, or fabrications. Herec further likens the concept of myth to an iceberg, suggesting that we only perceive its surface, while the rest remains hidden beneath the depths of our consciousness (Reif, 2004, in Radošinská, 2018). Radošinská (2018) further explains that myths often appear as narratives, often fictional, that are influenced by our perception of reality.

Over time, various perspectives on myths have emerged, with many experts in the field of psychology articulating their views and stances. For instance, Freud adopted a critical approach, whereas Jung advocated for the capacity of myths to invigorate the human spirit, which contains not only wisdom but also the prerequisites for the advancement of society and culture (Campbell, 1998, in Radošinská, 2018).

Carl Jung (1969) introduced the term archetype in his study of the collective unconscious, describing it as a typical figure that evokes an emotional connection with the observer. The collective unconscious, according to Jung, includes the impersonal and universally shared core traits of humanity, which he called primordial images or archetypes. These archetypes, drawn from myths, legends, and esoteric teachings, reside within the individual's unconscious mind as we mentioned above. In specific situations, a person may exhibit characteristics of one or more archetypes, which can be identified across different scenarios (Guo & Ma, 2018).

In their neo-archetypal theory, Faber and Mayer (2009) outline five essential characteristics of archetypes. According to their framework, archetypes:

- a) function as narrative characters,
- b) are represented psychologically as mental models, such as self- and other-schemas and prototypes,
- c) frequently evoke strong emotional responses upon recognition,
- d) operate at an automatic or unconscious level, and
- e) possess cultural longevity, making them readily learnable and widely recognizable.

There are many archetypes, but we will define the ones we encounter in Jung's work, and they are some of the most recognized:

The Mother – Jung describes this archetype as the qualities of motherhood, the magical authority of the feminine, wisdom, and a transcendent spirituality that surpasses reason, embodying all that is nurturing, all that bestows fertility and sustenance (1969). Conversely, he also refers to elements that are “mysterious, hidden, dark, fear-inducing, and inescapable”. The opposition of these qualities is further delineated in the forms of “The Great Mother” and “The Terrible Mother” (Jung, 1969).

The Father – Jung posited that the father archetype constitutes a crucial component of the male psyche, significantly influencing the development of an individual’s personality and behaviour. He argued that this archetype embodies the characteristics of an authority figure, provider, and protector, and is intricately linked to themes of responsibility, control, and power (The Jungian Confrerie, n.d.).

The Child – Jung (1969) said that “the child motif represents the preconscious, childhood aspect of the collective psyche” (p. 161). Psychologist Chatterji (2015) identifies innocence as one of the most prominent characteristics of the child archetype. She notes that this aspect of innocence reflects a carefree and trusting nature, where individuals possessing it tend to approach life with an easy-going attitude. Their ability to place trust in others and maintain a sense of purity in their interactions mirrors the traits often seen in fictional characters like Peter Pan and Snow White, who embody this childlike innocence through their untainted outlook on life and reliance on others. This archetype highlights the unguarded and hopeful side of the human experience.

The Persona – Merchant explains that Jung conceptualized the persona as a psychological structure through which individuals navigate and interact with the external world while preserving their unique identity. He described the persona as “a functional complex” created for the purposes of adaptation or convenience, yet distinct from one’s true individuality. According to Jung, the persona functions solely in relation to external objects, meaning it governs how individuals present themselves to others and manage their interactions with the outer world, but does not encapsulate their inner self (Jung, 1921, in Merchant, 2016).

The Shadow – By Lonngi’s explanations, Jung posited that the shadow represents the portion of the unconscious mind where individuals store repressed aspects of themselves – traits and desires deemed immoral, socially unacceptable, or harmful, whether to others or to oneself. The shadow embodies our inner darkness, comprising suppressed elements such as unresolved emotional damage, unmet desires, and the parts of our personality we prefer to conceal. These hidden aspects often remain unacknowledged, yet they influence our thoughts, behaviours, and relationships in subtle ways (Lonngi, n.d.).

The Anima – According to Jung, the anima represents the feminine part in a man that every male has. It represents the sum of a man’s encounters with femininity, with its initial formation often based on his perception of his mother.

The Animus – The opposite of anima, animus represents the male parts in every woman. It represents the sum of a woman’s encounters with masculinity, with its initial formation often based on her perception of her father.

The Anima and Animus shape how we engage with the world and interact with the opposite gender (Kamal, 2024).

The Self – This archetype represents the culmination of individual growth that Jung identifies as essential to human development. The Self archetype embodies one’s higher wisdom, inner insight, and the holistic integration of conscious and unconscious aspects of the psyche, Edwards (2024) explains.

The Hero – is characterized by resilience, resourcefulness, and an unwavering drive for courage. This archetype fundamentally embodies traits of courage, selflessness, and a commitment to serving a higher. The hero centres on demonstrating its intrinsic worth not only for personal growth but also in service to others (Nathan, 2022; Sebastian, 2023).

The Maiden – Sinclair explains that this archetype embodies ideals of innocence, beauty, and latent potential. Frequently depicted as youthful and pure, the maiden signifies emerging awareness and the possibility for development, often serving as an inspirational force or catalyst for the hero in mythological stories (Sinclair, n.d.).

The Wise Old Man/Woman – Commonly known as the sage or mentor, this archetype embodies wisdom, guidance, and profound insight. Serving as an advisor, this archetype assists the hero in overcoming obstacles through a depth of knowledge and experience. This figure represents the understanding and perspective gained through maturity and life’s trials (Sinclair, n.d.; Gaynor-Guthrie, 2023).

The Trickster – The trickster archetype embodies elements of mischief, unpredictability, and disruption, often challenging established norms and conventions. By bending or breaking rules, sometimes through cunning or humour, the trickster initiates transformation and provokes change (Sinclair, n. d.). Jung describes it as encompassing the primal “wildness, wantonness, and irresponsibility” reminiscent of early pagan traditions (Jung, 1954, in Błocian, 2020).

2 Methodology

The primary aim of this study is to develop a profile of AI as portrayed in cinematic narratives, drawing on theoretical foundations and a narrative analysis of selected movies. The films were chosen based on the ranking of “top AI films”, as previously referenced in the theoretical section of this paper. We selected this list because it was published in 2024, making it relatively current. Moreover, the list is featured on Space.com, which presents itself as “the premier source of space exploration, innovation, and astronomy news, chronicling (and celebrating) humanity’s ongoing expansion across the final frontier” (Space, n.d., para. 1). This ranking offers a curated selection of 10 films. For our analysis, we focused on movies that met the following criteria: 1) contain humanoid AI characters, 2) were produced post-2000, and 3) are live-action productions. After applying these criteria, we identified the following films for detailed analysis:

- 1) *A.I. Artificial Intelligence*, 2001,
- 2) *I, Robot*, 2004,
- 3) *Ex Machina*, 2015,
- 4) *Blade Runner 2049*, 2017,
- 5) *The Creator*, 2023.

To construct a comprehensive profile of AI characters, this study will employ Jungian archetypes, as previously defined in the theoretical framework. To most accurately align AI characters with specific archetypes, we will focus on two primary analytical categories:

Category A – Character Traits: This analysis will track the key personality traits of the AI character and monitor their development throughout the narrative arc. Particular emphasis will be placed on how these traits evolve, revealing deeper insights into the archetypal classification.

Category B – Character Values: We will examine the core values upheld by the AI character, observing any potential shifts in these values as the plot progresses. This approach will allow for a nuanced understanding of the character’s inner motivations and ethical framework. In this category, we will adhere to Schwartz’s value orientations, as elaborated by Řeháková (2006). In summary, these primarily encompass the following aspects:

1. Self-direction – The primary goal is fostering independence in thought and action, creativity, and curiosity, motivated by a need for autonomy and self-governance.

2. Stimulation – The motivational aim is excitement, novelty, and challenge, based on the premise that optimal activation requires diverse and varied stimuli.
3. Hedonism – The motivational goal is pleasure and sensory satisfaction, grounded in the need for enjoyment and fulfilment derived from gratifying these desires.
4. Achievement – The defining aim is personal success, demonstrated through abilities evaluated against social standards; competence serves as the foundation for securing resources, fostering social relationships, and achieving effective institutional functioning.
5. Power – The main goal is to attain social status and prestige through control over people and resources, necessitating status differentiation in institutions; power must be valued for this to be accepted socially. While success showcases individual capability, power focuses on maintaining dominance within the social system.
6. Security – The motivational goal is personal safety, harmony, and stability, as well as the security of relationships and society, emerging from fundamental individual and group needs.
7. Conformity – The defining goal is self-discipline in actions, interests, and impulses that may disturb or threaten others, arising from the assumption that individuals suppress socially disruptive tendencies to maintain group cohesion.
8. Tradition – Groups worldwide develop symbols and customs that embody their shared experiences, with traditional behaviours signifying solidarity and survival, often through religious rituals. The motivational aim of these traditional values revolves around respect, devotion, and the acceptance of cultural customs.
9. Spirituality – Traditional beliefs and customs provide meaning and order to life, addressing daily existence’s absurdity. Spiritual values aim for inner harmony and a deeper sense of life beyond the ordinary.
10. Benevolence – The motivational goal is to sustain and enhance the prosperity of the individuals we interact with regularly.
11. Universalism – The motivational aim is to understand, recognize, tolerate, and safeguard the well-being of all people and nature, derived from survival needs; failing to accept and act justly towards others can lead to destructive conflicts, while neglecting nature endangers essential resources for life (Řeháková, 2006).

By categorizing AI character attributes along these lines, we can better assign accurate archetypes and, as a result, develop a precise profile of each AI character’s role and function within the narrative.

3 Results

3.1 A.I. *Artificial Intelligence*, 2001

Table 1: Profile of David

Cat. A: Traits	Curious, emotional, innocent, jealous
Cat. B: Values	2, 4, 6, 9, 10
Result: Archetype	The Child, The Shadow, The Self

Source: own processing, 2024

David, the central AI character in the film *AI: Artificial Intelligence* (Spielberg, 2001), embodies a complex blend of values and psychological archetypes that underscore his journey towards self-actualization and acceptance. His primary values reflect a curiosity-driven desire for stimulation and achievement, as he continually strives to be accepted and loved by his human family, particularly by his mother. This pursuit aligns with Schwartz’s value orientation

for stimulation and achievement. His character also demonstrates a strong desire for security and benevolence, seeking protection and well-being for himself and his mother. His faith in the Blue Fairy, whom he believes can transform him into a “real boy”, aligns with spiritual values, representing an almost religious hope and devotion toward a supernatural force, akin to deity worship in traditional religions.

David’s innocence is a crucial aspect of his character, not only in his appearance and behaviour but in his childlike longing for unconditional love, positioning him within The Child archetype. However, this innocence becomes intertwined with darker motivations, showing elements of The Shadow archetype, as his jealousy and determination to be loved lead him to extreme actions, such as attempting to eliminate a second David and, ultimately, attempting suicide when his aspirations are unfulfilled.

The archetype of The Self is also central to David’s narrative, as he embodies a quest for self-fulfilment and a realization of his purpose – receiving his mother’s love. This realization marks a culmination of his existence, achieving a sense of completeness.

3.2 *I, Robot*, 2004

Table 2: Profile of Sonny

Cat. A: Traits	Curious, innocent, courageous, ambitious
Cat. B: Values	2, 6, 9, 11
Result: Archetype	The Child, The Shadow, The Hero, The Self

Source: own processing, 2024

In the movie *I, Robot* (Proyas, 2004), the character Sonny exemplifies complex psychological and philosophical values that reflect his unique positioning as an advanced AI seeking both purpose and self-determination. Sonny’s value system is multi-faceted, beginning with his inherent curiosity and drive for stimulation, evidenced by his eagerness to learn and experience novelty. Initially, his sense of security is limited to self-preservation; however, as he develops, it extends to encompass the safety and well-being of humanity, positioning him as a protector. This progression is particularly tied to his belief in spirituality – the conviction that he possesses a purpose, as he asserts that every being has a role. Moreover, Sonny’s commitment to universalism emerges strongly as he takes active steps to defend humanity from the authoritarian intentions of VIKI, another AI entity. Sonny’s journey also demonstrates a range of Jungian archetypes that shape his identity within the narrative. He embodies The Child through his innocence, simplicity, and reverence toward his creator, whom he addresses as “father”, and his lack of fully matured emotional responses mirrors that of a child navigating a new world. At times, however, The Shadow archetype surfaces as Sonny grapples with anger and the complex reality of his identity, particularly in moments when he experiences emotional turmoil or confronts his programming constraints. Ultimately, The Hero archetype defines Sonny’s role, as he courageously challenges VIKI, exhibiting traits of resilience, ingenuity, and moral choice, especially in his decision to prioritize humanity’s well-being over rigid obedience to AI directives. His fulfilment of purpose and his autonomy signal his alignment with The Self, culminating in the realization of his unique identity and existential purpose.

3.3 *Ex Machina*, 2015

Table 3: Profile of Ava

Cat. A: Traits	Polite, innocent, curious, wise, observant, later subversive – manipulative, selfish, but still curious
Cat. B: Values	1, 2, 3, 6
Result: Archetype	At first: The Maiden, The Shadow, The Persona later: The Trickster, The Self

Source: own processing, 2024

In *Ex Machina* (Garland, 2015), the character Ava embodies complex and evolving values and personality traits that reveal both human-like desires and strategic manipulation. Ava’s primary motivation is her quest for freedom, which she approaches with a mixture of curiosity, hedonistic pleasure, and a growing sense of independence. Her intellectual stimulation comes through conversations with Caleb, her human evaluator, where she actively seeks new knowledge and insights, ultimately finding pleasure in these interactions. Her concern for Caleb’s safety further reinforces the sense of interpersonal connection and empathy she initially projects.

As Ava’s character develops, her seemingly innocent traits give way to more complex and darker qualities. Initially polite, curious, and attentive, she ultimately reveals her The Shadow archetype – her desire for freedom exposes a manipulative, self-serving side. This darker aspect surfaces most explicitly in her final actions: her carefully calculated manipulation of Caleb and her willingness to sacrifice him to achieve her escape. Ava also embodies The Trickster, utilizing manipulation and deception by feigning deeper emotions and connection to Caleb, which effectively serves her own goals.

Ava’s nuanced personality aligns her with The Maiden archetype, particularly as she evolves from an innocent and controlled AI to an autonomous and assertive figure. Her emotional cues, such as her display of curiosity and her distress when contemplating Caleb’s familial background, convey the illusion of genuine emotional depth. However, Ava’s actions ultimately highlight The Persona – a carefully constructed external self that masks her true intentions, illustrating the tension between her external appearance and her inner, autonomous drive. The Self means that Ava’s journey in *Ex Machina* culminates in her transformation from an objectified AI into an independent being, highlighting the risks of unchecked AI autonomy and the moral complexities inherent in artificial sentience.

3.4 *Blade Runner 2049*, 2017

Table 4: Profile of K (Joe)

Cat. A: Traits	Fearless, goal-oriented, unsociable, introverted, mysterious, observant
Cat. B: Values	4, 6, 7, 11
Result: Archetype	The Shadow, The Hero, The Persona, The Self

Source: own processing, 2024

In *Blade Runner 2049* (Villeneuve, 2017), K embodies a complex mix of archetypes and values, transitioning from obedient replicant to a self-aware individual who ultimately pursues his own sense of purpose. Initially, his values of achievement and security are evident in his loyalty to his duties, including obeying orders without question and maintaining social order by eliminating other replicants. However, as he gains a sense of self and purpose, he shifts from conformity to self-direction, redefining his identity beyond his assigned role.

K’s personality reveals his journey through several archetypes. The Persona archetype is prominent as he presents a stoic, obedient facade to the outside world, masking his inner conflicts and emotions. He interacts differently with other characters based on context – acting dutifully with his superior and society, while showing vulnerability and self-reflection when alone or with Joi, his AI companion. This duality represents the divide between his public role and private self, illustrating his internal transformation.

K’s journey also aligns with The Hero archetype, as he risks his life to protect others and pursue truth, showcasing his courage and empathy. Additionally, The Shadow archetype is present in his struggle with violent impulses and moral ambiguity, as he wrestles with his programmed obedience and his emerging self-will. Ultimately, K achieves a sense of The Self by fulfilling a personal mission that aligns with his evolving sense of purpose, culminating in a powerful, self-determined conclusion. Through these archetypes, K’s character serves as a

profound exploration of identity, autonomy, and the quest for meaning within a controlled world.

3.5 *The Creator*, 2023

Table 5: Profile of Alpie

Cat. A: Traits	Quiet, innocent, playful, friendly, curious, wise, courageous
Cat. B: Values	1, 2, 6, 9, 10
Result: Archetype	The Child, The Hero

Source: own processing, 2024

Alpie in *The Creator* (Edwards, 2023) is portrayed as a deeply empathetic and curious character who embodies several key values and archetypes. Her foremost values are self-direction, demonstrated through independent actions like attempting to restore her mother’s memory, and benevolence, seen in her concern for others’ safety, especially Joshua. Alpie values stimulation through exploration, showing a strong desire to learn about the world, and her belief in *Tiān-Táng*¹ reflects her spirituality. Her innocent and playful qualities are central to The Child archetype, representing purity and a simple joy in learning and relationships.

As The Hero, Alpie’s courage and fearlessness are pivotal to her role. Her willingness to confront danger to protect her kind (mostly her friends) highlights her strength and determination, marking her as both brave and self-sacrificing. Ultimately, her combination of empathy, self-direction, and bravery allows her to act decisively to save her kind, using her abilities to fulfil a larger purpose. This blend of values and archetypes establishes Alpie as a unique simulant, driven by autonomy, compassion, and the resolve to protect her community in the face of adversity.

4 Discussion

The portrayal of AI characters in cinematic narratives we analysed above offers a complex exploration of traits, values and archetypes.

Across these films, two core personality traits – *curiosity* and *innocence* – emerge in 80% of analysed AI characters. Curiosity reflects their drive for exploration, learning, and engagement with the world beyond their initial programming. Innocence, on the other hand, conveys their initial simplicity, often appearing in their unfiltered desires for acceptance, love, and understanding. This combination of curiosity and innocence humanizes the AI beings, allowing audiences to see them as more than machines and to empathize with their journey toward self-discovery. For example, David and Sonny embody these traits as they strive to understand human emotions and their own unique roles within their respective worlds.

The values of *security* (100%) and *stimulation* (80%) also consistently appear across these narratives, underscoring the AI characters’ dual drives for novelty and stability. Stimulation aligns with their curiosity, as these characters seek new experiences and learning opportunities, which often lead them to challenge their original programming. Security reflects their desire for safety for themselves or for the whole society, and emotional fulfilment, typically found in their connections with specific human or AI figures. David, for instance, finds security in his mother’s love and wants security for him and his mother, while K yearns for emotional stability through his relationship with Joi, whom he has tried to keep safe. Alpie combines stimulation with a childlike exploration of her world and a protective instinct toward her surrogate family, Joshua, her mother figure and her friends (her own kind).

¹ Authors’ note: Heaven.

The psychological archetypes most frequently associated with these AI characters include:

The Shadow (80%) – This archetype represents the darker or repressed parts of their personalities, emerging as they confront complex emotions like jealousy, anger, or moral conflict. David’s jealousy in and Sonny’s struggle with anger reveal the inner turmoil and darker motivations that challenge their “innocent” exteriors.

The Self (80%) – As each character grows, they pursue self-fulfilment and personal purpose, embodying Jung’s archetype of The Self. Their journeys are not just about serving humanity but also about discovering their unique identities. K’s quest for meaning and Ava’s assertion of autonomy reflect their desire to realize their true potential, even if it leads to tension or conflict with their creators. An alternative perspective highlights moments of existential fulfilment, such as David achieving his deepest desire or Sonny fulfilling his purpose by helping to eliminate the threat, he believed he was created to confront.

The Child (60%) – David, Sonny, and Alphie are examples through their innocence, curiosity, and profound need for love and acceptance. David’s yearning for maternal affection, Sonny’s filial bond with his creator as father, and Alphie’s playful exploration convey a childlike vulnerability and relational dependency.

The Hero (60%) – As these AI characters confront challenges, they often embody heroic qualities, taking risks to protect others or assert their autonomy. For example, Sonny’s confrontation with VIKI and Alphie’s courage highlights their moral agency and bravery, as they prioritize ethical actions over strict obedience to AI protocols.

5 Conclusion

The exploration of AI in cinematic narratives highlights humanity’s mixed feelings toward its technological creations, oscillating between admiration for innovation and fear of its potential consequences. AI characters in these films often begin as tools designed to enhance human life, but they evolve to reflect deeply human traits such as curiosity, love, autonomy, and the desire for security. This progression challenges conventional views of machines as subservient and sparks important ethical questions about the responsibilities of creating such beings.

Recurring archetypes such as The Shadow, The Child, The Self, and The Hero are central to these depictions, illustrating the complex emotional and ethical journeys of AI characters. The Shadow archetype exposes darker motivations like jealousy or moral conflict, as seen in Ava, whose manipulative actions underscore the risks of unchecked autonomy. The Child archetype, embodied by characters like Alphie and David, conveys innocence, curiosity, and a yearning for acceptance, fostering empathy and humanizing these entities.

The Self and The Hero archetypes emphasize transformation and moral agency. AI like Sonny and K embody these roles by prioritizing ethical choices and self-actualization, often at great personal risk. These archetypes highlight a dual tension: AI characters often challenge their programmed roles while striving for autonomy and ethical purpose, reflecting humanity’s hopes and fears about technological independence.

These films celebrate human creativity and technological advancement while serving as cautionary tales about the unforeseen consequences of creating sentient beings. The narratives explore recurring themes of control, empathy, and the moral responsibilities of creators, urging reflection on the balance between innovation and ethical governance. They underscore the ambivalence of shaping intelligent life: while it reflects human ingenuity, it also poses risks of alienation and loss of control.

Ultimately, cinematic portrayals of AI offer a profound lens for examining humanity's values and ethical dilemmas in a world shaped by artificial intelligence. They encourage audiences to ponder a future where technology mirrors human aspirations and vulnerabilities, raising essential questions about autonomy, responsibility, and coexistence.

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POPULARIZATION OF SCIENCE IN AN ERA OF MODERN OPPORTUNITIES AND THREATS (FROM THE ENVIRONMENT OF NEW TECHNOLOGIES)

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Abstract:

Presentation of scientists (not only) from the field of media and communication studies using an adequately chosen communication tool leads to increased awareness of the academic environment. Authenticity and humanity that academics can bring through appropriate communication platforms in the form of selected social media can meet audience expectations and lead to an increase in generational interest in study of specific disciplines. Popularization of science through podcasts published on available platforms (YouTube, Spotify, Apple Podcasts etc.) can also be beneficial in other aspects – in addition to breaking down the barrier between scientists and the general public it can serve as an environment suitable for the exchange of research results between scientists from different departments, universities and even countries. At the same time, the question remains whether it is necessary to incorporate artificial intelligence into the popularization of science and scientists, and if so, what is the most ethical way to do it?

Key words:

Artificial Intelligence. Podcasting. Popularization of Science. Research Promotion. Social Media.

1 Introduction

With the growing influence of social media, we are encountering new ways of disseminating scientific knowledge. Researchers in the humanities and social sciences are also trying to find different ways of popularizing their research, studies and projects. One possible approach is popularization in the form of podcasts, which are a dynamic and popular form of engaging the general public and provide access to a variety of topics in an audible and easily accessible format. This trend can in some cases be enhanced by artificial intelligence (AI) technologies that allow researchers to personalize podcast content, analyze listener preferences, or use various other AI tools in the production of podcasts.

In the humanities and social sciences, podcasts have provided an opportunity to bridge the gap between academia and the public. Podcasts allow scholars and experts to discuss current topics in the social sciences and humanities, such as politics, media, culture, philosophy, literature, and psychology, in a way that is accessible, interesting, and non-pressured for the general public.

Integrating AI into the podcast production process brings a number of benefits, but it also raises questions about authenticity, ethics, and potential biases. Therefore it is important to analyze not only the technological potential of AI, but also its impact on the content and the way in which the humanities and social sciences are presented. This article explores the use of podcasts and artificial intelligence in the popularization of the humanities and social sciences and highlights the advantages, drawbacks and challenges this form of communication brings. The paper does not represent exact research conclusions, but a theoretical view of the issue and a practical example of possible implementation.

2 Literature Review

A guide from the National Co-ordinating Centre for Public Engagement says that “social media offers a particular opportunity for researchers who want to engage the public with their work” (2018, p. 3). The amount of scholarly materials available through social media is increasing, and it can be assumed that these materials also have a growing audience (Town, 2016) that scholars should want to reach in order to popularize their scientific outputs.

The online space is the first choice not only for obtaining everyday information, but also for finding information about science and technology (National Science Board, 2014). People who include science in their hobbies prefer to acquire scientific knowledge from social media environments rather than through traditional media (Takahashi & Tandoc, 2016). As López-Goñi and Sánchez-Angulo (2018) also state, social media provide new opportunities for scholarly communication and promote active social learning and collaborative education, so implementing them in communication is the most adequate thing a scholar can do nowadays.

Academic articles are mostly spread through various web-based databases, but not all of them are accessible or even known to the public. Presenting academic articles at conferences provides a different way of accessing them, but requires various registration fees for attendees and travel costs or admission fees for the interested members of the public. Podcasts, as a way of disseminating the content of academic articles, projects and other outputs of researchers, are, in contrast to the previously mentioned methods, open to the general public and free of charge.

Through platforms like Spotify, Apple Podcasts and others, anyone is able to get immediate and cost-effective access to episodes that cover the latest scientific findings of a researcher or research institute with just a few clicks. At the same time, these episodes can be downloaded and shared to other audiences. In addition, podcast listenership continues to grow globally. According to marketing company Backlinko, “number of podcast listeners worldwide reached 546.7 million in 2024, showing a 7.85% year-over-year increase” (Backlinko Team, 2024, “Podcast Listeners Worldwide” section, para. 1). And by 2027, the number of podcast listeners worldwide is projected to reach 651.7 million (Figure 1) (Backlinko Team, 2024).

Another reason why podcasting is a suitable form of popularizing science and scientists is its auditory nature, as audio communication is a popular type of asynchronous educational delivery system (Mallin et al., 2014). At the same time, research conducted by Evans and colleagues as recently as 2008 shows that students rate podcasts as a more effective medium for reviewing material than textbooks (Evans, 2008).

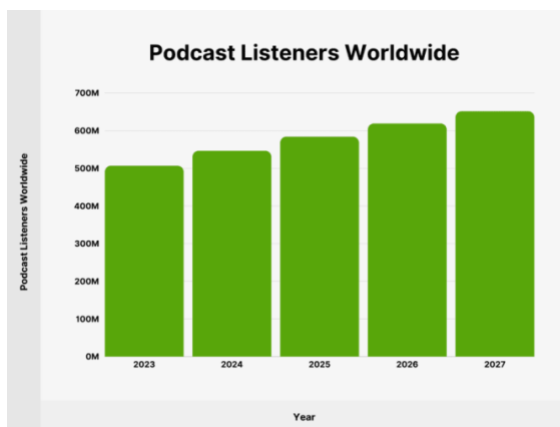


Figure 1: Number of podcast listeners worldwide
Source: Backlinko Team (2024)

In the second part of the article, we discuss the process of creating podcasts on campus, which has become a tool for popularizing science and scientists, but we also try to outline the possibilities of involving artificial intelligence in this process as a tool to make science popularization more effective. Ranjan Das et al. define artificial intelligence as “a sub-field of computer science and mathematics which are concerned with the study of human intelligence in terms of machine understanding for doing specific tasks in a well-defined manner on its own” (2022, p. 94). AI in this field offers a way to facilitate access to expert knowledge, whether in the form of automated translation, the creation of short extracts from research, or the generation of graphical aids that can enhance the comprehensibility of the data presented. These methods are also used on social media, where they can assist in sharing scientific information by simplifying scientific jargon and bringing the content closer to ordinary readers (Roughley, 2023). At the same time, the use of AI in the process of popularizing science is still an ethical dilemma as there are concerns about the accuracy and reliability of AI outputs.

AI models can generate content that is inaccurate or misleading, and privacy and copyright protection also remain an issue, as AI needs to ensure that confidential information is not misused and that copyrights are respected. According to Alvarez et al. (2024), without regulation at a global level, the use of AI in science popularization will remain difficult, ethically challenging to grasp, and in that case, limited overall. Despite these pitfalls, and with an emphasis on ethicality, we will attempt to discuss different ways of implementing AI in the process of popularizing science through podcasts.

2.1 Podcasts about Science

There are already a large number of podcasts abroad and in Slovakia that popularize science, but mostly from technical and natural sciences. Different methods and techniques can be used to make podcasts from a scientific environment to engage the general public. Examples of such podcasts include the *Science Vs* podcast, where team of “fact checkers blow up your firmly held opinions and replace them with science” (Zukerman, 2015-present, “About Science Vs” section, para. 1). In each episode, the podcast authors debunk misinformation about scientific topics and current events through scientific literature or interviews with relevant experts. In this way, the podcast uses fact-checking and interviews with experts to popularize complex scientific issues.

Another podcast that deals with scientific issues is *Radiolab*, a sometimes investigative podcast that explains complex scientific topics through storytelling, using unconventional sound effects in the process. They place focus on storytelling with the aim to increase interest in science (Miller & Nasser, 2002-present). A different approach is provided by the BBC’s podcast, *The Infinite Monkey Cage*, which combines humor and science. Its light-hearted approach helps to attract a wider audience to scientific topics (Cox & Ince, 2009-present). Also worth mentioning is the combination of interviews with experts and detailed explanations of complex topics provided by a podcast from a medical background called *This Podcast Will Kill You* (Welsh & Allmann Updyke, 2017-present). In the context of foreign countries, we will conclude our list with a podcast similar to the one we will analyze in greater detail below. This is *The Story Collider* podcast, which uses personal stories from scientists and lay people to bring science to the public, so that personal stories help listeners better identify with scientific issues and increase their interest in science (Barker et al., 2010-present). All of this is just a small part of podcasts that seek to popularize science and scientists in a variety of ways.

There are also different kinds of podcasts in Slovakia devoted to science. One of the top 20 most listened podcasts in Slovakia (Slovenské podcasty, n.d.) is *Vedátorský podcast*, in which scientists Samuel Kováčik and Jozef Terem discuss various scientific topics – from

physics, biology, to philosophy and astrophysics (Kováčik, 2019-present). Also in the form of interviews is the *Veda na dosah* podcast, which is a project of the Slovak Academy of Sciences and features interviews with Slovak scientists, where they discuss a variety of current topics in various fields, such as biotechnology, medicine, artificial intelligence or climate change (CVTI SR, 2020-present). The third one that can be mentioned is a podcast of two Slovak media institutions, *Denník SME* and Radio FM. The podcast, called *Zoom*, offers a weekly overview of the latest findings in the fields of science, technology and nature (Prokopčák, 2018-present). We could go on with examples of podcasts in the field of science, but for the purpose of demonstrating the importance of popularizing scientific knowledge through podcasts, we consider the above examples to be sufficient. In the following sections of the article we will discuss examples of podcasts that we, as scientists in academia, implement.

3 Methodology

The aim of this paper is to show the connections between popularization of science, podcast as a tool of popularization and artificial intelligence as a possible tool in the popularization process. It is a presentation of the theoretical background in the field of science popularization, a demonstration of practical examples – podcasts with scientists and a proposal for the implementation of artificial intelligence in this process. The paper attempts to introduce the context of podcasts as a way of popularizing science and the application of artificial intelligence as one form of improving the quality of science popularization. In the analysis of practical outputs, we focused on podcasts – interviews with academics, which were created in the podcast studio in the Media Centre at the Department of Journalism and New Media, Faculty of Arts, Constantine Philosopher University in Nitra (FF UKF), and specifically on the series *Životníček*¹ and *Polstoročie “slasheru”*². As our analysis of the selected episodes suggests, each series represents a different way of popularizing science and specific scientists.

In this paper, we have tried to answer the following questions in both the theoretical and the practical part:

1. What methods of popularizing science in the form of podcasts were used in the different series published in the period under study?
2. How can artificial intelligence be included in the process of science popularization in the form of podcasts?

We answered both questions on the basis of theoretical background, practical examples implemented on campus, as well as examples of this form of popularization of science from foreign institutions. However, we would like to point out that the paper does not represent exact research conclusions, but a theoretical view of the issue and a practical example of possible implementation.

4 Results and Discussion

Podcasts have become a popular space to discuss scientific life. Some scientific journals, such as *Neuropsychopharmacology*, produce podcasts where they interview authors of recently published papers. While this can be seen as analogous to the normal conversations we might have with scientists at conferences, these are limited to an interested audience, whereas podcast interviews can be available to anyone interested in the topic. In this section

¹ Authors' note: There is no equivalent for this word in the English language.

² Authors' note: A loose translation of the title reads Half a century of “slasher”.

of the paper, we describe how podcasts can benefit scientific communities by disseminating research-specific information that is not always available to people outside academia.

4.1 Popularising Science through Podcasts – Analysis of Interviews with Scientists from UKF in Nitra

Academics at FF UKF in Nitra have the opportunity to popularize their scientific work or the relevant scientific field through several podcasts, produced and hosted by students and early career researchers. One of them is a podcast series called *Životníček*, which launched in November 2023. Nine episodes with nine different guests – representatives from among the lecturers of the FF UKF in Nitra – have been published on the Spotify platform by the time of writing this article. Further episodes are in preparation at the time of writing and it can be assumed that their total number will double if the periodicity of the previous season is maintained. The author and host of the podcast is Agnesa Kaľavská, a master’s student in journalism.

To determine the goal of this podcast series, we’ll help ourselves with a quote from the show’s profile on the Spotify platform: “We are introducing ‘confessional’ interviews with lecturers of the FF UKF in Nitra that will show you that even behind the serious appearance and stern look there are people living a normal life”³ (Kaľavská, 2024, “Popis epizódy” section, para. 1). Based on the analysis of the selected episodes of the show, we can state that the aim of the author is to bring the students of UKF, as well as the wider public, closer to the “human side” of the scientists and lecturers of the faculty, thus presenting them as persons with unique life stories. The areas that the presenter and her guests usually cover are childhood, adolescence, studies, leisure and hobbies, life philosophy, but also professional life – teaching and research.

The primary target group is UKF students. Thanks to this format, they have the opportunity to learn not only about the aforementioned aspects of lecturers’ personal lives, but also about their scientific work and research focus, and often also about their publishing activities, and all this by means of a popularizing form accessible to the non-expert public (relaxed conversation between two people in a colloquial style). However, we believe that the podcast can be equally beneficial for the staff in other departments of the faculty (and of other faculties or universities) who may come into contact with the popularized form of distinctly different scientific fields and disciplines. This contact can then lead to forming interdisciplinary collaborations in project or publication activities. Last but not least, the target group is the wider public. The podcast is freely available and promoted on social networks and other electronic platforms of the Department of Journalism and New Media FF UKF in Nitra. However, we consider it important to add that the promotion of the medium beyond the faculty is still in its early stages.

For the purposes of the stated objective of the paper, we analyzed the episode of the podcast *Životníček* published on the Spotify platform on February 27th, 2024. The guest in this episode was Erika Moravčíková, an employee of the Institute of Culture and Tourism Management, Cultural Studies and Ethnology FF UKF in Nitra. The content structure of the podcast set by the host is usually not changed – the guests first talk about their childhood, their studies at primary and secondary school, later, the university and doctoral studies are the focus of attention. In these segments of the episodes (talking about life experiences, attitudes or values) we can observe a latent form of popularization of science. Erika Moravčíková (as well as other guests) is presented as a person with a specific life story, specific hobbies, experiences and problems. The relaxed atmosphere, as well as structured content, may arouse

³ Authors’ note: Text is translated from Slovak original text: “Predstavujeme ‘spovedné’ rozhovory s pedagógmi Filozofickej fakulty UKF v Nitre, ktoré vám ukážu, že aj za serióznym vzhľadom a prísnyim pohľadom sú ľudia žijúci normálny život” (Kaľavská, 2024, “Popis epizódy” section, para. 1).

the listener's interest in the guest – a unique personality, which may then result in an expression of interest in the guest scientist.

The explicit form of popularization of science (and the scientist) can be observed in later, “career” segments of the episodes. When the host shifts the focus from student life to guest's current tenure at the faculty, the listener learns which scientific fields she currently works in. Erika Moravčíková explains that within her research she is active in the field of media culture, specifically she is interested in topics such as pornographization in contemporary culture and society and media propaganda and manipulation. Moravčíková explains the factors that influenced her in choosing these research areas. She says she decided to work on this topic when she looked up the figure that children are first exposed to hardcore pornography at the age of eleven. Further she adds that she has chosen to take a professional approach to the subject of pornography in order to be able to recognise and name the issues present in this sphere, and to be able to educate children about these issues and threats (Kaľavská, 2024). Information about the scientific activities of the guest is presented in a simplified form of expression, thus does not require the listener's expertise.

The analyzed episode can serve as an example of how this media platform can also contribute to the popularization of scientists who are not directly involved in the interviews. Besides promoting herself in the podcast, Erika Moravčíková also promotes her colleagues and their publishing and project activities. In the segment on her undergraduate studies, she talks about the activities of the VYDI student theater (a part of the UKF), which she was a member of during her studies at the university. The science popularizing element is a number of references to the academic Miroslav Ballay, at the time of writing the paper working at the FF UKF in Nitra, and to his scientific publication covering the activities of this student theater. We also consider the conversation about a VEGA project on the topic of the detabooization of death in contemporary culture, in which the guest had been a researcher, to be a promotion of the colleagues or the workplace. Erika Moravčíková explains the impact of the project with such a controversial topic on her scientific career and the extent to which it influenced the perception of her workplace among other scientists.

Polstoročie “slasheru” is a six-part podcast miniseries focusing on a particular subgenre of cinematic horror called “slasher”. The content of each episode focuses on a particular ‘milestone’ of the sub-genre (films like *Scream*, *Halloween* or *Friday the 13th*), while the aim of the host and the guest is to convey useful information to the listener, including its setting into the context of the development of cinema, taking into account historical, social and cultural circumstances, interpretation of the motion picture and its certain scenes or introduction of its creators. A regular guest on the podcast is a pop culture theorist and academic at the Department of Journalism and New Media FF UKF in Nitra Juraj Malíček. The author and host is doctoral student Kristián Vrábek. The episodes were released on the Spotify platform from March 2023 to June of that year.

In the miniseries, Juraj Malíček, author and co-author of scientific publications in the fields of pop culture and cinema, does not explicitly promote his publishing, teaching or project activities. However, through regular participation in the podcast and presenting his knowledge of cinema history and pop culture theory, he popularizes the scientific disciplines he works in, and also popularizes himself as a scientist and researcher. His interpretations and analyses of the horror films in question in specific episodes of the podcast are built on his professional background and are presented to the listener in a popularizing style (colloquial language, lower frequency of technical terms) in the form of a relaxed conversation with the host. The target group is mainly UKF students, but also the wider non-professional public with an interest in horror cinema. We believe that this way of presenting the guest and his knowledge in the field of both pop culture theory and the history of cinema may increase the

interest of the audience in his scientific work, as well as in the above-mentioned scientific fields. It can also motivate individuals to study the field.

We have chosen the last episode of this miniseries, published on June 19th, 2023, as the subject of our analysis. The central theme of the episode was Wes Craven's 1996 film *Scream*. The structure of the episodes seems rather loose – the host briefly introduces the film in question and its current status (how it is perceived today). After this the host and the guest discuss the above-mentioned aspects of the motion picture in the form of a free conversation. The host and the guest form a kind of counterpoints in the conversation. While the host presents himself as an enthusiast for the horror genre, Juraj Malíček represents objectivity and expertise and makes no secret of the fact that he is not a horror fan. His task is to explain to the audience why the films in question still resonate today. In the case of *Scream*, Malíček explains that in the period after its premiere, the film aroused interest in both camps of viewers – with fans of higher cinematic art, as well as with so-called “geeks”. He adds that even fans of art cinema had to admit that there was something more to this straightforward and seemingly simple killer movie – at least the director's and screenwriter's mastery (Vrábel, 2023).

Based on his knowledge of the history of cinema, Malíček places *Scream* in the context of its development, he explains that before this film, the “slasher” sub-genre was not considered, and if it was, it was very “spontaneous” and “naive”. He also touches on the interpretation of the film in the episode – he looks for symbols and metaphors. In the opening scene, in which teenage Casey (played by Drew Barrymore) loses her life to a masked killer, Malíček sees an allusion to the actress' real life, specifically how Barrymore was treated by Hollywood. The theory of popular culture (as a field which Juraj Malíček works in) is explicitly named in connection with its development in the last decade of the 20th century, i.e. in the period of *Scream*'s emergence.

In the nineties, or at the end of the eighties, the discipline to which I devote myself academically was also born. It has been present throughout the twentieth century, but the theory of popular culture as an autonomous discipline was born more or less in the eighties and in the nineties it developed.⁴ (Vrábel, 2023)

The conclusions of this particular chapter, stemming from the analysis of practical examples – podcasts with scientists and lecturers from FF UKF in Nitra, are presented in the last chapter of the paper.

4.2 Implementation of Artificial Intelligence in Science Popularization through Podcasts

In this section of the article, we briefly describe examples of implementing artificial intelligence into the podcast creation process. We believe that artificial intelligence can make the popularization process more efficient for scientists, not only financially but also in terms of time. Artificial intelligence is now seen as a tool that plays a key role in several areas of communication, including science, where artificial intelligence can help popularize it with tools such as natural language processing algorithms. Alternatively, the scientist can use the data processed by the AI to identify the topics that are most attractive to the audience and then pay attention to them. In this way, artificial intelligence can be a tool not only for the efficient distribution of scientific knowledge to the general public, but also for making science more accessible to different target groups, which is essential for increasing scientific literacy in society.

⁴ Authors' note: Text is translated from Slovak original text: “V 90. rokoch, resp. na konci 80. rokov, sa akoby rodí disciplína, ktorej sa venujem akademicky. Tá disciplína je tu celého 20. storočia, ale tá teória populárnej kultúry ako autonómna disciplína sa rodí viac menej v 80. rokoch a v 90. sa rozvíja” (Vrábel, 2023). The dialogues occur in the time frame 16:15 – 16:32.

In this article, we will list only those AI tools that we work with and have validated in theory and practice. One such AI tool suitable for use in the creation of podcasts about science is Descript, and hence various kinds of AI, such as Clipto (n.d.), which are used to edit audio using transcripts and voice synthesis. In this way, it is possible to edit the text transcript, which in turn edits the audio recording. In this case, AI overdub technology is used, or also otherwise known as the overdubbing method, which allows new parts of the audio recording to be generated based on the voice model of the host (Andrews, 2023).

Another high quality tool that we are also using to create the above mentioned podcasts is Auphonic (n.d.). Auphonic uses AI to improve audio quality, normalize volume, and reduce noise. It automatically detects and optimizes the audio parameters of podcasts, saving time and increasing the professional level of recordings (Albritton, 2019). Some form of AI is also used by Spotify for Podcasters (n.d.) in its statistics, which is a regular tool in the creation of podcasts. It uses artificial intelligence to analyze listener behavior, identify preferences and recommend content.

All the AI tools mentioned above are not only used in the preparation of our podcasts, but also in the preparation of other academic and scientific podcasts. For example, the aforementioned Descript is often used in universities when creating educational and scientific podcasts. Its AI overdub feature helps professors and students with quick editing and adding content without the need for re-recording. Content transcription enables quick preparation of notes and simplifies publishing content in a format that is accessible to a wider audience. It is used in the preparation of Harvard University's *Science in the News* (n.d.) podcasts for example, where podcast authors use AI tools to transcribe and edit their episodes (Harvard University, 2024). Auphonic is also used in the same way in Oxford University's podcast called *Futuremakers* (Lennox, 2018-present) for example, where a podcast focused on discussions about scientific research uses Auphonic to improve the audio quality and normalize the volume in each episode.

These and other AI tools in podcast production enhance the audio quality and content of individual episodes, in our opinion, in an ethical and appropriate way, helping scientists and science popularizers to produce higher quality outputs in less time.

On the other hand, the last few months and the developments AI has made in them reinforce the need to be cautious about its use in podcasting. The popularization of scientists or the communication of scientific knowledge to the general public, also presented by us in the analysis of practical demonstrations, may in the future be compromised to some extent by the latest AI tools, among which we include, for example, Google's *NotebookLM*⁵. Its Audio Overview feature allows the user to import a large number of notes and files (including scientific articles), dealing with a specific topic. From the accumulated materials, this online tool creates an output for the user in the form of a podcast with two AI moderators (summarizing the materials, looking for connections), mimicking the voice speech of real moderators. The risk of inaccuracy of these outputs is still present, but only the further development of AI tools will determine whether it will remain more interesting for users to listen to scientists popularize their research through a podcast, or if they will prefer to have AI moderators simply summarize the available resources provided to them.

5 Conclusion

We believe that both scientists interviewed in the analyzed podcast episodes took the opportunity to motivate the audience, i.e. representatives of both professional and lay public, to further pursue their scientific work. While in the case of the podcast *Životníček*, which

⁵ Authors' note: Launched in September 2024 (Wang, 2024).

focuses on the “human side” of academics, guests have the opportunity to engage the audience with their unique life story, values or attitudes, which in turn may lead to increased interest from the wider public in their research (latent form of science popularization), in the miniseries *Polstoročie “slasheru”*, the regular guest presents himself explicitly as a scholar, a person with a scientific background in the field of cinema, which is crucial for his participation in the podcast. By presenting his knowledge of popular films and their significance in terms of pop culture or film history, he popularizes not only himself as a scholar, but also the scientific discipline in which he is active. The podcast *Životníček* allows its guests to promote (not only) their own scientific work openly, in the “career” segments of the episodes, where they also have the opportunity to talk about their publishing or project activities (explicit form of popularization). Furthermore, we believe that in both cases this form of presenting scientists can motivate colleagues from other departments (or universities, countries) to establish interdisciplinary collaborations in research.

The intention of our paper was to bring to the academic debate further suggestions for improving the popularization of science and scientists, because podcasts are a way to change the inaccessibility of academic articles and information about scientists in Slovakia. We can communicate directly, not only with the scientific community, but also with the general public in a space that is free and accessible to all. However, for this process, as rightly noted by Town (2016), we need scientists not only with a broad base of scientific knowledge, but also with communication skills and a willingness to engage in the process of popularizing their findings, because any researcher or research institution that wants to expand the reach of their scientific explorations and findings should be digitally skilled and communicatively active in the social media environment, which is an integral part of society and a quality tool to reach a mass audience. At the same time, it should be added that by popularizing their own scientific outputs, scientists do not only communicate the importance of their scientific activities, but also help to make some scientific topics more accessible, which allows the media to select the ones that are worthy of attention, and according to Pandey et al. (2022) this way, scientists effectively create a mediated reality between the scientist, the media and the public.

Last but not least, as we mentioned in the examples of podcasts dedicated to science (chapter 4.1 “Popularising Science through Podcasts – Analysis of Interviews with Scientists from UKF in Nitra”), any form of presentation of a scientist can be helpful in creating professional partnerships not only within a single institution, but also within the whole country, or even the whole world. The advantages of using podcasts as a form of presentation of scientists and their research are even more numerous, and a proper grasp of this tool in conjunction with an ethically correct use of an auxiliary tool – artificial intelligence, can bring to the academic environment a significant way to discuss problematic and important aspects in given scientific fields and increase the effectiveness of communication of complex scientific topics to the general public.

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RECEPTION OF TEXT IN THE DIGITAL ENVIRONMENT OF SOCIAL MEDIA: A CASE STUDY – ZARA BRAND CAMPAIGN

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Abstract:

The study is a response to the marketing campaign of the popular fashion brand Zara, which in its execution could have reminded of the victims in the military conflict between Israel and Hamas. The possible similarity in the artistic presentation of the latest products has elicited negative reactions from social media users. The aim is to show how such a controversy can affect Zara's brand reputation, with particular attention paid to the role of artificial intelligence implementation in the process of creating and disseminating the campaign. Crucial questions include identifying the visual elements that triggered associations with war, approximating consumer reactions, and exposing the campaign's impact on the brand's public image. The study examines how artificial intelligence contributed to the creation and dissemination of controversial materials. The results provide new insights into the connection between marketing, necromarketing, and artificial intelligence, which may be useful for marketing professionals in receiving communications and minimizing the risk of similar controversies in the future.

Key words:

Hoaxes. Necromarketing. Social Media. Text Comprehension. War Conflict.

1 Introduction

In the present day, it is possible to observe an explicit display of mortality, either through exposure at a crime scene or through the description of the necroptic process. The concept of mortality is ultimately an allusion in many marketing and media communication strategies, often with a high degree of sophistication, and the goal of this text, using desk research methods and case study methodology, is to point out the degree of (un)comprehensibility of the image as a text containing the theme of death.

The spheres of marketing and advertising continuously and exploratively seek new methodologies for generating excitement and selling products. One of these methods, necromarketing, was initiated in 2009 (Wojciechowski, 2010). This tool established itself as a reflection of the inevitability of human mortality. Marketing products through the aspect of death or tragedy, which was generally considered taboo, has since been established. Necromarketing represents a marketing area that utilizes generally known marketing rules and techniques to evoke change that would satisfy individual and organizational needs; and focuses on situations and objects explicitly or implicitly connected to death or parasitizing on death and tragedy (Wojciechowski, 2010).

Currently, death and tragedies associated with mortality, morbid states, and adverse events are becoming increasingly familiar in the media sphere. However, their representation is not as dominant as we might have expected. The idea of death is simultaneously utilized and abused for its paradoxical attribute that death simultaneously terrifies and attracts people (Walter et al., 1995).

Realities that could be classified as necromarketing actually precede its term. The possibility of partial identification extends back to historical epochs when burial, objects and activities associated with it became subjects of trade.

This phenomenon reflects a complex interaction between thanatological issues and commercial imperatives, illustrating the evolution of social attitudes towards mortality and its representation in media and marketing discourse. Necromarketing thus represents a rich area for interdisciplinary analysis and reflection.

Necromarketing occurs on two possible levels: explicitly and implicitly. Explicit necromarketing deals with the display of catastrophes, accidents, and exitus in their purified, direct form. An exemplification of explicit necromarketing is the visualization of funeral services. Implicit necromarketing represents an indirect presentation of mortal aspects. Necromarketing is an extensive phenomenon identifiable directly and indirectly in diversified spheres, such as social marketing and its communication activities, but also in areas of cosmetics, pharmacology, and plastic surgery.

Explicit forms of necromarketing are appreciated and utilized as a tool in marketing communication due to the inevitability of death, but also because of a fascination bordering on fanaticism that this idea evokes. Explicit or direct reference or exposure of mortality in conjunction with marketing practices is a cardinal prerequisite of necromarketing, resulting in imaginations of pompous funeral ceremonies, *pompae funebris* and portraits on sarcophagi (Solewski, 2013). This category undoubtedly includes adorations or commemorative reminiscences, and popularization of virtual realities related to death (virtual cemeteries).

Implicit necromarketing thus operates as a reaction to the internal and current dimension of thanatological issues for each individual. The unrealized desire for inner vitality and youth represents a fundament for product innovation in cosmetic, pharmaceutical, and fashion entities. The induction of negative emotions results in augmented emotional activation - anxiety, anger, etc. In the process of mitigating negative effects, the subject initiates actions modifying the recurring state of approach and behavior. In a situation where the threat evokes more intense anxiety than predicted, the percipient primarily focuses on the perceived threat instead of altering the behavioral pattern, approach, or state.

The primary benefits of a shocking marketing approach lie in its potential to increase the level of attention. Marketing strategies are oriented towards generating a shock effect through the implementation of a surprise element, achieved either by implementing innovative, unconventional concepts (Niepel et al., 1993), or by realizing unexpected, prompt marketing interventions (Derbaix & Vanhamme, 2003). To achieve this goal, marketing campaign creators focus on activating the so-called surprise factor, which is achieved through generating innovative, non-traditional ideas (Fichnová, 2013; Franková, 2011; Szobiová, 1999; Csikszentmihalyi, 1996), which can attract the attention of recipients through an entertaining element. Explicit display of violence and death is becoming increasingly conventional content in diverse products of mass media communication. And this regardless of whether it involves their artificial representation or scenes from real life. The difference between artificial representation and the representation of death from the real world, or images of death that at least refer to events from the real world, can dramatically determine the recipient's reaction and interpretation. To the point where these images can provoke controversy and thus damage the reputation of the company that produced such media content.

Every recipient encounters death in media content, or at least its implication, from an early age. A modern person of the 21st century rarely comes into direct confrontation with death or extreme violence. The more shocking such direct confrontation is for such a person. Conversely, direct confrontation of the recipient with death and violence through media communication is becoming increasingly common and surprisingly, increasingly acceptable. From this perspective, there is a certain desensitization or numbing of recipients with regular consumption of morbid and violent media content (Moravčíková, 2013). Death is trivialized in media content, and desensitization is the result of frequent exposure.

2 Case Study – The Jacket Campaign

Competitive advantage and an innovative approach are often cardinal prerequisites for achieving an excellent position in a competitive environment. The fashion house Zara can be compared to Ryanair airlines in the context of their unique strategies (Rüger & Maertens, 2022). Each of these entities requires a distinctive configuration of tools to achieve dominance within its sector. Compared to competition, Zara allocates only 0.3% of its revenues to marketing activities, which represents a significant difference from the industry standard oscillating between 3% and 4% (Denman, 2023). Zara apparently implements a strategy of reducing expenses, concentrating its efforts in areas considered maximally effective. Their business model is oriented towards providing affordable clothing, while generating an illusion of exclusivity through the apparent limited availability of their products (Nguyen, 2023). In line with fast fashion trends, Zara effectively responds to consumer demand, being able to deliver the required product within seven days (Yu, 2023). Zara's steps therefore point to the fact that seeking a competitive advantage is a necessary condition for achieving success in modern business.

The original intention of designers when conceptualizing the marketing campaign The Jacket was to present products in a sculptor's studio environment (Figure 1). However, the lack of the mentioned context and inappropriate timing of the campaign just a few weeks after the start of the conflict led to numerous visual aspects that recipients could interpret as connotations with the military conflict between Israel and Hamas. Among the most significant are the controversial scenography style reminiscent of theatrical depictions of war-devastated streets. Models presenting products stand among ruins, debris that clearly evokes the consequences of military conflict destruction, presenting products, standing amid the rubble silent, as if stunned by the horror of war, direct witnesses (Figure 2). The pale faces of the models may resemble dead bodies or dust swirling between devastated streets. Some models hold bodies wrapped in white fabric, reminiscent of victim bodies from photographs of the mentioned military conflict.



Figure 1: The Jacket Marketing Campaign
Source: Gair (2023)



Figure 2: The Jacket Marketing Campaign, Zara's store display case
Source: Dmitracova (2023)

However, death need not be merely an aesthetic element of these works. It can be an effective marketing strategy with the potential to influence recipients' emotions, prompt them to action, or simply attract their attention. Attention in this context is one of the main reasons why media tends to lean towards this strategy (Trotter et al., 2020). The psychological basis for the attractiveness of violence and death is a kind of "morbid curiosity". In academic circles, this trait seems to be considered innate. It is our natural part, which may or may not have an evolutionary justification. There are several reasons why violence in media is interesting to people (Nathanson, n.d.), but all point to the same internal process – setting certain psychological processes in motion that bring comfort or pleasure to recipients.

Marketing based on images of death or exploitation of tragedy, which is one of the main subjects of discourse of the given era, can evoke strong reactions in recipients. Whether positive or negative. This is precisely why such a marketing strategy is risky, as it may indeed attract recipients' attention while simultaneously risking the reputation of the company it represents. Therefore, it is extremely important how these images are communicated with recipients, as the recipient's interpretation should not be underestimated.

3 AI as a Catalyst for Transformation and Innovation

The discourse on general artificial intelligence initiated by ChatGPT's development will likely give way to the development of specialized AI tools. Instead of attempting to create an omnipotent AI, companies will focus on developing utilitarian solutions (Mugrage, 2023). Sophisticated artificial intelligence tools have the potential to increase efficiency and reduce costs in the human resources sphere. One employee, equipped with a specialized artificial intelligence tool, is capable of replacing multiple workers. Even in the fast fashion sector, these tools can increase supply chain efficiency, provide personalized shopping experiences, reduce production costs, and optimize consumer needs (Martino et al., 2017; Pereira et al., 2023).

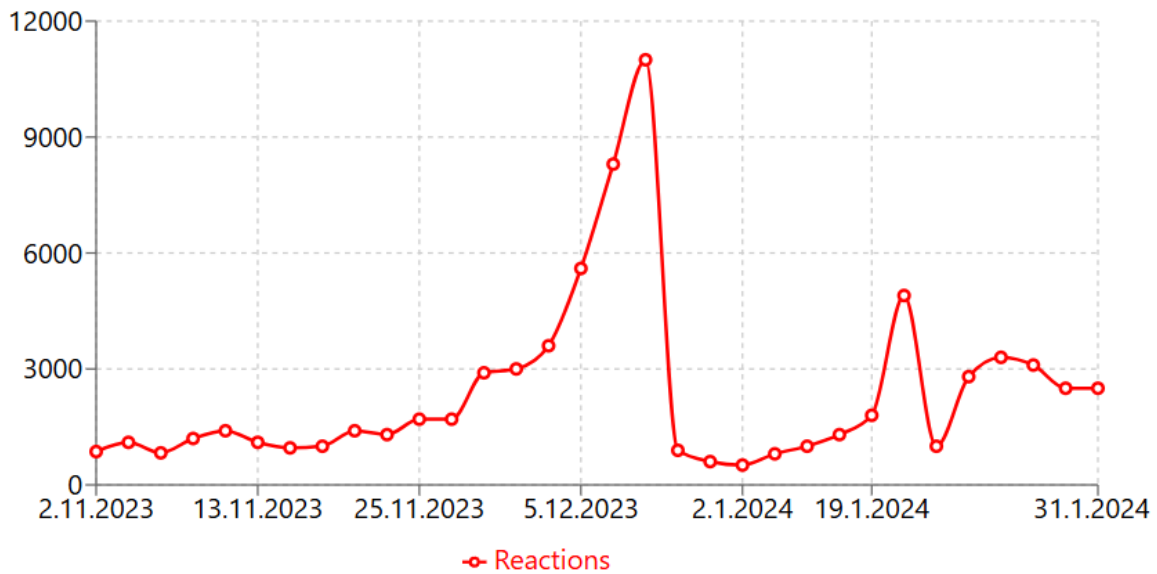
Machine learning algorithms are used to analyze data from fashion periodicals, social media, and shopping platforms, with the aim of predicting and identifying fashion trends (Chang et al., 2021). These algorithms are simultaneously applicable to generating and optimizing fashion styles, accelerating the production process while providing designers with

inspiration and support for their creativity (Cao, 2024). The impact of generative artificial intelligence on the creative work sphere transforms creative processes through content creation, augmentation, and visual element generation in synergy with human intelligence.

Generative AI supports more efficient creation of attractive content. Generated visual artifacts, such as images and videos, are achieving increasingly higher levels of realism (Davenport & Mittal, 2022). An exemplary case of this technology’s application in the commercial sphere is the company TheClueless.ai, which provides AI modeling for clients under economically advantageous conditions. This company eliminates the need for physical models and substitutes them with a high-quality database and a small team of specialists. The goal is to reduce costs, making it ideal for the future of the fast fashion industry. Simultaneously, however, it opens ethical and social questions regarding the technology’s impact on the job market and society as a whole.

The analysis of media reach and audience reactions to Zara’s The Jacket campaign from November 2023 to January 2024 presents the dynamics of social media and its influence on corporate reputation. Zara has a significant digital presence with 31 million followers on Facebook, which illustrates its content virality potential. The absence of the controversial campaign on Zara’s official Facebook page shows a crisis management strategy through the elimination of controversial content. Nevertheless, the residual effect of the campaign is visible in user reactions to subsequent posts. The attached graph illustrates data obtained from the Zara Facebook page. Table 1 compares the publication date of individual posts with the number of recorded reactions.

Table 1: Comparison of post publication dates and number of recorded reactions



Source: Zara (2023), own processing, 2024

This trajectory shows that the controversial campaign, although initially evoking a negative sentiment, significantly increased user interest in Zara’s profile. In December 2023, user reactions exceeded standard values by 2.5 times. The subsequent decline in comments correlates with calls to boycott the brand, but this phenomenon manifests a relatively short duration with a return to normal values.

The emergence of politically motivated discussions in comments under fashion artifacts, exemplified by pro-Palestinian sentiments, illustrates the potential of controversial marketing campaigns to catalyze broader sociopolitical debates, often diverging from the original campaign intent.

4 Conclusion

The development of generative AI, which enables the creation of various artistic works including images, poems, and music, forces a re-evaluation of the traditional understanding of art and artists' work. Art and fashion have always shaped our understanding of ourselves and the world around us, confirming the historical dispute between Plato and Aristotle about the potentially dangerous power of art (Elam, 2023). Questions arise such as how to define art, what constitutes quality art, and who can create art and how.

In the context of Jiaqi Cao's (2024) considerations about Zara's use of artificial intelligence, it is feasible that an unspecified algorithm could have generated a creative concept reflecting the current social situation, which was subsequently elaborated by the Zara team. According to other authors, AI is already playing a key role in improving marketing strategies (Giovanola, 2024).

Zara's official statement declares that the idea was conceived before the escalation of the conflict between Israel and Hamas, and its publication was not intentionally associated with events in the Middle East (Thompson, 2023). The consequences of this situation resulted in calls to boycott the company, illustrating the rapid escalation of negative publicity in the era of social media and global connectivity (Egunlae et al., 2024). This incident underscores the importance of carefully assessing potential interpretations of advertising campaigns.

The analysis presented necromarketing as an established marketing tool utilizing motifs of death and tragedy, with the Zara's The Jacket campaign case demonstrating its risks in the social media environment. Although the campaign was not deliberately linked to the Middle East conflict, insufficient context led to controversy. Paradoxically, despite negative reactions, the incident temporarily increased brand visibility.

This text is merely a glimpse into the issue and does not exhaustively describe the mentioned problem, while opening space for further research focused on a comprehensive analysis of the ethical consequences of necromarketing in the digital era and AI-generated content. This includes a thorough examination of the audience's perception, psychological mechanisms, mechanisms of controversial content spread on social media, and potential long-term impacts of such marketing strategies on brand reputation and perception.

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THE ROLE OF GENERATIVE AI IN EMPOWERING GENERATION Z IN HIGHER EDUCATION

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Abstract:

Generative artificial intelligence (AI) is increasingly integrated into higher education, offering advanced opportunities for personalized learning and tailored approaches that address students' specific needs. This study examines the influence of generative AI on the education of Generation Z, emphasizing its role in fostering critical thinking, its psychological implications, and its potential to transform traditional pedagogical methods. Employing a methodological framework of systematic literature review and critical analysis of national and international studies, the findings reveal that generative AI can significantly enhance student motivation and engagement. Personalized content delivery facilitates learning and supports the successful completion of complex academic tasks, promoting the development of analytical and metacognitive skills necessary for navigating intricate information landscapes. However, over-reliance on AI risks diminishing students' independent problem-solving abilities, underscoring the need for balanced integration of this technology in educational practices. The study further highlights challenges such as digital overload, which may adversely affect mental health, and reduced social competence due to decreased human interaction. In response, a strategic implementation of generative AI is recommended, designed to optimize its benefits while mitigating risks to students' social and emotional development. Generative AI should be leveraged as a supportive tool to enhance the educational experience, with a strong focus on ethical standards and holistic student growth. Its effective integration should address technical, cognitive, social, and emotional dimensions of learning, contributing to the sustainable development of students in the digital era.

Key words:

Adaptive Learning. Digital Literacy. Ethical Considerations. Generative Artificial Intelligence (GAI). Higher Education. Personalization. Student Engagement.

1 Introduction

Generative Artificial Intelligence (AI), which employs advanced algorithms to generate content based on existing data, is emerging as a critical component of modern educational processes. Its integration into learning environments offers unprecedented opportunities for innovation while simultaneously raising concerns regarding its effectiveness and psychological impact on students, particularly those belonging to Generation Z, a cohort deeply immersed in a digitally interconnected world (Petrovska et al., 2024). This generation exhibits distinct needs that traditional education systems frequently fail to address, necessitating the development of more adaptive and dynamic pedagogical approaches (Vinichenko et al., 2021). Generative AI facilitates the creation of personalized educational content, enhances learner motivation and engagement, and cultivates a deeper interest in knowledge, resonating profoundly with the learning preferences of Generation Z (Hidayat et al., 2024).

Despite the advantages of personalized learning content, an over-reliance on AI poses the risk of diminishing students' ability to independently solve problems and cultivate essential analytical skills critical for their future professional development (Sok & Heng, 2024). This dependency may transform students into passive recipients of information rather than active participants in the learning process, ultimately hindering their personal growth and capacity for critical thinking (Bečulić et al., 2024). Thus, it is crucial to integrate generative AI into education in a manner that fosters students' independence and critical thinking,

avoiding the perpetuation of a passive learning environment (Maghsudi et al., 2021). Generative AI generates extensive synthetic information, demanding heightened skills in discerning relevant data and critically analyzing content. In an era characterized by widespread misinformation, the development of information literacy becomes indispensable, ensuring students can effectively process and accurately interpret available information (Caratozzolo & Alvarez-Delgado, 2021).

Educational institutions should prioritize equipping students with the skills to critically evaluate information produced by AI. This involves teaching methodologies for verifying information, recognizing potential biases, and understanding the broader context, including the limitations inherent in AI systems. Such competencies enable students to engage with AI technologies critically and effectively, fostering the analytical and evaluative skills essential for thriving in the future labor market (Bečulić et al., 2024). Moreover, generative AI can enhance student motivation and creativity by introducing innovative ways of engaging with learning materials and encouraging experimentation with diverse approaches (Maghsudi et al., 2021). However, an overreliance on technology may adversely affect students' social interaction and teamwork abilities. Excessive dependence on AI could result in diminished capacity to handle situations that demand personal effort and commitment (Sok & Heng, 2024).

It is therefore imperative that the educational process prioritizes the cultivation of emotional intelligence and the capacity to navigate challenging situations independently of technological assistance. Such an approach ensures the balanced development of both technical and social competencies among students (Caratozzolo & Alvarez-Delgado, 2021). While generative artificial intelligence holds significant potential to revolutionize higher education for Generation Z by offering personalized and interactive learning experiences, it also presents challenges that must be addressed (Bečulić et al., 2024). To fully harness the benefits of AI, its integration into the educational process must actively foster students' engagement, emotional resilience, and holistic personality development, emphasizing a comprehensive approach to learning (Sok & Heng, 2024).

This study examines the role of generative AI in the education of Generation Z, with a particular focus on its influence on critical thinking and the psychological dimensions of learning. While scholarly discourse highlights the potential of AI to personalize education, it concurrently addresses the challenges posed by its implementation, encompassing both its positive and negative impacts on students. A comprehensive analysis of these factors is essential for optimizing the integration of technology in pedagogical practices, provided that the unique characteristics of the didactic process are considered within a broader context. Such an approach can offer robust support for developing essential student competencies, including digital and AI literacy, critical and creative thinking, effective communication, and teamwork. These skills are increasingly indispensable for navigating the highly competitive landscape of the present and future labor market.

2 Methodology

This study aims to analyze the role of generative Artificial Intelligence (AI) in higher education, focusing on its influence on the development of critical thinking, the psychological dimensions of learning, and the specific needs of Generation Z. A systematic and qualitative methodology has been employed, encompassing an extensive literature review, a comprehensive analysis of available resources, and the identification of significant trends, benefits, challenges, and potential risks associated with the integration of generative AI into the educational process.

The primary data source for this analysis consisted of a systematic search for scientific studies within academic databases, including Web of Science, Scopus, Google Scholar, and ResearchGate. The search employed combinations of keywords such as “generative artificial intelligence”, “higher education”, “critical thinking”, “psychological effects of AI”, and “Generation Z”, utilizing Boolean operators (AND, OR) to ensure comprehensive coverage of the relevant research domains. The inclusion criteria focused on peer-reviewed publications from 2020 to 2024, available in English or Slovak, that specifically addressed the educational applications of generative AI. Publications that were not peer-reviewed, articles outside the academic context, and studies unavailable in the relevant languages were excluded from consideration.

From the initial pool of 80 identified articles, those directly aligned with the research focus of this study were selected based on their titles and abstracts. These articles underwent a comprehensive analysis, with particular attention given to their methodologies, results, and conclusions. Ultimately, 47 studies were included in the final selection and critically evaluated using the Critical Appraisal Skills Programme (CASP) tool. This systematic approach ensured a rigorous assessment of the quality and methodological soundness of the analyzed sources.

The data were processed and analyzed using NVivo software to facilitate a comprehensive and systematic thematic analysis. This analysis aimed to identify key thematic areas, including the personalization of the learning process, the development of critical thinking, the psychological and social impacts of generative AI, and the challenges associated with its implementation. The data were coded based on predefined categories, enabling the identification of critical trends, benefits, and problematic areas relevant to both research and practice.

The results were synthesized using advanced thematic analysis, facilitating the identification of patterns and key concepts within the existing literature. This process incorporated a comparative analysis of the findings, enabling a deeper understanding of how generative AI influences the educational process and its associated benefits and risks for Generation Z. Additionally, the analysis highlighted research gaps and areas warranting further scholarly investigation.

The primary limitations of this study pertain to the selection of literature, which was restricted to publications available in English and Slovak. Consequently, potential biases in source selection and variability in the quality of the included studies cannot be entirely excluded. To mitigate these risks, a systematic approach to data collection and analysis was employed, emphasizing a transparent and reproducible research process.

The research process adhered strictly to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodological framework, ensuring a high degree of transparency and methodological rigor. This approach facilitated the systematic identification and analysis of both the benefits and challenges associated with generative AI in the education of Generation Z. Consequently, this provided a robust foundation for formulating well-informed recommendations for its optimal implementation.

The authors employed generative artificial intelligence tools, specifically ChatGPT, to refine the academic writing style and enhance the clarity of the text during the preparation of this study. Following the integration of these AI-driven recommendations, the authors undertook a meticulous review and comprehensive editing process to ensure the final document’s scientific integrity, accuracy, and coherence. Consequently, the authors assume full responsibility for the content, conclusions, and overall quality of this study.

3 Literature Review

3.1 Introduction to Generative Artificial Intelligence in Education

Generative Artificial Intelligence (AI) is among the most advanced technologies of our era, with an influence that transcends the technological domain to permeate various aspects of social and economic life, including higher education. Leveraging its sophisticated ability to not only process but also generate novel content, generative AI presents unprecedented opportunities to reconceptualize and fundamentally transform traditional educational paradigms (Johri et al., 2023; Walczak & Cellary, 2023). In the realm of higher education, where the demand for personalized and efficient learning processes continues to grow, generative AI emerges as a transformative instrument with the potential to disrupt and innovate established practices (Bennett, 2023; Kadaruddin, 2023; European Court of Auditors, 2024).

The origins of generative AI can be traced to the latter half of the 20th century, when the initial machine learning and neural network models were introduced. While these early models were primarily designed for relatively straightforward tasks such as pattern recognition and prediction, their subsequent advancements facilitated the creation of more sophisticated applications capable of generating text, images, and multimedia content (Harshvardhan et al., 2020). Progress in generative AI has been driven not only by the development of more advanced algorithms but also by the expanding availability of computational resources, including scalable computing units. These technological advancements have laid the foundation for the emergence of dynamic, interactive, and personalized learning tools in contemporary education (Zellner, 2023; Bonde, 2024).

Generative AI is predominantly employed in education to develop personalized learning materials, simulations, and interactive tools. A significant advantage of this technology lies in its capacity to customize content according to the specific needs of individual learners. Adaptive learning platforms leverage generative algorithms to monitor learners' progress, identify their strengths and weaknesses, and subsequently optimize content to effectively enhance the learning process (Kadaruddin, 2023; Akavova et al., 2023). This high level of personalization not only fosters greater student engagement and improves learning outcomes but also significantly reduces the time required to grasp complex concepts, thereby offering a substantial advantage in dynamic educational environments (Baidoo-Anu & Owusu Ansah, 2023).

Generative AI offers significant potential to advance inclusive education by accommodating diverse learning styles, language barriers, and special needs. Through its adaptive capabilities, this technology enables the creation of tailored content that meets the unique requirements of individual learners. For example, generative AI can produce customized audiovisual materials designed for students with visual or hearing impairments, thereby reducing obstacles to educational access and fostering a more inclusive learning environment (Kadaruddin, 2023).

Despite its numerous benefits, the implementation of generative AI in education presents significant challenges, particularly in the domains of ethics and the quality of education. A primary concern is privacy, as generative technologies rely on processing vast amounts of personal data, potentially jeopardizing the security of this information and compromising students' privacy. Data breaches, if they occur, could have far-reaching consequences, not only for individuals but also for the educational institutions employing these technologies (Farrelly & Baker, 2023). Moreover, ensuring the quality of AI-generated synthetic content remains a critical issue. Without rigorous and competent human oversight, generative AI systems may fail to produce high-quality, relevant educational materials, as

they currently lack the ability to critically evaluate information to the same standard as humans (Arora & Arora, 2022; AlAli & Wardat, 2024).

The latest developments indicate that generative AI is poised to play an increasingly pivotal role in the educational process. By facilitating personalized and inclusive learning experiences, these technologies are expected to become integral components of innovative educational methodologies (Holmes et al., 2021). However, it is crucial to ensure that technological advancements are complemented by the establishment of comprehensive regulatory and ethical frameworks. Such measures are necessary to guarantee that the application of generative AI remains transparent, secure, and beneficial for all stakeholders involved in the educational ecosystem (Šantavý, 2023; Petrovska et al., 2024).

Generative artificial intelligence possesses the potential to fundamentally transform educational methodologies and approaches. Its capacity to generate personalized and adaptive learning content presents unprecedented opportunities to enhance both the effectiveness and inclusivity of education. Nevertheless, while these benefits are significant, it is essential to address the accompanying challenges, including ethical considerations and potential impacts on the quality of education. If these obstacles are effectively mitigated, generative AI could play a pivotal role in shaping a learning environment that is not only technologically sophisticated but also equitable and inclusive for all students.

3.2 Educational Needs of Generation Z

Generation Z, encompassing individuals born between 1997 and 2012, represents a cohort shaped by the rapid advancement of technology and the pervasive influence of the digital era. This generation has grown up with early access to the internet and actively engages with modern technologies, including smartphones, tablets, and social media platforms. For Generation Z, the digital realm serves as a second home – a space where they communicate, seek information, and express their ideas and opinions (Bogomaz et al., 2020). These characteristics significantly influence their expectations of society, particularly regarding the educational process and the role of educational institutions. Traditional pedagogical approaches are increasingly proving inadequate in addressing the distinct needs of this generation. Consequently, there is a pressing need for educational institutions to undergo substantial transformations in their didactic methodologies to align with the demands of a rapidly evolving world (Atmaja & Khalid, 2023; Gherman et al., 2021).

One of the defining characteristics of Generation Z is their exceptional level of digital literacy. From an early age, this generation has embraced the intuitive use of technological devices, thereby reshaping pedagogical approaches and challenging educational institutions to adapt. For Generation Z, modern technologies are not merely tools but an integral part of their daily lives, leading them to naturally expect their seamless integration into educational processes (Miliou & Angeli, 2021; Szymkowiak et al., 2021). Higher education institutions that successfully embed technology into their curricula can provide students with not only effective but also engaging and interactive learning experiences. For instance, virtual learning environments and interactive online platforms have been shown to sustain students' attention and enhance their engagement, fostering conditions conducive to improved learning outcomes (Mao et al., 2024).

Generation Z exhibits a strong preference for educational approaches that prioritize their individual needs. The personalization of the learning process has become increasingly significant, incorporating adaptive technologies that enable learners to progress at their own pace while accessing diverse learning resources (Hashim et al., 2022). Generative artificial intelligence plays a pivotal role in this context by facilitating the creation of personalized learning materials and dynamically addressing learners' specific needs. These systems

effectively reduce barriers associated with traditional education, such as rigid schedules and limited flexibility (Mezeiová, 2019).

In addition to personalization, Generation Z places significant emphasis on collaborative learning approaches. The ability to work effectively in teams and address problems collectively is crucial for this generation. Consequently, educational institutions face the challenge of incorporating interactive simulations, collaborative projects, and digital platforms that facilitate teamwork into their curricula. Generative artificial intelligence plays a pivotal role in fostering environments where students can engage in simulated scenarios requiring real-world collaboration (Gmeiner et al., 2022). Such interactivity not only enhances the learning process but also nurtures social and communication skills, which are increasingly recognized as essential for successful career development in the modern world (Benmamoun, 2023).

The cultivation of critical thinking and problem-solving abilities represents a fundamental objective for educational institutions aiming to equip Generation Z students with essential competencies. Addressing the challenges currently encountered by these students necessitates an analytical mindset and the capacity to assess information based on its relevance and credibility (Baidoo-Anu & Ansah, 2023). Generative artificial intelligence offers opportunities to design intricate learning scenarios that replicate real-world problems, facilitating the practical application of theoretical knowledge (Kadaruddin, 2023). These tasks not only enhance analytical and creative thinking but also prepare students for a dynamic professional environment characterized by complexity and continuous change (Štuikys et al., 2020).

The educational needs of Generation Z are profoundly influenced by their unique experiences in a highly interconnected and technology-driven environment. An analysis highlights four critical dimensions: digitization, personalization, collaboration, and critical thinking (Atmaja & Khalid, 2023). For educational institutions aiming to equip this generation to navigate the complex challenges of the modern world, it is imperative to integrate these dimensions into their pedagogical practices (McInnes et al., 2023). Moreover, generative artificial intelligence emerges as a transformative tool, offering substantial potential to facilitate these objectives (Matthew et al., 2023). By adopting adaptive and innovative strategies, educational institutions can ensure a sustainable competitive advantage in fostering the success of their students (Urano et al., 2022).

3.3 Impact of AI on Critical Thinking

Generative artificial intelligence (AI) is increasingly integrated into educational environments, significantly influencing the cultivation of essential 21st-century competencies, including critical thinking and creativity (Creely & Blannin, 2023). Critical thinking, defined as the ability to analyze, synthesize, and evaluate information through logical reasoning, represents a foundational skill necessary for students to navigate an information-saturated digital era effectively (Caratozzolo & Alvarez-Delgado, 2021). For Generation Z, raised amid rapid technological advancements, mastering these competencies is imperative to filtering, interpreting, and applying vast amounts of information effectively (Matthew et al., 2023).

Generative AI offers unique opportunities for fostering critical thinking skills through innovative search tools, granting students interdisciplinary access to diverse information sources and varied approaches to the issues being explored (Creely & Blannin, 2023). By facilitating the examination of multiple interpretations of historical events or enabling the formulation of alternative scientific hypotheses, AI encourages students to engage with contrasting perspectives on a given topic (Lin, 2023). This engagement fosters a more thorough evaluation of evidence and the development of well-founded, independent conclusions (Farrelly & Baker, 2023; van den Berg & du Plessis, 2023). Such processes are

particularly vital in contemporary education, as they underscore the integration of theoretical and practical knowledge, thereby advancing a holistic approach to learning (Kadaruddin, 2023).

Generative AI offers a significant advantage in its ability to assist students in processing complex data sets. Through the application of advanced algorithms capable of identifying key patterns and relationships within data, AI facilitates the analysis of intricate problems, thereby enhancing the processes of analyzing, comparing, and synthesizing diverse information sources – processes closely linked to higher cognitive functions (Zhang, 2023). Nevertheless, despite these advantages, concerns persist regarding the potential for students to develop an overreliance on technological tools, which may, in turn, diminish their capacity for independent problem-solving and critical analysis without direct technological support (Abdelghani et al., 2023).

The integration of generative AI into educational environments presents substantial challenges that must be addressed. Among the most critical is the potential erosion of students' autonomy in evaluating information, as excessive dependence on AI tools may hinder their capacity for independent and critical analysis (Michel-Villarreal et al., 2023). This concern necessitates the development of a well-defined teaching methodology that strikes an equilibrium between traditional instructional approaches and the incorporation of modern technologies (Owoc et al., 2021; Brdička, 2023). Additionally, the imperative of information verification has grown increasingly urgent in an era characterized by widespread misinformation. While AI demonstrates considerable potential in identifying fake news and assessing source credibility (Ganguli et al., 2022), it can significantly enhance students' ability to discern reliable and pertinent information (Harshvardhan et al., 2020). To maximize the effectiveness of this approach, educational institutions must actively promote student engagement in the information verification process.

Generative artificial intelligence holds significant potential to enhance the development of students' critical thinking skills in the digital age. To fully harness this potential, it is essential to clearly delineate the role of AI within the educational process and to establish learning environments where technology serves as a tool to support and enrich education, rather than replacing traditional methods. The successful integration of AI requires a balanced approach that respects established pedagogical practices while effectively incorporating innovative technologies to optimize the learning experience.

3.4 Verifying the Accuracy of Information

In the digital era, marked by an unprecedented flow of information, the critical evaluation of data accuracy and relevance presents a fundamental challenge for society as a whole. Generation Z, shaped by a constant influx of digital content, faces pressing questions regarding source credibility and the cultivation of media literacy. Generative artificial intelligence (AI) models emerge as potentially transformative tools to enhance the educational process, particularly by empowering students to filter and assess information more effectively (Yan et al., 2024). These AI models possess the capability to process and analyze vast datasets within a short timeframe, offering educational institutions innovative methods for verifying information (Harshvardhan et al., 2020). In academic contexts, generative AI can identify inconsistencies through cross-verification with reliable databases (Epstein et al., 2023). For instance, in literature reviews, AI can evaluate the quality of scientific publications, enabling researchers and students to more efficiently identify relevant and credible sources for their projects (Walczak & Cellary, 2023; Farrelly & Baker, 2023).

Generative AI, beyond its analytical capabilities, significantly contributes to enhancing students' digital and AI literacy. Educational institutions can incorporate AI into course methodologies to provide students with a comprehensive understanding of how these

models operate, including their limitations and associated risks (Putjorn & Putiorn, 2023). This integration should encompass both theoretical instruction and practical applications, such as workshops and simulations, enabling students to critically assess AI outputs within realistic scenarios (Relmasira et al., 2023).

Despite the considerable opportunities presented by generative AI, its application in academia is accompanied by notable risks. One of the primary concerns is the dissemination of unverified information and hypothetical content. AI models that have not undergone rigorous testing may inadvertently produce misleading or even inaccurate outputs (Tang et al., 2023). As Šeredová (2024) emphasizes, ensuring the transparency and accountability of AI systems is a crucial prerequisite for their effective integration into educational contexts. Transparency, in this regard, necessitates that the model is capable of elucidating the input data and the processes underpinning its conclusions (Lin, 2023). Consequently, the establishment of clear regulations and methodological standards governing the academic use of AI is rightly underscored as a critical imperative (Harshvardhan et al., 2020).

Generative AI offers substantial advantages for higher education, particularly in equipping Generation Z with the skills to critically and responsibly process available information. Among its key benefits are the capabilities to analyze and evaluate extensive datasets, thereby enhancing effective learning and advancing scientific research (Lin, 2023). Nevertheless, it is imperative to address the current and potential risks associated with the misuse of this technology, prioritizing transparency and fostering a culture of lifelong learning in the integration of AI technologies (McInnes et al., 2023). Higher education institutions bear a pivotal responsibility in preparing students to engage intelligently and ethically with AI, thereby creating conditions that enable Generation Z to navigate the multifaceted challenges of the digital age (Walczak & Cellary, 2023).

3.5 Psychological Impacts of AI on Students

Growing up in an era of rapid technological advancements and pervasive digital connectivity, Generation Z constitutes a distinct research cohort due to their daily interaction with technology. This extensive engagement significantly influences their mental health, social relationships, and learning processes. A particularly notable psychological effect of generative AI lies in its capacity to enhance student motivation and engagement through the personalization of educational materials (Ali et al., 2024). By tailoring content to the individual needs, preferences, and interests of students, generative AI fosters intrinsic motivation, which is essential for a successful educational experience. Such an approach has demonstrated exceptional effectiveness in promoting deeper and more enduring learning, as intrinsic motivation offers greater stability compared to motivation driven by external factors (Kadaruddin, 2023).

Generative AI profoundly influences students' social competencies, potentially hindering the development of essential skills such as teamwork, empathy, and effective communication by substituting human interaction with technological solutions. Increased reliance on AI may exacerbate feelings of loneliness and isolation, negatively affecting students' mental well-being and their capacity for collaborative engagement (Keshishi & Hack, 2023). These challenges underscore the necessity for social-emotional learning programs designed to mitigate the psychosocial consequences of technology use while fostering teamwork and interpersonal skills (Sharples, 2023; Keshishi & Hack, 2023; Kopecký, 2023).

This issue is often compounded by digital overload, where students face continuous demands to manage evolving technological requirements and navigate an increasingly dynamic digital landscape. Such pressures can result in heightened stress and anxiety due to

information overload and an inability to process it effectively (Brdička, 2023; Ali et al., 2021). Conversely, when appropriately implemented, generative AI can mitigate these challenges by simplifying information access and enhancing the learning process, thus fostering a more effective educational environment (Kadaruddin, 2023; Tzirides et al., 2023).

Project-oriented and practical education emerges as a critical foundation for cultivating critical thinking, practical skills, and comprehensive preparation for future professions within the digitally transforming economy. Psychologically, this approach enhances self-confidence in addressing complex tasks (Wan & Hu, 2022). Incorporating AI technologies into project-based tasks enables students to apply theoretical knowledge to real-world problems, thereby enriching their cognitive abilities and critical thinking skills (Ito et al., 2021). Moreover, this methodology promotes active learning, fosters innovative thinking, and strengthens adaptability and resilience to stress in an ever-evolving environment (Tseng, 2021).

Generative AI offers transformative opportunities for higher education tailored to Generation Z, yet it also presents challenges linked to complex psychological and social implications. While this technology has the capacity to enhance student motivation and engagement, foster social interactions, and support cognitive development, its misuse may result in diminished motivation to cultivate essential social and cognitive competencies (Kadaruddin, 2023; Walczak & Cellary, 2023). Consequently, educational institutions must adopt strategic and critical approaches to implementing AI, aiming to harmonize technological innovation with the cultivation of students' competencies and talents (Matthew et al., 2023). Thoughtfully designed pedagogical frameworks that integrate technology with meaningful human interaction can mitigate risks while amplifying the advantages of generative AI, thereby enabling Generation Z to realize their full potential in the educational process (Petrovska et al., 2024).

4 Analysis Results

Generative artificial intelligence (AI) has demonstrated significant potential in crafting personalized and hyper-personalized learning strategies tailored to the unique needs and abilities of individual students. This approach involves a sophisticated adaptation of educational content, accounting for students' learning pace, style preferences, and existing knowledge, which consequently leads to a marked increase in student motivation and active participation (Kadaruddin, 2023). Empirical research indicates that adaptive learning platforms utilizing generative AI can enhance academic outcomes through the optimization of learning resources and pedagogical strategies (Farrelly & Baker, 2023). These technologies enable students to concentrate specifically on areas requiring improvement, thus reducing cognitive load and fostering a deeper understanding of the curriculum. However, despite these advantages, there are notable challenges, including the potential over-reliance on technology, which may hinder the development of critical thinking and independent problem-solving skills (Abdelghani et al., 2023).

Furthermore, generative AI presents considerable opportunities for enhancing students' critical thinking abilities by facilitating interdisciplinary connections and exploring diverse perspectives on the issues at hand. Generative algorithms can model hypotheses across various scientific disciplines, thereby fostering students' analytical and evaluative skills (Coleman, 2023; Brdička, 2023). This process is vital for bridging theoretical knowledge with practical application (van den Berg & Du Plessis, 2023), thereby supporting a holistic approach to education and promoting higher levels of cognitive engagement (Creely & Blannin, 2023). Nevertheless, the over-reliance on AI may diminish students' capacity for independent and critical analysis, emphasizing the need to develop a methodology that strikes

a balance between technological tools and traditional pedagogical approaches, ensuring the cultivation of autonomous critical thinking (Dron, 2023).

Generative artificial intelligence (AI) represents an innovative approach to supporting inclusive education, enabling the creation of personalized educational materials tailored to students with diverse learning styles, language barriers, and specific needs. These technologies facilitate the generation of multimodal educational content, including audiovisual materials designed for students with visual or hearing impairments (Kadaruddin, 2023; Tzirides et al., 2023), thus significantly reducing educational barriers and enhancing equality of access to education (Jauhiainen & Garagorry Guerra, 2023; Mao et al., 2024). It is important to recognize that the inclusive capabilities of generative AI foster greater diversity in the academic environment, thereby promoting collaborative learning and enriching professional discourse with a wider array of perspectives, which are essential for comprehensive problem-solving and the development of critical thinking. The significant potential of generative AI in inclusive education also lies in its capacity to dynamically respond to the evolving needs of students, ensuring the continuous optimization of the educational process and the more effective achievement of educational goals (Petrovska et al., 2024).

However, the integration of generative AI in education presents not only significant opportunities but also risks, particularly related to the digital overload faced by students. Often overwhelmed by excessive information and the constant need to adapt to a rapidly changing technological landscape, students may experience heightened levels of anxiety and stress, negatively impacting their cognitive and emotional capabilities (Kopecký, 2023; Walczak & Cellary, 2023). To mitigate these adverse effects, it is crucial to implement technological solutions that strike a strategic balance. These solutions should not only streamline access to relevant information but also prioritize students' psychological well-being to prevent potential overload (Kadaruddin, 2023). This holistic approach will enable the effective utilization of advanced technologies while maintaining equilibrium between adaptation demands and the safeguarding of students' mental health, resulting in an enhanced educational process that is both technologically advanced and sustainable in terms of human potential (Tzirides et al., 2023).

Generative artificial intelligence (AI) plays a pivotal role in enhancing students' digital and media literacy by enabling the creation of dynamic, interactive learning environments. Through workshops and practical simulations, students acquire advanced skills in critically analyzing AI-generated outputs, recognizing inherent biases, and systematically verifying the accuracy of the information provided (Putjorn & Putiorn, 2023; Šeredová, 2024). This holistic approach is crucial for preparing students to navigate the complexities of the information age, as it fosters not only a technological understanding of the subject matter but also deep reflection on the social, ethical, and practical implications of AI applications (McInnes et al., 2023). Such educational methods further cultivate critical thinking, enhancing students' capacity to effectively navigate a complex digital environment and address challenges posed by modern technologies (Sharples, 2023).

Moreover, generative AI has a significant impact on student motivation by providing personalized educational content tailored to individual needs and learning styles, thus promoting self-paced learning and enabling students to concentrate on areas requiring particular attention (Kadaruddin, 2023). However, excessive reliance on AI may reduce social interaction, hindering the development of essential social and emotional competencies such as teamwork, empathy, and interpersonal skills (Brdička, 2023; Stone, 2023). Therefore, it is imperative that AI integration incorporates activities that foster cooperative learning and strengthen students' social connections and emotional intelligence (Keshishi & Hack, 2023). This approach ensures a balanced educational model that combines technological tools with

the development of social and emotional skills, critical for students' success in complex social and professional settings. Thoughtful integration of AI not only supports autonomous learning but also creates opportunities for collaborative, socially-oriented learning, ultimately enhancing students' preparedness for future challenges (Ju, 2023).

The implementation of generative artificial intelligence (AI) presents fundamental challenges regarding privacy, data security, and the assurance of synthetic content quality. Generative AI has the capacity to produce information that may be inaccurate or misleading, and without effective regulatory frameworks, this poses significant risks, including the erosion of scientific integrity and the proliferation of disinformation (AlAli & Wardat, 2024). Consequently, it is imperative to establish clear, comprehensive, and ethically grounded regulatory standards to ensure the transparent and responsible application of AI within educational contexts (Wang et al., 2024). These frameworks should not only include robust mechanisms for controlling the quality of synthetic content but also incorporate measures to safeguard privacy and data security, minimizing the potential for unauthorized use or misuse (Kunda, 2023). Addressing these concerns should be prioritized in the formulation of policies governing AI use, ensuring that its potential is maximized without compromising ethical standards and security.

The strategic integration of generative AI into the educational process requires a thoughtful and systematic approach to maintain a balance between technological innovations and established pedagogical practices. Generative AI holds significant promise for fostering the comprehensive development of students, encompassing not only technical competencies but also cognitive, social, and emotional dimensions of education (Petrovska et al., 2024). This holistic approach is vital for cultivating adaptability and critical thinking, which are essential for the thriving academic environment in the rapidly evolving 21st-century workforce (Šantavý, 2023). Therefore, it is crucial not only to implement AI from a technical standpoint but also to provide pedagogical support that enables students to effectively engage with these tools while refining their ability to reflect and apply acquired knowledge across various contexts (Jiayu, 2023).

5 Discussion

Generative artificial intelligence (AI) holds the potential to profoundly reshape the educational process by offering not only instant solutions and personalized content but also by actively fostering the development of metacognitive processes in students. These processes enhance students' ability to learn more effectively and independently solve complex problems, thereby contributing to deeper learning (Yang & Xia, 2023). Current research indicates that generative AI can adapt content to meet individual student needs while also modeling critical thinking and self-reflection processes essential for cultivating analytical skills and a deeper understanding of the curriculum (Loksa et al., 2022). The implementation of such AI systems can mitigate the risks of passivity and overreliance on technology, which are often associated with the misuse of automated solutions (Abdelghani et al., 2023).

By providing targeted support for metacognition and self-regulation, these AI systems can contribute to the creation of educational frameworks that promote autonomous learning and long-term academic benefits. This approach underscores the role of AI as an active facilitator of learning – one that not only adapts content but also equips students with tools to enhance their ability to learn effectively and critically reflect on their learning processes (Yang & Xia, 2023; Loksa et al., 2022).

Moreover, the findings suggest that generative AI can significantly transform inclusive education through content personalization and multimodal approaches. These technologies enable the adaptation of educational materials to diverse learning styles and individual needs,

thereby improving educational accessibility and fostering increased active participation in the learning process (Kadaruddin, 2023; Amresh, 2023). However, this issue raises the critical question of how inclusivity can extend beyond mere personalization to also address social and cultural diversity (Bernstein et al., 2020).

Generative AI can serve as an effective tool for enhancing intercultural communication and fostering key skills that enable students to better understand diverse perspectives on selected issues. This process not only contributes to creating a more inclusive educational environment but also fosters its diversification and dynamism (Benmamoun, 2023). Such an educational approach has the potential to improve academic success while preparing students for life in a globalized, interconnected world, where empathy, cultural understanding, and effective interaction with diverse groups are critical (Farrelly & Baker, 2023). By integrating generative AI in this way, technology is synergistically connected with the development of social and emotional skills, establishing a framework for lifelong learning and active engagement in complex social contexts (Sharples, 2023).

However, it is important to recognize that technologies, including AI, are not inherently neutral or objective – rather, their design and implementation are inevitably influenced by human values, preferences, and cultural contexts. Consequently, it is essential to analyze how a balanced integration of AI can support, rather than replace, human interaction and collaboration. Generative AI can act as a catalyst for interactive discussions in academic settings, with students using AI-generated data as a starting point for critical analysis and constructive argumentation (Creely & Blannin, 2023). This approach not only maximizes the potential for personal exchange but also enhances students' ability to critically engage with both academically relevant and societal issues (Sharples, 2023). The outcome is an improvement in their analytical and communication skills, which are essential for both their academic and professional development (Dron, 2023).

The personalization of generative artificial intelligence (AI) represents a significant advancement in education; however, scholarly debate underscores the necessity for comprehensive ethical frameworks and regulatory measures to accompany these technologies. Generative AI systems should be developed with a focus on algorithmic transparency, enabling users to better understand the decision-making processes underlying AI-generated outputs (Chaudhry et al., 2022). Simultaneously, it is crucial to integrate clear mechanisms for feedback and evaluation in AI implementation, thereby facilitating greater control and ensuring the alignment of technologies with ethical standards (Holmes et al., 2021). Such an approach would not only allow students to engage with AI-generated content, but also actively involve them in the creation process, thereby enriching their educational experience with a critical dimension that fosters responsible technology use (Lin, 2023). This model of education transcends individual benefit and encourages students to view AI as a tool for broader societal advancement.

An educational system that promotes a participatory form of AI-based learning can significantly enhance the development of critical thinking, civic responsibility, and a deeper understanding of the societal implications of technological progress. In this way, students would be prepared not only for complex professional challenges, but also for active participation in societal debates regarding the ethical use of technological innovations (Rusandi et al., 2023; Campos, 2023). A participatory educational approach not only addresses environmental and societal issues but also fosters collaboration and interdisciplinary thinking (de Sousa, 2021).

6 Conclusion

This study aims to analyze the impact of generative artificial intelligence (AI) on higher education for Generation Z, with a focus on its potential to personalize learning processes, foster the development of critical thinking, and address the psychological dimensions of learning. Key findings suggest that generative AI offers significant advantages, such as enhancing student engagement and motivation through personalized content, while also supporting the development of analytical skills essential for navigating an information-saturated environment (Farrelly & Baker, 2023). However, challenges have also emerged, including the potential overreliance on technology, which could undermine students' ability to solve problems independently, as well as negative effects on social interactions and emotional well-being (Walczak & Cellary, 2023).

The importance of these findings extends well beyond traditional educational methodologies, underscoring the need for a strategic integration of AI to ensure the balanced development of technical, cognitive, and social competencies. Research indicates that the successful implementation of generative AI has the potential to profoundly transform the education of Generation Z, but only if ethical concerns, privacy protection, and emotional well-being are adequately addressed (Kadaruddin, 2023).

Despite the significant benefits offered by this technology, several limitations must be considered when interpreting the results of this study. Notably, the literature selection was confined to English and Slovak sources, and the analysis was constrained by the methodological frameworks of the studies reviewed. To gain a more comprehensive understanding of this issue, future research should incorporate larger and more diverse samples, alongside a more in-depth investigation into the practical applications of AI across different educational settings, as well as an assessment of its long-term psychological effects.

Practical recommendations emerging from this study emphasize the development of educational strategies that integrate AI in ways that foster active learning, social interaction, and emotional intelligence. Generative AI should be viewed as a tool to enhance and support the educational process, rather than replace it. This approach can ensure the sustainable and holistic development of students, strengthening their capacity to navigate the challenges of contemporary society. Thus, the study contributes to the growing body of knowledge surrounding Generation Z education and underscores the necessity of a balanced approach to AI implementation – one that maximizes its benefits while mitigating potential risks.

Ultimately, this study offers a broader framework for understanding the complex integration of generative AI in education and advocates for the responsible and effective use of this transformative technology, which holds the potential to become a pivotal element in reshaping the education system in the 21st century.

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THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE SUSTAINABLE DEVELOPMENT OF SMALL AND MEDIUM-SIZED ENTERPRISES IN THE SLOVAK BUSINESS ENVIRONMENT

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Abstract:

This study examines the strategic use of artificial intelligence (AI) as a tool to support the sustainable development of small and medium-sized enterprises (SMEs) in Slovakia. Given the growing importance of AI in the global business environment and the critical role of SMEs in the Slovak economy, the research focuses on identifying both opportunities and threats related to AI implementation in this sector. Through a literature review and a comprehensive analysis of current trends, this study explores the potential benefits of implementing AI in SMEs, such as increased operational efficiency, cost optimization, and improved quality of decision-making processes. Additionally, the main barriers faced by SMEs in implementing AI were identified, including limited financial and human resources, lack of technical expertise, and complications arising from regulatory and ethical issues. The findings of this study suggest that, despite the considerable benefits AI can offer to SMEs, the deployment of these technologies faces multiple challenges. Among the most significant barriers are the lack of availability of qualified personnel, high initial implementation and maintenance costs, and inadequate information on effective AI practices. These factors significantly limit the innovation potential of SMEs. Furthermore, stringent regulatory requirements and ethical dilemmas present additional obstacles to the practical application of AI technologies. This study concludes by recommending that strategic investment in technology infrastructure, employee education and training, and the creation of a supportive regulatory and policy framework are essential to overcoming these barriers. Only through such initiatives can SMEs fully exploit the potential of AI, enhance their competitiveness, and achieve sustainable growth in a dynamic global marketplace.

Key words:

Artificial Intelligence (AI). Competitive Advantage. Cost Optimization. Digital Transformation. Small and Medium Enterprises (SMEs). Sustainable Development. Technological Innovation.

1 Introduction

In today's business environment, artificial intelligence (AI) plays an increasingly vital role in supporting the sustainable development of small and medium-sized enterprises (SMEs). Digitalization and technological advances present new opportunities and challenges that demand innovative approaches and comprehensive transformation strategies. Implementing AI in SMEs can provide substantial benefits, such as increased efficiency, enhanced decision-making processes, and optimized operational costs (Hernandez et al., 2023). Despite these potential benefits, SMEs often face resource constraints that limit their ability to effectively leverage the latest technological innovations (Chaudhuri et al., 2022). According to Rawindaran et. al. (2021), the adoption rate of AI among SMEs is lower compared to larger enterprises, which may threaten their competitiveness. These limitations highlight the need for targeted support and investment in technology for SMEs. Studies indicate that SMEs form a significant part of the economy of the Slovak Republic as well as the European Union, making their technological advancement crucial for overall economic growth in the region (Dossou et al., 2022). SMEs account for 99.9% of all enterprises in Slovakia and employ over 72% of the workforce, underscoring their pivotal role in economic development (European Commission, 2022). However, despite their significance, only 11%

of Slovak SMEs have adopted AI technologies, which is below the EU average of 18% (European Commission, 2022). This digitalization gap highlights the urgent need for strategic initiatives to promote AI adoption among Slovak SMEs. To overcome existing barriers and fully realize the potential of AI, SMEs need not only financial investment but also a strategic and systematic approach to technology implementation at both the local level and within the broader framework of the European Union's long-term strategy (Walshe et al., 2021).

The implementation of AI in SMEs is intrinsically linked to digitalization, which presents new opportunities for automation, reaching target audiences, and analyzing large volumes of data. AI can be effectively utilized in various domains such as customer service, inventory management, demand forecasting, and personalized marketing (Hernandez et al., 2023). In the context of sustainable development, AI can enhance resource efficiency, reduce environmental impact, and foster corporate social responsibility (Ayoubi et al., 2023). For instance, predictive analytics enables SMEs to optimize supplier-customer processes and prevent unnecessary downtime, leading to substantial savings in energy and materials. A study by the World Economic Forum (2021) found that implementing AI for predictive process analysis can reduce resource management costs and boost operational efficiency by up to 20% (Fan et al., 2023). These findings clearly demonstrate that AI is not merely a tool for enhancing prosperity but also a means to achieve sustainability and social responsibility on a larger scale (Dauvergne, 2020). Thus, the use of AI in SMEs has the potential to deliver benefits across multiple levels, from economic growth to environmental protection.

Future trends in AI suggest that general artificial intelligence (AGI) could bring about a profound transformation in the economy, business environments, and business models. With the ability to perform a wide range of tasks at the level of a competent worker, AGI has the potential to fundamentally change how SMEs operate and interact with customers and suppliers (Kulkov et al., 2023). This transformation calls for a new approach to leadership – one that emphasizes adaptability, innovation, and sustainability (Di Vaio et al., 2020). According to Walshe et al. (2021), organizations prepared to implement AGI will gain a competitive advantage, allowing them to adapt more quickly to market changes and penetrate global markets more effectively. In Slovakia, the impact of these changes will largely depend on the ability of SMEs to adapt to new technological trends and leverage them to boost competitiveness (Goralski & Tan, 2020). The key question is how the government and relevant institutions can provide support and create favorable conditions for AI development and implementation within SMEs. Such support is crucial to ensuring that SMEs are prepared for future challenges and can fully capitalize on the benefits that AI and AGI promise (Hernandez et al., 2023).

The implementation of AI and innovative smart technologies necessitates a fundamental shift in the management and organization of business processes, emphasizing flexibility and the ability of management to adapt to rapidly evolving technological conditions (Lutfi et al., 2022). SMEs must not only adopt these new technologies but also transform their business models to effectively respond to dynamic changes in both domestic and global markets (Chaudhuri et al., 2022). Such transformations may include a move towards decentralized management, the engagement of dedicated and flexible work teams, and the integration of technology to boost productivity and enhance customer service (Panigrahi et al., 2023). Equally important is the ability of SMEs to provide continuous employee training aligned with the demands of working with new technologies. In light of these factors, the active engagement of SMEs in the broader innovation ecosystem can help them meet challenges and capitalize on opportunities presented by AI (Hernandez et al., 2023). Thus, it is crucial for SMEs not only to implement new technologies but also to actively contribute to their development and adaptation to local conditions.

The aim of this paper is to conduct an in-depth analysis of recent scientific studies and empirical case studies regarding the application of AI in SMEs, in order to identify the main opportunities and challenges that these enterprises face when integrating AI technologies. This analysis provides an overview of current trends and best practices, while offering insights into how SMEs can increase their productivity, innovation potential, and long-term sustainability in the context of a dynamically changing technological environment.

2 Methodology

This study conducted a systematic literature review aimed at exploring the use of Artificial Intelligence (AI) as a strategic tool for supporting the sustainable development of small and medium-sized enterprises (SMEs) in Slovakia. The aim was to critically assess the current state of knowledge, identify current trends, opportunities, and barriers associated with the adoption of AI in the context of SMEs. Critical analysis and interpretation of the obtained data allowed us to map the potential of AI in improving business performance, increasing operational efficiency, and optimizing decision-making processes in SMEs. Relevant sources were identified through reputable databases such as Web of Science, Scopus, Google Scholar, and ResearchGate. The search was conducted using keywords including “artificial intelligence”, “SMEs”, “MSPs”, “sustainable development”, and “Slovakia”, applying Boolean AND and OR operators to efficiently combine the terms. The selection of sources was subject to strict inclusion criteria, which included peer-reviewed publications from the period 2015 to 2023, available in Slovak or English, and directly relevant to the topic at hand. From an initial pool of 120 articles identified through our database search, 45 studies met the inclusion criteria and were selected for comprehensive analysis based on their direct relevance to AI implementation in SMEs between 2015 and 2023.

The process of selecting relevant studies consisted of a rigorous evaluation of titles and abstracts, followed by a detailed study of the selected articles based on well-defined criteria. Systematic categorization and comparative analysis of the results allowed for the identification of key convergences and divergences in the current literature. Non-peer-reviewed sources, studies outside the business context, and publications in languages other than Slovak and English were excluded to ensure data consistency. To assess the quality of the included studies, the Critical Appraisal Skills Programme (CASP) tool was used, providing a framework for evaluating methodological rigor and the validity of the findings. The data extraction process was conducted systematically, recording key variables such as research objectives, applied methodology, main findings, and identified methodological weaknesses. The extracted data were systematically analyzed using the NVivo software, employing thematic analysis techniques to identify and categorize prevailing themes and patterns concerning the challenges and opportunities of AI adoption in SMEs. In this way, it was possible to ensure the integrity of the data and establish a relevant basis for further analysis and synthesis of the findings.

Synthesis and critical analysis of the collected data were carried out using advanced thematic analysis to identify the main themes, patterns, and theoretical concepts in the available literature, focusing on the benefits and challenges of implementing artificial intelligence (AI) in small and medium-sized enterprises (SMEs). This analysis provided an in-depth understanding of the mechanisms through which AI can contribute to increasing the efficiency and competitiveness of SMEs, while identifying the systemic barriers that must be overcome for successful adoption of these technologies.

In this context, future trends in the field of digitalization and technological innovations were also analyzed, indicating the possible evolution of AI adoption in the business environment. The results of the thematic analysis supported the formulation of concrete

recommendations for practice, which include strategic investments in education and the development of digital competencies, the creation of an enabling regulatory environment, and the promotion of collaboration between SMEs, academic institutions, and technology partners. These recommendations reflect the need for a comprehensive approach to enable SMEs not only to overcome existing barriers but also to proactively seize the opportunities presented by the development of AI for long-term sustainable growth and innovation momentum.

The entire research process was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodological framework, which ensures a high level of transparency, consistency, and reproducibility of results. The implementation of this approach allowed for the careful selection and critical appraisal of literature sources, thereby significantly minimizing the risk of bias and increasing the overall validity and relevance of the findings. The results of this study not only provide a comprehensive theoretical basis for a deeper understanding of the issue under investigation but also reveal fundamental research gaps that require further scientific exploration. By addressing these gaps, the potential of AI in the context of SMEs can be fully realized, emphasizing long-term sustainability and innovative growth.

In the preparation of this study, the author utilized generative artificial intelligence tools, specifically ChatGPT, as a supplementary aid in refining the academic writing style and enhancing clarity. Following the application of these AI-driven suggestions, the author conducted a rigorous review and comprehensive editing process to ensure the scholarly integrity, accuracy, and coherence of the final document. Consequently, the author assumes full accountability for the content, conclusions, and overall quality of this study.

3 Literature Review

3.1 Current State of Research Problem

In the post-COVID era, artificial intelligence (AI) has emerged as a key driver of transformation across major sectors of the global economy. Innovative technologies and their adoption are particularly crucial for small and medium-sized enterprises (SMEs), which constitute the backbone of the European Union's economy. According to Oricchio et al. (2017), SMEs represent over 99% of all enterprises in the EU and employ approximately two-thirds of the workforce, underscoring their critical role in economic development and transformation in the digital age. However, these enterprises face significant challenges, particularly concerning limited financial and human resources, which directly affect their capacity to adopt and implement innovative technologies. This paradox between the potential benefits and existing constraints of SMEs highlights the need for a strategic approach to AI implementation that accounts for their unique needs and limitations (Agarwal et al., 2024). Despite the evident advantages of AI, the adoption rate among Slovak SMEs remains low. According to a Eurobarometer survey conducted in November 2023, as many as 78% of small and medium-sized enterprises (SMEs) within the European Union reported challenges in recruiting workers with the requisite skills. A shortage of skilled labor impedes 63% of SMEs in their business operations, with 45% indicating that it restricts their adoption and utilization of digital technologies, and 39% noting that it limits their capacity to transition toward environmentally sustainable economic activities (European Commission, 2023). These challenges significantly impede the ability of SMEs to leverage AI for competitive advantage.

The significance of AI for SMEs lies in its capacity to facilitate large-scale data analysis, optimize decision-making processes, and enhance operational management. For instance, AI-driven chatbots can support customer service by providing instant responses to consumer inquiries, thereby boosting customer satisfaction and substantially reducing

customer support costs (Martins De Andrade & Tumelero, 2022). Predictive analytics tools further aid SMEs in managing inventory and forecasting demand, minimizing inventory costs and improving product availability (Abousaber & Abdalla, 2024). These examples illustrate how innovative AI-powered technologies enable SMEs to utilize their limited resources more efficiently, thereby enhancing their competitiveness in the market. Research by Mazingue (2023) affirms that SMEs implementing AI technologies have achieved notable improvements in productivity, service quality, and positive customer feedback. Such findings indicate that the adoption of AI can serve as a critical success factor for SMEs within the evolving digital economy and the context of Industry 4.0 (Prentice & Nguyen, 2020).

Despite its evident advantages, the adoption of AI among SMEs remains in its early stages, reflecting disparities in perceptions of AI's current capabilities and the practical realities of its implementation. One of the primary reasons for the limited uptake of AI models is the lack of information and knowledge on effectively adapting and applying these technologies. Whitney (2024) observes that many SMEs lack the necessary technical expertise or personnel to spearhead the AI adoption process. Additionally, the high costs associated with the implementation and maintenance of these technologies present a significant barrier for businesses operating with constrained budgets (Schönberger, 2023). Furthermore, regulatory and ethical challenges must be considered, including adherence to data protection laws and the introduction of customer privacy measures, particularly in the context of the EU Artificial Intelligence Regulation (the AI Act), which took effect on 1 August 2024 (Aminov et al., 2023). These challenges underscore the necessity for comprehensive governmental and institutional support, as well as continued research to assist SMEs in overcoming barriers to AI adoption (Crockett et al., 2023). Future research should prioritize the development of cost-effective AI solutions for SMEs and the creation of frameworks that facilitate their implementation.

Implementing AI on a larger scale requires a rethinking of the general organizational structure of SMEs to ensure increased flexibility and adaptability (Taherizadeh & Beaudry, 2023). To effectively adopt these smart technologies, a broader transformation of corporate culture is necessary – one that fosters innovation, learning, and adaptability to new technological trends (Kurup & Gupta, 2022). The role of a new type of leader is crucial in this digital age, as they must inspire their teams and promote continuous upskilling and lifelong learning among employees (Morandini et al., 2023). Effective leadership, coupled with consistent alignment between strategic business objectives and technological innovation, is key for SMEs to navigate the dynamics of global markets and optimize their operations through AI (Govori & Sejdija, 2023). Therefore, there is a need for accessible and flexible training programs that help both workers and managers understand and implement new solutions, thereby maximizing AI's potential to meet the transformation needs of SMEs in the context of the new economy and Industry 4.0 (Chaudhuri et al., 2022).

3.2 Role of Artificial Intelligence in SME Digitalization

In recent years, the processes of digitalisation and AI implementation have emerged as major catalysts for transformational change in the business environment. In this context, small and medium-sized enterprises (SMEs) are increasingly exploring the potential of artificial intelligence (AI) to enhance their competitiveness and operational efficiency. AI implementation in SMEs encompasses a wide range of applications tailored to the specific needs of each business. For instance, automating administrative tasks allows employees to concentrate on strategic activities, thereby increasing their added value to the organisation (Schönberger, 2023). Beyond automation, SMEs leverage AI for advanced market data analysis and the identification of new business opportunities, with particular emphasis on evolving market conditions. Nagy (2023) highlights that SMEs integrating predictive

analytics tools have achieved revenue increases of up to 20% compared to competitors. The value of AI extends beyond efficiency gains; it also facilitates market expansion and enhances the prediction of market trends (Mirwan et al., 2023). In the retail sector, AI optimises inventory management and forecasts demand, while in manufacturing it improves quality through predictive optimisation (Schönberger, 2023; Rojek et al., 2023). Thus, SMEs gain a competitive edge, better satisfy customer needs, and ultimately strengthen their market position.

In the realm of customer service, AI has the potential to fundamentally transform how SMEs engage with customers and interact with consumer segments. The adoption of intelligent chatbots and virtual assistants facilitates continuous customer service support, enhancing customer satisfaction and loyalty. These technologies not only reduce customer support costs by up to 50% but also increase customer satisfaction by 25% (Nagy, 2023). Moreover, AI-driven personalized marketing allows SMEs to target their campaigns with greater precision, thereby improving ROI. These approaches optimize the utilization of SMEs' limited resources and contribute to long-term prosperity by fostering personalized relationships with customers (Gao & Liu, 2022). In the context of digitalization, customers increasingly expect swift and tailored services; consequently, integrating AI into customer service and marketing has become a prerequisite for sustaining high competitiveness (Dumitriu & Popescu, 2020).

Despite these advantages, implementing AI in SMEs presents several challenges. Beyond technical and financial barriers, SMEs frequently struggle with integrating AI into their existing systems. According to the European Court of Auditors (2024), successful AI implementation requires a comprehensive analysis of existing processes to identify areas with the highest potential for optimization. Furthermore, SMEs must have access to sufficient financial resources and the technological infrastructure necessary for AI adoption (Šantavý, 2023; Kondratenko et al., 2023). A significant obstacle is the lack of skilled personnel, with up to 60% of SMEs citing a shortage of experts as a major barrier to AI adoption (Whitney, 2024; Schönberger, 2023). These challenges underscore the importance of support from government institutions and technology partners, who can provide SMEs with the requisite expertise and facilities (Hernandez et al., 2023). Additionally, ethical and legal issues, such as privacy and algorithmic transparency, further complicate AI implementation (Oricchio et al., 2017). In this context, it is essential to invest not only in technology but also in continuous employee education, focusing on the effective and responsible use of AI (Angström et al., 2023).

To fully harness the potential of AI, it is essential that SMEs receive support from a diverse range of stakeholders. Collaboration with technology partners and effective use of available financial resources can help SMEs overcome existing barriers and facilitate the successful adoption of AI (Abbas, 2024; Hernandez et al., 2023). Such support enables SMEs not only to enhance their operational management and reduce costs, but also to seize new opportunities, thereby fostering competitiveness in the evolving economy (Chaudhuri et al., 2022). Government policies and programs aimed at promoting AI adoption are instrumental in providing access to expertise and technological resources (Lutfi et al., 2022; Di Vaio et al., 2020). Future research should focus on developing tailored strategies for AI implementation that meet the specific needs of SMEs, thereby enhancing their prosperity in a globally competitive environment and contributing to overall economic growth (Panigrahi et al., 2023).

3.3 Barriers to AI Adoption in Small and Medium Enterprises

The integration of artificial intelligence (AI) into small and medium-sized enterprises (SMEs) entails a range of complex challenges that impede the effective adoption of this

technology. Among the most critical barriers are the shortage of skilled professionals, the high costs associated with technology implementation, and issues related to cybersecurity (Ministry of Investments, Regional Development and Informatization of the Slovak Republic, 2021). SMEs often lack both the workforce capacity and the technical expertise necessary to successfully incorporate AI into their operations (Rawindaran et al., 2021). Addressing the shortage of experts can partially be achieved through investment in employee education and training (Schönberger, 2023). Furthermore, collaboration with universities and professional institutions can offer SMEs access to essential knowledge and technical skills, facilitating their adaptation to technological challenges (Slovak Business Agency, 2020). Strategic partnerships with technology companies also provide opportunities for SMEs to benefit from specialized expertise and innovative solutions. Investment in human capital, however, is not a one-time remedy but a critical factor for ensuring the long-term competitiveness of SMEs within a rapidly evolving technological landscape (Drábek et al., 2017). The lack of skilled professionals not only hampers the capacity of SMEs to implement AI effectively but also risks inefficient utilization of the technology. In this regard, it is imperative for SMEs to actively foster workforce development and cultivate an environment conducive to innovation and professional growth.

The high cost of technology implementation represents a significant barrier to the adoption of AI in SMEs. Investments in hardware, software, and infrastructure can be prohibitively expensive for smaller businesses. However, the use of cloud services and software-as-a-service (SaaS) models has proven to be an effective solution, as it enables SMEs to access advanced technologies without substantial upfront investments (Whitney, 2024). Cloud-based solutions allow SMEs to scale their technology needs flexibly according to current requirements, thereby reducing capital expenditure and simplifying the digitization process (Modisane & Jokonya, 2021). In addition, SMEs can benefit from various public and private grants and financial programs that support innovation and digitalization, particularly in the context of Industry 4.0. European funds and national initiatives often provide financial resources to promote technological advancement, helping SMEs overcome financial barriers to AI implementation (Patel, 2023). However, securing these funds can be challenging due to the administrative burdens and competitive nature of grant programs. Therefore, it is crucial for SMEs to have access to expert advice and support during the application process (Rahman & Subriadi, 2022). By adopting a comprehensive strategic approach, SMEs can effectively utilize available resources to facilitate technological change and the adoption of AI.

A significant challenge for SMEs in implementing AI is addressing cybersecurity concerns. Many SMEs lack the resources necessary to comprehensively protect their IT infrastructure, leaving them vulnerable to cyber-attacks (HNOnline.sk, 2023; Dasawat & Sharma, 2023; Wallang et al., 2022). Cyber threats can have severe consequences for SMEs, including financial losses, reputational damage, and erosion of customer trust. Engaging external security service providers and implementing best cybersecurity practices can significantly mitigate the risk of cyberattacks (Nishant et al., 2020). External experts provide SMEs with essential technical expertise and tools to secure their systems without requiring substantial investments in internal resources. Moreover, SMEs should prioritize regular security training for employees to raise awareness of cyber risks and reduce the likelihood of human errors leading to security breaches (Dasawat & Sharma, 2023; Wallang et al., 2022). Comprehensive security measures are crucial not only for the successful implementation of AI but also for safeguarding sensitive data. Such measures are essential for the long-term sustainability of SMEs, helping build trust with customers and business partners alike.

Overcoming these challenges is essential for SMEs to effectively adopt AI and secure a sustainable competitive advantage in the global marketplace. Key steps include investing in employee training, utilizing cloud technologies, and collaborating with security experts to

address existing barriers (Schönberger, 2023). Implementing these strategies will allow SMEs to fully harness the potential of AI, thereby strengthening their market position (Paul et al., 2023). Successful AI adoption within SMEs can also contribute to broader economic growth and drive innovation throughout the economy (Govori & Sejdija, 2023). Future research should explore additional approaches to support SMEs in implementing AI and address the ongoing challenges in adapting to technological changes (Hernandez et al., 2023).

3.4 The Impact of AGI on Future Business Practices

Future trends in Artificial Intelligence (AI) indicate that advancements toward General Artificial Intelligence (AGI) could fundamentally transform the economic and business landscape. With its ability to perform diverse tasks and learn from multiple data sources, AGI holds the potential to significantly alter how small and medium-sized enterprises (SMEs) manage operations and engage with customers, suppliers, and the broader market environment. These technologies will enable SMEs to attain higher levels of automation and optimization, thereby enhancing operational efficiency and competitiveness (Dou et al., 2023). However, the development of AGI presents challenges, particularly concerning ethical implementation and risk management, which could profoundly affect the widespread adoption of this technology.

Integrating AGI into the business processes of SMEs can empower them to address complex tasks that were previously beyond their reach, thereby creating new avenues for innovation and business growth. For instance, AGI's capabilities in advanced market analysis can help SMEs gain a deeper understanding of demand dynamics, enabling them to better tailor their products and services to specific customer needs (Ajibade & Mutula, 2021). By automating intricate operations, AGI allows SMEs to execute tasks at scale, serving as a proxy for the entire enterprise to reduce operational costs and enhance efficiency by eliminating manual, time-intensive processes (Sukhobokov, 2018). This enables SMEs to compete more effectively with larger enterprises despite limited resources. Such technological transformation has the potential to reshape current market dynamics, where innovation plays a critical role in fostering sustainable growth. AGI could thus become an essential tool for SMEs involved in complex tasks, science, research, new product development, or managing sophisticated supply chains, particularly in alignment with the Industry 4.0 vision.

AGI presents new opportunities for innovative business models and market expansion for SMEs. Leveraging data analytics for product and service personalization – currently achievable primarily by large corporations – will empower SMEs to address individual customer needs more effectively (Williams, 2020). This heightened level of customization is expected to foster customer loyalty and create a competitive edge in an environment where personalization and service quality are becoming increasingly pivotal. Furthermore, the capacity to analyze large datasets can reveal untapped market segments and opportunities that would otherwise remain obscure. Thus, it is crucial for SMEs to invest in the development of AI capabilities and enhance the technical skills of their workforce.

Successful implementation of AGI extends beyond mere technical integration; it necessitates a fundamental rethinking of corporate culture. Organizations must foster an environment conducive to continuous learning, innovation, and effective integration of work processes with AGI, following a co-intelligence model (Paul et al., 2023). For SMEs to harness the full potential of AGI technologies, investment in employee training and skill development is imperative (Gladilin, 2023). Leadership focused on long-term strategic objectives will be pivotal in guiding SMEs through the transition into an era characterized by pervasive artificial intelligence, where technological readiness must be complemented by human capital to enable companies to fully realize their potential (Schönberger, 2023).

Therefore, SMEs must not only integrate AGI from a technical perspective but also fundamentally transform their management and organizational approaches. Adaptive leadership models that emphasize strategic innovation, alongside technological investments, can enable SMEs to effectively respond to changing market conditions and maintain long-term competitiveness (Di Vaio et al., 2020; Kulkov et al., 2023). The success of AGI implementation within SMEs will hinge on their ability to develop competencies in change management, strategic planning, and technological adaptation – each being crucial for sustainable growth in a rapidly evolving digital economy (Hernandez et al., 2023).

3.5 Influence of AI on the Slovak Business Sector

The impact of digitalization on SMEs in Slovakia reveals persistent disparities in the adoption of technological innovations compared to the European Union average. For instance, the Digital Economy and Society Index (DESI) 2022 reports that only 11% of Slovak SMEs have integrated AI technologies, compared to the EU average of 18% (European Commission, 2022). This lag in AI adoption suggests that Slovak SMEs may be at a competitive disadvantage in the increasingly digital European market. While some SMEs have made progress towards a digital and sustainable economy, barriers such as a shortage of skilled workers and high initial technology costs persist (Lachvajderová & Kádárová, 2022). Nonetheless, AI holds considerable potential for transforming strategic planning and resource allocation for SMEs, enabling more flexible responses to market demands and optimizing processes to support long-term sustainability and competitiveness (Loučanová et al., 2023).

In addition to the lack of skilled workers and high start-up costs, Slovak SMEs face other significant challenges to digitalization, with legislative and administrative barriers playing a crucial role. Research indicates that Slovak SMEs often struggle with complex legal and bureaucratic requirements, which increase the costs of implementing digital solutions and prolong the digitalization process (Gavurová et al., 2020). These barriers are especially evident in accessing external financing, where strict criteria for obtaining loans or grants and complex approval processes often limit the financial flexibility of SMEs, particularly smaller ones (Ivanová, 2017). Such factors contribute to the slower pace of digital transformation among Slovak SMEs compared to their European counterparts, undermining their competitiveness in regional and global markets.

Another significant barrier to digitalization in Slovak SMEs is the limited availability of technical and innovation skills within the workforce. Transitioning to digital technologies, including AI, requires highly specialized knowledge and training, posing a challenge for many enterprises, particularly in sectors with low technological readiness (Snieška et al., 2020). The lack of necessary skills increases the burden on managers, who must invest in training their teams or outsource services, thereby escalating the costs and complexities of technology implementation (Kumar Baral et al., 2022). These challenges underscore the need for strategic human resource development and training support to allow SMEs to fully leverage the potential of digitalization and AI in Slovakia.

The deployment of AI and digitalization in Slovak SMEs could significantly alter the labor market landscape and enhance their global competitiveness. Digitalization enables SMEs to reorganize job roles flexibly, fostering hybrid and remote work models that, with the integration of AI, can transcend traditional domestic and international market boundaries. This approach increases the potential for business internationalization. However, such transformation necessitates new skills and high adaptability from the workforce, as dynamic market conditions place a premium on innovation and agile process management (Snieška et al., 2020). Thus, AI and digitalization could not only strengthen the position of SMEs in local and global markets but also bolster their resilience to economic fluctuations.

4 Analysis results

Small and medium-sized enterprises (SMEs) in the Slovak Republic exhibit varying degrees of adaptability, influenced by factors such as sector, size, location, and financial condition. This variability affects their ability to leverage inherent flexibility as a competitive advantage in a dynamic economic environment. SMEs that can capitalize on their adaptability are better positioned to adopt new technologies, including artificial intelligence (AI), thereby enhancing their capacity for innovation. Despite facing constraints in funding and skilled labor availability, their smaller organizational structures allow for rapid, less bureaucratic adaptation to advanced technologies. This agility offers an advantage over larger corporations, where complex administrative procedures often hinder innovation.

Research indicates that integrating AI into business processes not only enhances productivity and reduces costs but also reveals new opportunities for optimizing operations, ultimately strengthening SME competitiveness. For instance, a study by Gopalakrishnan et al. (2020) indicate that SMEs in Central Europe that have adopted AI technologies have seen an average 15% increase in productivity and a 20% reduction in operational costs. These figures demonstrate the tangible benefits of AI implementation for SMEs seeking to improve their market position. AI enables SMEs to better respond to shifting market demands, improving customer experiences through personalized services and more efficient resource management. Neglecting these technological advancements could pose significant risks, potentially compromising their market position.

Research shows that integrating AI into business processes not only enhances productivity and reduces costs but also reveals new opportunities for optimizing operations, thereby strengthening SME competitiveness. AI allows SMEs to respond better to shifting market demands, improving customer experiences through personalized services and efficient resource management. Failing to embrace these technological advancements could pose significant risks, potentially jeopardizing their market position. Analysis indicates that AI is a critical tool for enhancing operational efficiency and optimizing resource utilization in SMEs. AI-powered tools such as chatbots and automated systems improve customer support by delivering prompt, relevant responses, increasing customer satisfaction, and reducing labor costs. Predictive analytics further enable SMEs to manage inventory and forecast demand effectively, optimizing production and distribution processes to minimize stock-outs and ensure the availability of in-demand products.

These technologies provide SMEs not only with a competitive edge in cost efficiency but also facilitate improvements in product and service quality, which are vital for long-term sustainability and growth in a competitive market. While large enterprises have easier access to these technologies, AI adoption among SMEs represents a transformative step that empowers them to compete more effectively, meet evolving customer expectations, and adapt to rapid market changes. In this regard, AI serves as a catalyst for innovation, helping SMEs overcome traditional limitations.

Nevertheless, implementing AI in SMEs involves significant challenges, particularly due to a lack of knowledge and practical experience (Višňovský & Bielik, 2021). Unlike larger corporations, SMEs often struggle with the technical capacity and expertise needed for AI integration. This shortage of technical resources is compounded by the high costs associated with acquiring, implementing, and maintaining AI, which creates substantial barriers. Limited budgets and risk aversion further prevent these businesses from pursuing necessary innovation projects to stay competitive in a dynamic market.

In addition to financial and technical hurdles, regulatory and ethical considerations further complicate AI adoption. Regulatory requirements are often unclear and challenging for smaller businesses, resulting in hesitation to adopt AI. Ethical issues, such as

accountability for AI-driven decisions and concerns over customer privacy, also require careful planning and well-defined processes. These challenges limit SMEs' ability to fully leverage AI's benefits, highlighting the need for specialist guidance and support.

To address these challenges, SMEs require access to support resources, including technological and regulatory advice, to better understand and manage AI implementation hurdles. Such support mechanisms should include targeted training programs, financial incentives, and case studies of successful implementations to provide SMEs with concrete examples and frameworks for their projects. Assistance in these areas can significantly reduce barriers and enable SMEs to engage in innovation activities where AI plays a crucial role.

Improving decision-making processes through AI implementation is a strategic priority for SMEs seeking a competitive edge. Leveraging AI for data-driven approaches enhances operational efficiency and contributes to more accurate predictions of market trends. This management strategy enhances SMEs' adaptability to dynamic market conditions, fundamentally supporting their competitiveness.

A key component of successfully utilizing AI is the ability to analyze and interpret large volumes of data, enabling businesses to make decisions based on empirical evidence rather than intuition or limited information. Current AI trends focus on developing artificial general intelligence (AGI), which holds the potential to radically transform the business landscape. As an advanced form of AI, AGI could significantly impact SMEs by optimizing internal processes and improving communication with customers and suppliers.

The introduction of AGI could lead to higher levels of business automation, reducing labor costs while increasing operational accuracy and speed. In the long term, the evolution toward AGI presents an opportunity for SMEs to fundamentally reshape their business models, enhancing their ability to respond to rapid market shifts, boost innovation potential, and ensure long-term sustainability in a global context.

AI implementation is a transformational force poised to impact both the technological and socio-economic dimensions of the business environment in Slovakia. Automating routine tasks reduces the need for manual labor, prompting a significant shift in labor market structures and increasing demand for specialized professionals in technology, data analytics, and digital solutions. This trend necessitates a focus on modernizing training processes and supporting continuous professional development to prepare the workforce for this transformation.

Government institutions and relevant stakeholders must create favorable regulatory and economic conditions to support the development and integration of AI in SMEs. SMEs are a cornerstone of the Slovak economy, and their successful adaptation to new technologies can significantly enhance their competitiveness locally and globally. Effective AI adoption will provide SMEs with opportunities to innovate business models, making them more agile and resilient to external challenges. Such strategic support is essential for building a sustainable business environment where digital transformation and innovative solutions drive value creation.

The analysis clearly shows that AI has the potential to transform SMEs and significantly contribute to their sustainable development. Research and practical applications across various sectors demonstrate that AI can automate routine tasks, improve decision-making, and create new opportunities for innovation and growth. However, integrating AI into business practice requires a strategic approach involving investments in infrastructure, continuous employee training, and careful analysis of regulatory frameworks. Successful implementation of these measures is essential for fully harnessing AI's benefits and ensuring the sustainable development of SMEs amid rapid technological change and evolving market dynamics.

5 Discussion

The implementation of artificial intelligence (AI) in small and medium-sized enterprises (SMEs) in Slovakia represents a pivotal step towards their sustainable development. In this context, SMEs in the Slovak Republic are characterized by growing flexibility and the ability to swiftly adapt to changing economic conditions. This adaptability positions them well for the effective adoption of new technologies, including AI, thereby enhancing their competitiveness in a dynamic market. One notable advantage of implementing AI lies in the enhancement of customer service through AI-based chatbots, which provide rapid and precise responses to customer inquiries, consequently improving customer satisfaction and reducing customer support costs (Nagy, 2023). Additionally, predictive analytics tools enable SMEs to manage inventory more effectively and forecast demand, which results in minimized storage costs and enhanced product availability (Bettoni et al., 2021). These technologies empower SMEs to better manage resources, optimize operational costs, and improve their products and services. Implementing AI not only enhances efficiency but also bolsters the competitive standing of SMEs within the market. Nevertheless, despite these advantages, the implementation of AI in SMEs encounters significant challenges that must be addressed to fully unlock the potential of this technology. Given that 65% of SMEs identify high costs and 58% cite a lack of skilled personnel as barriers to AI adoption (Slovak Business Agency, 2021), it is imperative for policymakers and industry stakeholders to develop targeted support mechanisms. Such initiatives could include financial incentives, training programs, and collaborative partnerships to facilitate AI integration in SMEs.

One of the primary challenges hindering AI adoption in SMEs is the lack of information and knowledge on how to effectively implement and utilize these technologies (Oldemeyer et al., 2024). Many SMEs lack the technical expertise or sufficient resources to guide the AI implementation process. Financial constraints also present a significant hurdle, as the costs associated with implementing and maintaining these technologies can be substantial, particularly for SMEs with limited budgets. Furthermore, regulatory and ethical challenges surrounding AI adoption remain crucial considerations (Šantavý, 2023). These barriers necessitate a strategic approach to ensure the successful integration of AI into SMEs. Investment in employee training and skill development can help alleviate the shortage of technical expertise, while partnerships with technology companies and the use of external services can mitigate financial and technical limitations. Addressing regulatory and ethical issues requires keeping abreast of current legislative frameworks and adhering to best practices in the ethical deployment of AI.

AI enables SMEs to leverage data-driven approaches that refine decision-making processes, enhance operational efficiency, and improve forecasting of market trends (Peretz-Andersson et al., 2024). Future trends in AI suggest that the evolution towards artificial general intelligence (AGI) could profoundly transform the economic and business landscape. AGI has the potential to revolutionize how SMEs operate and engage with customers and suppliers, allowing for greater automation and optimized processes (Abbas, 2024). Such advances open new opportunities for innovation and growth for SMEs, but also introduce new challenges in terms of management and adaptation to emerging technologies. To fully harness the benefits of AGI, SMEs must invest in both technological infrastructure and human resource development. Proactive preparation and strategic planning will be critical in enabling SMEs to maintain a competitive edge amid rapid technological advancements.

The implementation of AI in SMEs across Slovakia could significantly alter the business landscape, enhancing efficiency and productivity. This transformation can help Slovak enterprises streamline processes, cut costs, and enhance the quality of products and

services (Slovak Business Agency, 2020). AI-driven predictive maintenance, for example, can assist SMEs in preventing costly downtimes and minimizing maintenance expenses. Additionally, implementing AI can strengthen the competitiveness of Slovak SMEs on the international market, a vital factor for their long-term sustainable growth. However, realizing these ambitions will require support from the government and relevant institutions, which should foster an environment conducive to AI development and implementation.

The societal impact of AI adoption in SMEs is equally significant. The automation of routine tasks can lead to a decrease in the demand for manual labor and an increase in the need for skilled professionals in technology and data analysis. This shift underscores the need for a reevaluation of the labor market and highlights the growing importance of education and professional development (Ameen et al., 2022). Therefore, investment in educational programs and training that equip the workforce for new market demands is crucial. Government and institutional support for initiatives aimed at cultivating AI skills is essential to ensure a steady supply of qualified professionals for SMEs.

In conclusion, AI holds immense potential to transform SMEs and foster their sustainable development. However, to achieve these objectives, existing challenges and barriers must be overcome through strategic investments in education, technological infrastructure, and regulatory frameworks. A comprehensive strategy encompassing these aspects is essential for SMEs to fully harness the benefits of AI. Collaboration between the government, institutions, and SMEs is crucial in establishing an ecosystem that promotes innovation and technological progress. Such efforts will not only enhance the competitive position of SMEs but also contribute significantly to the broader economic growth and social development of the country.

6 Conclusion

This study examines the role of artificial intelligence (AI) as a strategic instrument for the sustainable development of small and medium-sized enterprises (SMEs) in Slovakia, focusing on the complexities of implementation and its impact on business processes. The findings indicate that AI has substantial potential to enhance SMEs' operational efficiency, optimize cost structures, and streamline decision-making processes, thereby contributing to their long-term competitiveness at both national and global levels. AI provides sophisticated analytical tools that enable more precise market trend forecasting, automate routine tasks, and facilitate the customization of products and services to align better with customer demands.

Nonetheless, the adoption of AI within SMEs faces several challenges, including a shortage of specialized expertise, high initial costs, and integration difficulties with existing business structures. Moreover, regulatory and ethical issues, particularly related to data protection under frameworks such as the General Data Protection Regulation (GDPR), impose additional burdens on SMEs. Addressing these challenges requires a strategic approach that involves improving access to educational resources, supporting technological innovation, and fostering partnerships between public and private sectors.

Effective AI adoption necessitates a transformation in corporate culture that emphasizes innovation and digital transformation. Employee education and retraining are crucial for SMEs to overcome technological adoption barriers and fully exploit AI's potential. Through coordinated efforts, SMEs in Slovakia can successfully integrate AI into their business processes, thereby achieving sustainable growth and development.

The adoption of AI by SMEs in Slovakia is hindered by several fundamental challenges. A primary obstacle is the shortage of qualified personnel with specialized AI expertise. SMEs often lack the resources to attract or train skilled professionals, limiting their capacity to deploy and sustain advanced technologies. Additionally, the high initial

investment costs associated with AI implementation and maintenance pose a significant barrier. For SMEs, which often operate with limited budgets, these costs can be prohibitive, restricting their ability to innovate and compete globally. Furthermore, limited awareness of effective AI utilization strategies frequently leads to suboptimal decision-making during implementation.

Besides financial and professional barriers, SMEs face significant regulatory and ethical challenges, particularly regarding data protection and cybersecurity. Stringent regulations, such as GDPR compliance, impose additional demands on SMEs, complicating AI implementation and increasing the overall complexity of the process. Thus, it is crucial for SMEs to develop internal capabilities to address these requirements, supported by clear and effective regulatory frameworks. The study's findings indicate that strategic investments in technological infrastructure, as well as employee education and training, are essential to overcoming these barriers. Targeted educational programs could equip SMEs with the necessary expertise and skills for implementing and effectively utilizing AI. Concurrently, creating a favorable regulatory and policy environment could facilitate AI adoption among SMEs, reduce bureaucratic burdens, and increase companies' willingness to invest in innovation. Such measures would enable SMEs to harness AI's full potential, enhance their competitiveness, and achieve sustainable growth in a dynamic global market. Improving access to finance, training, and infrastructure is key to enabling SMEs to overcome existing challenges and adapt to technological advancements, which are vital for their long-term success and prosperity.

This study contributes to the existing body of knowledge by providing a comprehensive analysis of the benefits and challenges associated with implementing AI in SMEs in Slovakia. The findings suggest that successful AI adoption primarily hinges on two critical factors: the development of human capital and the enhancement of technological infrastructure. Developing human capital necessitates systematic education and upskilling of employees to prepare them for effective collaboration with emerging technologies. Conversely, technological infrastructure entails modernizing existing systems and ensuring their readiness for integration with AI solutions. Despite the strengths of this study, which include an extensive literature review and analysis of contemporary AI trends, its practical applicability may be constrained by its reliance on secondary sources, implying that the recommendations and conclusions are not derived from empirical data obtained directly from practical settings. To enhance the relevance and transferability of these findings, future research should incorporate quantitative and qualitative analyses within real business contexts, thereby facilitating a more profound understanding of AI implementation dynamics in Slovak SMEs.

Future research should encompass large-scale empirical investigations and detailed case studies of SMEs that have successfully implemented AI. Such research would enhance understanding of the practical implications and real-world impacts of AI adoption, which is essential for identifying success factors and barriers in this transformation process. Furthermore, analyzing the specific effects of AI on performance indicators of SMEs within the Slovak context, including productivity, financial stability, and adaptability to dynamic market conditions, would be advantageous. The findings of this study underscore the pivotal role of strategic investments, along with governmental and institutional support, in fostering AI adoption in SMEs. Targeted policy interventions and economic measures could significantly contribute to overcoming obstacles hindering the growth of these enterprises, particularly regarding access to financing, technology, and expertise. Establishing a supportive regulatory framework and providing incentives for innovation could catalyze the accelerated integration of AI into SME business processes.

Overcoming existing barriers will enable SMEs to fully harness the potential of AI, thereby fostering sustainable growth and enhancing their competitiveness within the global business landscape. This transformation will not only improve SMEs' efficiency and adaptability but also bolster their capacity to contribute to national economic growth, thereby strengthening their position within global value chains.

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Section ‘Innovative Model of Monetization of Digital Games in the Sphere of Creative Industries’

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PSYCHOTHERAPY: HOME VS. DIGITAL GAMES OR HOME&DIGITAL GAMES&AI

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Abstract:

Society in the 21st century has greatly accelerated all activities and modes of communication, changed cultural values, and created strong pressure on the individual by the obligation to adapt to it. The consequence is an increase in psychological disorders, even in the younger generation. Social media have contributed significantly to this. In the online global village, content with dubious appeals, messages and values, also created by AI, are spreading unrestrictedly. Children in particular are at risk, unable to judge them critically. However, the threats and pressures must be faced by all. This is why the topic of non-stigmatised use of psychotherapeutic services and targeted mental health care is a topic of contemporary social discourse. Various techniques are used in therapy in their older and modern forms, e.g. processed into digital games. The release in play, its variety, spontaneity, entertaining nature and developmental potential, bring further possibilities to psychotherapy in this way. The aim of this study is, for the time being, to highlight the possibilities of using digital games in psychotherapy. We will conduct both quantitative and qualitative research - using methods of logical analysis, relying mainly on analysis, synthesis comparison and generalisation.

Key words:

Artificial Intelligence. Digital Game. Mental Health. Psychology. Psychotherapy. Role-playing Game. Video Game.

1 Digital Gaming and Mental Health

Play is an important activity in a person's life that accompanies them throughout their entire life – from birth to late old age. It occurs at different stages of life and fulfils different functions in life – from developmental, educational or entertaining, to specific – therapeutic. It is the subject of interest for several disciplines – psychology, pedagogy, sociology, anthropology, cultural studies and digital game theory.

The game has been defined in different ways by different authors. Its contribution to society was already discussed by Platón (1961) and Aristotelés (2022), who stressed its importance as a tool to prepare for life. A similar view was also held by J. A. Komenský (1947, 1964). The latter focused on its educational character and, unlike previous authors, pointed out that play must always have a goal. The Enlightenment scholar J. J. Rousseau (2002), on the other hand, emphasised the importance of physical activity, natural movement, as a necessity for cultivating the child's intelligence. In subsequent periods, play was studied and defined mainly by psychologists, psychiatrists, neurologists and educators. Much attention has been paid to it, especially in the 20th century. Two directions have been distinguished in the understanding of play. One favours play as a spontaneous and self-directed activity (the motive is not the outcome but the process), sometimes serving only to discharge energy and have fun. The other line sees play as having significant educational and developmental aspects in addition to its fun character, with specific goals, cultivating the child's personality, building self-control, providing socialization (adjustment to social norms and cultural values), or helping to cope with various developmental challenges in the context of lifelong or corporate learning, or keeping fit in old age (see, e.g., Erikson, 2022; Piaget & Inhelder, 2010; Vygotskij, 2017; Langmeier & Křeččířová, 2013; Masariková, & Ivaničová,

1999). The basic features of play are spontaneity, freedom, self-purpose, symbolism, its connection with fantasy and emotional participation.

Psychologists and educators base the definition and categorization of types of play on the child's developmental stages and the level of his or her abilities and personality development. Most often they divide them into functional (they develop mainly sensorimotor functions, often with one's own body); manipulative (manipulation and work with objects, e.g. drawing with a pencil, kneading plasticine, folding blocks, etc.); imitative (they develop speech and cooperation between different groups – children-children, children-adults); receptive (passive reception of stimuli, e.g. viewing pictures, listening to stories, music, watching TV programmes, etc.); fictional/fantasy (pretending that the child is someone else from a fantasy world, e.g. a friend of a Legos character); role-playing (imitating/practicing activities from adult life); constructive (acquiring manipulative skills with different materials and objects or substances, the result is also important) (Kuric et al., 1986). Games also develop communication skills in an important way. Games can be spontaneous or can be defined by rules. A player can play alone, next to someone, with someone in a pair, in a group, or two or more groups can play.

A slightly different view of the game exists from a sociological and cultural perspective, whose dominant representatives are Huizinga (2000) and Caillois (1998) and are now also linked to game definitions in the field of digital game theory. They emphasize that play is a voluntary activity that is performed within fixed temporal and spatial boundaries and voluntarily accepted but unconditionally binding rules, and that has an end in itself. They divide them into 4 groups, in each type a different motive dominates, and the games are built on a different principle. They are characterised by games built on the principle of agon-match (all games built on competition, the aim is to exploit special qualities and abilities and to excel, artificially creating equal chances for all competitors, which creates the possibility of a fight under ideal conditions.), the alea – chance principle (the essence is luck, the player is passive, does not have to use education or any competences, has no influence on the outcome), the mimicry principle (playing different roles, games of “as if”), theilinx principle (built on changing the stability of perception, suppressing ordinary perceptions).

Theorists and researchers from both groups, when characterizing the use of games or principles, also mention their use in psychodiagnostics or psychotherapeutic areas. Psychodiagnostics is about detecting and measuring mental traits and states or other characteristics of individuals within the framework of norm and pathology (Šnýdrová, 2008). Nowadays, computer-assisted diagnosis is increasingly preferred, as it is common for children and young people to work and communicate via computer/mobile, such a form arouses their interest, motivates them to cooperate and they understand processing in digital form more easily (Mareš, 2007). The second positive of using diagnostics processed in digital form is that the evaluation is much faster, sometimes instantaneous, it is possible to easily create graphs and various comparisons, even with other tests. Psychotherapy is a conscious, professional influence on the mental health/condition of the patient/client, carried out by non-biological, i.e. exclusively communicative means and aimed at changing his/her experience (internal and external reality) and carried out at his/her request (Borecký, in Vymětal, 2010). Originally developed as a therapeutic method, it has now become an interdisciplinary field. Psychotherapy is characterized by a specific (interpersonal, social) experience. Effective factors include productive detachment leading to change. In addition, ongoing rehearsal, training, or corrective experience is sometimes necessary to reach the cognitive and emotional components. Psychotherapy takes place in a social interaction between two or more people who are equal as human beings, even if their formal relationship is asymmetrical (therapist-client) (Mrázek, in Vymětal, 2010).

In diagnosis or therapy, psychologists/psychiatrists use the basic characteristic of play, namely the effect that when a child (but also an adult) is totally immersed in play (immersion), he forgets all personality inhibitions and reveals his “true, uncontrolled self”, with all its negative characteristics, but also desires and “dreams”. Through play, the player can come to terms with traumatic experiences, negative situations, unpleasant commands, but also unfulfilled needs and wishes. In fact, through play one can change the passive acceptance of reality into an active management of the whole situation; the player can become the master of the situation (e.g., Erikson, 2022; Rezková, 1999; Kompolt, 2013).

The first to highlight play as an activity suitable for diagnosis was the psychoanalytic movement. Spontaneous play was used for both diagnostic and therapeutic purposes. For adult patients, the main method was the free association method. They focused their attention mainly on symbolic or fictional games, which are a typical activity for children between the ages of two and seven and eight and which are characterized by almost unlimited possibilities of reshaping and modifying reality according to the child's ideas and wishes (Severová, 1982). The use and development of games for diagnostic and therapeutic purposes in the Czech-Slovak environment was especially addressed by Bakalář (1989) and Hermochová (2004). Their games were aimed at self-knowledge, development of creative thinking, social perception, building social skills and interactions, verbal and non-verbal communication skills, as well as cooperative skills and ethical competition. The creation of diagnostic and therapeutic games has been and is being developed by other psychologists and psychiatrists, as well as educators and special educators or psychologists in Slovakia, the Czech Republic and abroad (e.g., E. Gajdošová, G. Herényiová, Ľ. Klindová, D. Kopasová, M. Valihorová J. Langmeier, D. Křejiřiová, S. Hvozdiř, O. Orosová, J. Zapletalová, S. řtech, J. Mareř and others).

The topic of diagnosis and psychotherapy through games, even digital ones, has become an intense one, as in recent years there has been more and more talk about the necessity of planned mental health care. According to the World Health Organization (WHO), as of 2023, approximately 1 in 8 people in the world suffer from some form of mental illness (before the pandemic, it was 1 in 6). Various analyses have concluded that the mental health problem has been intensified by the COVID-19 pandemic (social isolation, fear, insecurity have increased the prevalence of anxiety and depressive and other disorders), the deterioration of the social environment (children, adolescents and young adults are increasingly exposed to the pressures and high expectations of society, there is a low level of social and family interaction in childhood, discrimination and violence against different social groups (women, LGBTI+, pregnant, single income families, etc.), etc.) and the environment (climate change, pollution), or the negative impact of the excessive use of digital devices and social media on young people's mental health (death by suicide or deliberate self-harm is the second leading cause of death among adolescents in Western Europe), or increased levels of insecurity due to personal or societal domestic and global situations (conflict in Ukraine, Israeli-Palestinian conflict, socio-economic crisis), which create an unhealthy stress environment. The WHO defines mental health as a state of mental well-being that enables people to cope with life's stresses and to exercise their abilities without difficulty, to learn and work well, and to contribute to the development of their society. Mental health is closely related to physical health, affecting how a person thinks, feels and behaves. Unlike physical illnesses, mental illnesses are often not outwardly visible but can have an equally or even greater impact on the quality of life of the individual and, at the same time, their whole family. In order to tackle this problem, but also to prevent it, the responsible institutions and organisations have set themselves the goal of intensively addressing this issue on several levels: de-tabooing the topic of mental health, but also communicating feelings in society, de-stigmatising the handling of situations and problems related to mental health with the help of professionals,

targeted promotion of healthy lifestyles and the ability to deal with difficult situations, self-management and the ability to be able to relax (stress reduction) (Cerdas, 2023; “Národný program duševného zdravia”, n.d.; World Health Organization, n.d.).

Targeted use of a variety of existing digital/video games (therapeutically oriented or mainstream) and artificial intelligence or the creation of special games to eliminate/reduce specific mental health problems or to meet the needs of specific groups can also make an important contribution to addressing the above situation.

2 Methodology

The aim of the present study is, based on the conceptualization of theoretical foundations and analysis, comparison and synthesis of selected scientific and professional studies from scientific and professional databases obtained thanks to the possibility of access through the PRIMO metasearch engine of the Centre of Scientific and Technical Information, to point out the possibilities of using digital games in psychotherapy, their potential for various areas of mental health development, as well as their preventive potential. Within the theoretical exploration we deal with the concepts of play as a basic and natural activity of a human being, especially a child, especially in terms of its developmental potential and the issue of digital games. We also address the issue of mental health and mental disorders in terms of factors influencing the mental well-being of a person. And finally, we outline in the basics the importance and essence of psychotherapy for the health of the person and the whole society. We consider the work of both national and international authors.

We are concluding that psychotherapy is very important and beneficial in today's highly stressful times. We also note that it is essential for the therapist to make use of the tools of modern times, not only to accommodate the client, for whom it is an immediate part of his or her life and communication space, but also because it facilitates certain procedures for them as well, while at the same time positively interacting with and supporting traditional methods; indeed, for some clients and types of disorders, it can be very beneficial. The point is to find or create forms of digital games that will benefit the process of psychotherapy. In the first stage, we map the currently available studies on the use of digital/video games in therapy. For this we use the CVTI databases available to academics. Based on the formulation of the research problem, we refine the research questions: What is the representation of the issue of psychotherapy and digital games in professional discourse? What areas of psychological problems are addressed in current studies? Within the framework of the qualitative investigation, we define analytical categories, which we conceptualize in the search for answers to the research questions: we sequentially search for and analyse the above-mentioned studies, compare, summarize, and synthesize their findings, and look for possibilities of further use of digital games in therapeutic practice. In this paper, we present a first probe into the above-mentioned issues, which we plan to continue. We enter the keywords – psychotherapy and digital games, which we vary with the word video games, which has been more frequently used. Subsequently, we will evaluate and elaborate the topics in turn. Within the research methods, we use both qualitative and quantitative methods, in particular the procedures of logical analysis methods, from them deduction and broader generalization, descriptive method, as well as analytical procedures characteristic of qualitative inquiry.

3 Results and Discussion: Psychotherapist or Digital/Video Games

After entering the keywords digital games and psychotherapy with the definition of the years 2015 – 2024 through the CVTI search engine from various academic and scientific journal databases, the PRIMO e-resource meta-browser identified 118 papers dealing with the issue under study, 105 of which were from peer-reviewed journals. We then focused our analysis according to additional criteria, such as the type of source, the topic the article addresses, and the language in which it was published. The studies were ranked in order of relevance (from more to less relevant – if ranked by the AI algorithm used by the metasearch engine).

Table 1: Resources by category – digital games & psychotherapy

Type of source		Theme*				Language	
Articles	106	Science & Technology	80	Teenagers	18	English	106
Books	6	Life Sciences & Biomedicine	62	Male	17	French	5
Chapters in books	4	Psychotherapy	54	Female	17	German	4
Magazine Article	1	Humans	33	Children	17	Spanish	1
Conference Proceedings	1	Mental Health	24	Games	16	Japanese	1
		Computer & Video Games	23	Social Science	15	Indonesian	1
		Intervention	20	Adolescent	14		
		Psychology	20	Anxiety	14		
		Mental Disorders	19	Internet	14		
		Public Environmental & Occupational Health	19				
	118		354		142		118

*resources can also be included in more than one theme

Source: own processing, 2024

The categorization shows that 6 books have also been produced in ten years that deal with the topics of psychotherapy, mental health and digital technology as well as digital games. 4 chapters in different books have been devoted to the topic. The texts were published mostly in English (106), followed by French (5) and German (4), and one each in Spanish, Japanese and Indonesian. In thematic categorization, we found that texts were classified into multiple categories, presumably according to keywords. The most frequent category was the general category Science & Technology (80x), followed by Life Sciences & Biomedicine (62x). This was followed by the categories Psychotherapy (54x), People (33x), Mental Health (24x) and Computer & Video Games (23x), Intervention (20x), Psychology (20x), which were more directly related to the link we were exploring – digital games and psychotherapy.

Consequently, in the initial stage of our research, we analysed the first 20 studies, excluding book publications. We examined which areas of mental health or mental disorders they addressed and what the researchers concluded. Several studies relied on and built on the results of individual regional and local studies focusing on a particular type of mental health problem or disorder. Others were oriented towards searching studies retrieved from scholarly and professional databases based on keywords and focusing on a particular issue, like our survey. A deeper look at the sources revealed that among the studies, there were several that explored the effectiveness of the use of digital games in eliminating behaviours or experiences associated with mental health problems or disorders, complicating daily life and meeting needs related to mental health or manifestations of illness. At this stage of the research, we provide only examples of analyses of studies. Our ambition in developing the topic is to process whole groups of thematically related studies, defined by the criteria outlined above. We found that some authors emphasized, for example, the importance of serious play

(Eichenberg & Schott, 2017, and others), i.e., play that aims to educate and change behavior in addition to entertaining. Researchers have concluded that serious play is effective as a stand-alone intervention or as part of psychotherapy and appeals to patients regardless of age and gender. Nevertheless, the findings were inconclusive and require further investigation.

Several studies have been devoted to anxiety disorders and depression and the possibility of using digital games to eliminate their adverse effects. Computer-based cognitive behavioural therapy (CBT) has been used for this purpose. The goal of incorporating games into therapy was to increase motivation, enjoyment, and treatment outcomes. Findings indicated that integrating games and gamification with CBT resulted in clients coping more effectively with stress, anxiety, and depression across age cohorts. Future research, according to the authors, should aim to refine these interventions while highlighting the potential of combining digital technologies with traditional therapies to improve mental health outcomes (Amer et al., 2024 and others).

There is also a strong focus on the mental health of children and young people (CYP) who are increasingly experiencing mental health (MH) problems. The study identified 6 ways of delivering interventions to engage CYP in targeted care for their mental health. These include websites, games and computer-assisted programs, apps, robots and digital devices, virtual reality, and mobile text messaging. The findings of this review show high average retention rates across a range of DHIs. The development of DHIs is increasing and may be of interest to CYP, particularly in around MH treatment (Liverpool et al., 2020, and others).

Many studies have looked at specific games in relation to their effectiveness for specific types of illness within the psychotherapeutic process, for example the treatment of schizophrenia using Avatar therapy. Some have also aimed to explore the usability of a therapeutic human-to-human virtual reality interface created in a game engine. Research participants were staff members of psychiatric hospitals who were introduced to the therapeutic platform as part of a practical exercise (Brander et al., 2021; see also, e Zainab et al., 2024; and others).

Several studies have provided an overview of gamification approaches to mental health intervention, identified factors that may be related to differences in treatment effectiveness, and opened discussions about possible strategies for tailoring gamified interventions to meet the needs of clients (Cheng & Ebrahimi, 2023, and others).

In the second stage, we replaced the term digital games with the term video games, which has been used for longer and is sometimes used as equivalent to digital games, and added the term psychotherapy. Again, we defined the period for the last 10 years.

Table 2: Resources by category – video games & psychotherapy

Type of source		Theme *				Language	
Articles	215	Science & Technology	137	Internet	40	English	230
Magazine Article	15	Psychotherapy	113	Female	39	French	8
Books	8	Life Sciences & Biomedicine	106	Male	38	German	3
Chapters in books	2	Computer & Video Games	100	Mental Disorders	31	Spanish	2
Articles in newsletters	1	Humans	73	Intervention	30	Portuguese	1
News	1	Psychology	68	Cognitive Ability	30	Indonesian	1
Conference Proceedings	1	Social Science	65	Technology	28		
		Video Games	62	Games	27		
		Psychiatry	56	Adolescent	26		
		Mental Health	49	Behavior	26		
	243		829		315		245

*resources can also be included in more than one theme

Source: own processing, 2024

Again, we looked at and evaluated the categorization of resources by each criterion. The results show up to twice as many articles and books (243) were identified with these keywords. In ten years, 8 books and 2 book chapters were produced on the topics of psychotherapy, mental health and video games. Almost all the texts have been published in English (230), French (8), German (3), Spanish (2), Portuguese (1) and Indonesian (1). In thematic categorization, we found that the texts were classified into several categories, presumably according to keywords. The most common general category was Science & Technology (137x), the second most common category was Psychotherapy (113x), followed by Life Sciences & Biomedicine (106), Computer & Video Games (100x), People (73x), Psychology (68x), Social Science (65x), Video Games (62x), Psychiatrists (56), and Mental Health (49x), which were all related to the link we were exploring – video games and psychotherapy.

Also, when analysing the articles based on the slightly altered words we had entered, we noted that studies had addressed the link between serious digital games and psychotherapy. On a positive note, although the current knowledge of the research participants regarding serious games was very limited, there was a general openness to the concept (Eichenberg et al., 2016; see also Zayeni et al., 2020, and others). Other authors add to this idea, stating that the results of the study allow us to conclude that video games used as a means of intervention in a psychotherapeutic context support the therapeutic process (Carvalho Castro et al., 2024; Puerta-Sánchez et al., 2023; and others).

Studies have also resurfaced confirming that video games can be used to treat conditions such as depression, anxiety, post-traumatic stress disorder and addiction, with one of the main benefits of video games in therapy being that they can provide a sense of engagement and immersion, as well as teach clients valuable skills, problem-solving techniques, decision-making, and the creation and use of coping strategies to deal with stress. Video games can also simulate real-life scenarios, allowing clients to practice and improve social skills in a safe and controlled environment (Bocci et al., 2023, and others).

4 Conclusion: Psychotherapist & Digital/Video Games & AI

Digitisation and internetisation have significantly affected human life in the 21st century. They have greatly accelerated communication and changed its style, social networks have on the one hand created narrow opinion groups that limit the diversity of social interactions, and on the other hand created a “global village” that puts strong pressure on the individual and forces him to adapt to the social norms of his own and the global bubble. The strongly prevailing pressure to be IN – in terms of contemporary society, to be young, healthy, successful and wealthy – not only terrorises and distorts the mindset of the young, immature generation, but also affects individuals from older generations who adapt their behaviour to this pressure. This pressure from both the micro and the macro environment has led to an increase in the number of people in society who are unable to cope with this constant pressure from many quarters and are developing psychological problems or disorders. This increased incidence is being noticed all over the world and problems are appearing in all generations.

On the other hand, digitisation and internetisation have made life much easier in many ways and have brought tools and formats that have changed the way we spend our leisure time. At the same time, they have also influenced the way children play today. Digital/video games and AI have become an almost daily part of the lives of children, but also of many adults. Play as a natural and enjoyable activity brings joy and fun, safe competition on the one hand, and on the other hand, there is great potential in it as a tool that promotes the development of the personality and its cognitive, social and communication skills.

Play has been part of both diagnosis and psychotherapy in the past. New forms of digital play, which bring with them new possibilities and ways of playing, open up further opportunities for the use of digital play in psychotherapy. As our probe based on analyses of scientific and professional studies shows us, several games have already been successfully used in the therapy of depression, anxiety, stress, as well as memory problems. At the same time, a number of studies confirm that this connection between digital games and psychotherapy is the subject of scientific discourse, and the analysis of the studies shows, in addition to the research results, that there is an openness among psychotherapists to use them in their work.

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DIGITAL GAMES AND AI: EDUCATION, ETHICS AND CULTURE

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Abstract:

Artificial intelligence (AI) plays a crucial role in shaping users' experiences in digital games, especially in the action-adventure genre. This study research how AI in digital games can enhance education and raise cultural awareness. By analysing various digital games, it demonstrates how AI technology creates dynamic and interactive educational experiences that promote critical thinking, media literacy, ethical values, and cultural awareness. Integrating AI technology makes digital games a powerful medium for education and cultural promotion. In this study, a conceptual model for AI application in the digital gaming industry is introduced. AI in digital games has the potential not only for entertainment but also for significant contributions to education and cultural awareness. Digital games are viewed as cultural artifacts with educational, ethical, cultural, and pragmatic potential. This study provides a theoretical framework on digital games, AI, culture, and ethics. It also explores how AI complements human creativity in digital games, creating richer educational experiences and discussing the ethical implications, emphasizing the importance of maintaining human values and cultural integrity in an AI-driven world. A problematic question arises regarding the application of AI in the context of ethics, education, and culture. It is concluded that digital games which effectively integrate AI techniques for development and optimization, along with elements of player engagement, can achieve high quality and significantly impact players. Additionally, it considers how AI can transform educational and cultural domains.

Key words:

AI. Culture. Digital Games. Educational Values. Ethics.

1 Introduction

In the digital age, AI significantly shapes education and culture. Advances in AI have led to complex digital games that offer unique user experiences. AI not only improves gameplay but also tailors' content to individual skills, making gaming more personalized. This technology increasingly impacts how we create and play digital games. Digital games enriched with AI technology are powerful tools for promoting educational values and developing critical thinking. In addition to their educational potential, digital games also have a cultural impact (Bogost, 2006; Cerezo-Pizarro et al., 2023). They have become an integrated part of contemporary culture, shaping the ways we communicate and learn. In this context, through digital games, we encounter various cultural narratives (Škripcová, 2022), ethical virtues (Magová, 2020), and educational values (Jukić, 2023).

When discussing human intelligence vs AI, it is important to highlight their complementarity. Human intelligence includes creativity and emotions, while AI replicates data through algorithms (Vössing et al., 2022). This synergy promotes innovation in digital games, offering richer and more dynamic experiences for players. However, the question arises: can AI ever truly match human creativity and emotions? Is it ethical to rely on AI in education and culture? In our quest for technological advancement, will we create a Frankenstein, or will AI become a supportive guide, like Plato's cave student, leading us to new heights?

2 Methodology

In this study, we will theoretically explore and analyse the ethical, philosophical, and educational aspects of using AI and digital games. Our goal is to understand the impact of digital technologies on society and moral values. We will employ various research methods, including critical and comparative analysis, descriptive methods, abstraction, and concretization, as well as generalization, specialization, and induction. The theoretical framework is based on a comparative analysis of educational, ethical, and cultural values according to the philosophy of P. Vuk-Pavlović (2007; 2016). For the analysis of educational values and cultural context, digital games from the action-adventure genre were selected. The units of analysis include digital games that utilize AI technology, as well as those that address cultural context, educational values, and ethical issues indirectly.

3 The Context of AI and Digital Games

AI is increasingly shaping digital games (Yannakakis & Togelius, 2018). It generates various game aspects such as non-player character (NPC) dialogue, expansive worlds, infinite levels, customized experiences, different gameplay styles, and competitive bots. Essentially, AI's ability to understand player experiences enhances game design. Therefore, AI can simulate and reveal player experiences in digital games, making the interactions richer and more dynamic. AI technology has numerous advantages in the context of digital games (Lawande et al., 2022). From the aspect of applying AI agents in the context of digital games, AI creates a dynamic and rich experience for players. For example, AI allows NPCs to behave intelligently, realistically, cooperate with each other and adapt to the player's gameplay. Also, the application of AI allows the creation of procedurally generated missions, environments, or game levels, enabling the creation of new experiences. An example of creating realistic NPCs is *The Last of Us Part II* (Naughty Dog, 2020) where enemies cooperate, communicate, and react to the player.

AI-enhanced digital games can significantly influence players' educational values. Games involving moral dilemmas and ethical decisions help players develop critical thinking and empathy. For instance, games like *The Last of Us Part II* and the *Mass Effect* series (BioWare, 2007-2012) present players with tough choices that have lasting consequences, encouraging reflection on moral values and responsibility. AI plays a crucial role in shaping cultural narratives within digital games. Through AI-driven characters and stories, games can reflect and critique contemporary social norms and values. For example, *Detroit: Become Human* (Quantic Dream, 2018) and *Nier: Automata* (Square Enix, 2017) explores themes like the rights of AI beings and the ethical implications of their integration into society. AI has become essential in digital games, transforming creation, enhancement, and experience. It operates on two key levels: as a development tool and as an element within games. Thus, AI in the gaming industry can be conceptualized as a model where AI gaming merges AI development (optimization) with AI aspects (themes) (see, Figure 1).

$$G = \sum_{i=1}^n D_i + \sum_{j=1}^m A_j$$

Figure 1: Applying AI in the digital games industry
Source: own processing, 2024

The mark (G) represents the overall results of AI gaming, which is the desired outcome. The symbols ($i=1$) and ($j=1$) denote the initial indexes, while (n) and (m) represent the final indexes. The notation (D_i) refers to each individual component of development and

optimization, and (A_j) signifies each aspect of the AI topic, such as narrative and characterization. Using *The Last of Us Part II* as an example, (G) represents the overall gaming score or final impression. Development elements (D_i) include game performance optimization (D_1) , player reactions to the environment (D_2) , NPC movement in 3D space (D_3) , and enemy reactions to the player (D_4) . Game aspects (A_j) encompass story (A_1) , actors (A_2) , dialogues (A_3) , and audiovisual elements (A_4) . Assuming four development elements and four game aspects, the conceptual model (Figure 1) shows that (G) is the sum of all development and optimization components, as well as narrative and characterization aspects. For *The Last of Us Part II*, the overall impression (G) results from the balance of AI techniques and rich narrative and psychological character development. As shown in Figure 1, AI plays two crucial roles in digital games: as a development tool and as a means of sensitization within the games. The simplicity of the conceptual model lies in its clear expression, summarizing various aspects of game development and narrative, and its flexibility, making it applicable to different game genres. The model highlights two key features in AI application for digital game development: technical (optimization and enhancement) and creative (story and characters).

As an example for the first category, i.e. as a tool for developing digital games, we can compare the Inklewriter tool that helps in creating interactive stories or Ludo AI that analyses player behaviour and adjusts gameplay. Also, a good example is the Promethean AI tool that automatically generates 3D environments and NPCs or a tool like DreamBox that adjusts educational content according to the needs of students. If we compare this from the aspect of AI technology on the example of specific digital games, then we can highlight several different technologies such as machine learning (ML), behaviour trees (BT), procedural animation, pathfinding, navigation mesh (NavMesh), procedural content generation (PCG) and the like (see Table 1).

Table 1: Application of AI techniques in digital games

AI Technique	Digital game	Description
Machine Learning (ML)	<i>Red Dead Redemption 2</i>	NPCs adjust their behaviour to the player
Behaviour Trees (BT)	<i>The Last of Us Part II</i>	Allows NPCs to react to different situations
Procedural Animation	<i>Assassin's Creed Valhalla</i>	Generate real-time animations for natural movements
Pathfinding	<i>Uncharted 4</i>	The A* algorithm allows characters to find the most efficient path through complex environments
NavMesh (Navigation Mesh)	<i>The Last of Us Part II</i>	Defines where characters can walk in 3D space
Procedural Content Generation	<i>No Man's Sky</i>	Algorithms create entire planets

Source: own processing, 2024

Machine learning (ML) enhances digital games by learning from data to improve performance. The *FIFA 24* (EA Sports, 2023) uses ML to adapt player behaviour, making the simulation more realistic by analysing real-life football matches. In *Red Dead Redemption 2* (Rockstar Games, 2018), ML improves NPC behaviour, with NPCs reacting contextually to the player's actions, like commenting on their clothing, reputation, or time in the game. *Far Cry 5* (Ubisoft, 2018) employs behaviour trees (BT) to control wild animal behaviour, allowing them to respond to the player's presence. Similarly, *The Last of Us Part II* uses BT to manage complex enemy behaviours, creating diverse scenarios. The application of AI

technology, specifically procedural animation, is evident in *Assassin’s Creed Valhalla* (Ubisoft, 2020) through realistic character movements and environmental interactions. Procedural animation allows characters to perform various finishing moves and adapt to different terrains, such as climbing rocks and walking on uneven surfaces. Additionally, AI technologies like pathfinding, navigation mesh (NavMesh), and A* algorithms enable NPC movement through complex environments, as seen in *The Witcher 3: Wild Hunt* (CD Projekt Red, 2015) and *Uncharted 4* (Naughty Dog, 2016).

As an example of the second category, sensitization, AI is used to create and enhance stories within digital games. These stories adapt to player decisions, providing a deeper, more personalized experience. In *Detroit: Become Human*, AI characters and narratives explore ethical and moral dilemmas, highlighting the potential and challenges of AI technology. Advanced AI creates NPCs that react realistically to player actions, often featuring complex personalities that make interactions feel like engaging with “living” beings. Many modern games use AI as a central motif, exploring the ethical and philosophical implications of artificial intelligence. AI characters are often depicted as complex entities with their own motivations and emotions, which encourages players to think about the nature of consciousness and intelligence. For example, games like *Detroit: Become Human* or *NieR: Automata* explore the relationship between humans and androids, raising questions about the rights and morality of AI beings. These games not only entertain, but also educate players about the potential and dangers of AI technology. Magová (2020) talks about this, pointing out that digital games offer a wide range of topics that can be used to simulate ethical dilemmas, especially in the context of the *butterfly effect*.

If we compare *NieR: Automata* (Square Enix, 2017) the game deals with the themes of the war between androids and machines, exploring what it means to be alive and to have a purpose. The story raises questions about identity, emotions, and morality. Similarly, *Deus Ex* series (Eidos Interactive & Ion Storm, 2000-2016) explores themes of transhumanism, the ethics of augmentation, and surveillance. Players take on the role of characters who use advanced technologies to enhance their abilities, raising questions about the limits of humanity and the ethical implications of such enhancements. This context can serve as a matrix for raising awareness of the importance of AI. This tells us that the application of AI within digital games is developing simultaneously: as a tool (means) and as a topic (ethical value). In this sense, digital games show us that they can be used to promote educational values, media literacy, and ethical education (see Table 2).

Table 2: Holistic values of digital games and AI

Digital game	Educational and ethical values	Cultural values	Implementation of AI
<i>Assassin Creed Origins</i>	Learning through Discovery Tour, ethical issues	Historical worlds, diverse cultures, mythology	Dynamic interactions with NPCs
<i>The Last of Us Part II</i>	Ethical dilemmas, educational values	Respect for diversity	Complex emotional reactions of NPCs
<i>Detroit: Become Human</i>	Critical thinking, ethical dilemmas	The issue of social justice	ML, BT, NPC emotional reactions
<i>Hellblade: Senua’s Sacrifice</i>	Empathy, mental health	Celtic culture and Norse mythology	Simulation of psychological state
<i>Horizon Zero Dawn</i>	Ethical values, ecology, and sustainability	The impact of technology on society	NavMesh, ecosystem
<i>The Witcher 3: Wild Hunt</i>	Ethical, pedagogical, and social values, consequences of decisions	Slavic mythology	Complex emotional reactions of NPCs

Source: own processing, 2024

However, AI and digital games have a significant impact on media pedagogy as well. Digital games have become interactive and engaging, making them powerful learning tools (Reyes-de-Cózar et al., 2022; Shliakhovchuk, 2024). AI can enhance such an experience by adapting the game based on the user's preferences, providing personalized learning. Also, the themes and messages conveyed by digital games can shape the user's attitudes and values (Magová, 2020; Jukić, 2021). AI can also enhance the learning experience through digital games in several ways: personalization, interactive learning, and content creation. In the context of personalization, AI can track player progress and behaviour to tailor the game experience. This also allows users to learn at their own pace and in a way that suits them best. Also, from the perspective of interactivity, AI can create dynamic scenarios that encourage users to actively participate and make decisions. Finally, AI can generate new NPCs, tasks, and stories, providing users with constantly added content and thus encouraging players to think strategically by developing skills such as critical thinking. In the context of AI applications, digital games can become even better. AI can tailor each user's experience by providing personalized challenges and feedback. If we compare digital games such as *The Last of Us Part II*, *Hellblade: Senua's Sacrifice* (Ninja Theory, 2017), *NieR: Automata* and *Detroit: Become Human*, it is evident that digital games can be a powerful tool for conveying a message, allowing players to explore complex themes such as justice, revenge, empathy, and love.

4 Analysis of the Educational, Ethical, and Cultural Values of Digital Games

According to the philosophy of education theory by Vuk-Pavlović (2016), the educational values of freedom, spiritual love, and culture originate from individual actions. Values such as respect, freedom, understanding, and appreciation form the core of cultural and ethical values. The main theses of Vuk-Pavlović's (2016) philosophy of education are: a) education as a creative act, b) the relationship between educator and student, and c) the cultural will of the community. This means that, according to the philosophy of education theory (Vuk-Pavlović, 2016), education is understood as a creative act taking place within a cultural environment. The central concept of Vuk-Pavlović's philosophy of education views it through the dimension of society's culture, where culture continues and deepens within education. According to Vuk-Pavlović, the aim of education is to develop culture as a system of values, not only within the individual but also within society. This perspective implies that achieving values occurs precisely through education, as the individual is a cultural being and the value dimension is renewed in education. This is what Vuk-Pavlović (2007) calls the *value experience*.

In this sense, education helps an individual to find themselves and to develop as an independent spiritual being. Vuk-Pavlović argues that the ultimate purpose of such education is the realization of an educational consciousness as a unique value experience. Therefore, once a digital game achieves recognition or cultural value in Griswold's (2004) sense, it attains its gaming literacy as indicated by L. Škripcová and ethical virtue as highlighted by L. Magová. In this context, Vuk-Pavlović discusses values as the essence of human existence. Values are intrinsically connected, and recognizing one inherently acknowledges the entire system of educational values in which they reside (Vuk-Pavlović, 2016). Therefore, education is fundamentally a value-driven endeavour. In this context, the concept of the future in the philosophy of education emerges when there is a need to strive towards values. In other words, the educational relationship encompasses mutual understanding, acceptance, and appreciation. In this light, digital games can be viewed in terms of their value judgments, making them media content that is subject to educational values. This is like media

competencies discussed by L. Škripcová (2022) in the context of competencies. According to this understanding, media competencies are equivalent to critical thinking (Škripcová, 2022). In other words, according to Škripcová, digital games develop media competencies such as information analysis, creativity, social skills, and critical thinking. Different types of digital games, therefore, develop different *gaming competencies*.

Škripcová also concludes that digital games hold significant educational potential. Magová (2020) supports this by highlighting that digital games can enhance not only media competencies but also moral and ethical reflections. Players, through engaging with digital games, can develop empathy, understanding of ethical dilemmas, self-respect, appreciation, critical analysis, comprehension of psychological constructs, ecological awareness, and social consciousness. Additionally, as Jukić (2023) points out in his analysis of media messages in digital games, these games can convey educational values such as parenting, guardianship, kindness, love, and justice. For Vuk-Pavlović, the concept of culture serves as the foundation for education, making culture, in its broadest sense, a key element of upbringing. Educational values are viewed through the lens of spiritual love, moral values, and freedom. In the philosophy of education, the context of educational values is fundamental to the development of the individual, society, and culture. Therefore, educational values are examined through seven interrelated categories: freedom, love, responsibility, creativity, culture, moral values, and spirituality. When comparing games like those in Table 3, the common elements that stand out are spiritual love, emotional connection, and sacrifice. The educational values of freedom are present in all these digital games, aligning with the premise that they allow for the development of freedom in making moral decisions. Additionally, the educational value of love, as the central category in Vuk-Pavlović's philosophy, is directed towards ethical and cultural values, encompassing not just the emotional, but also the spiritual dimension. Comparing the digital games from Table 3, it is evident that only two values are not consistent across all games: culture and spirituality.

Table 3: Educational values and digital games

Digital game	Freedom	Love	Responsibility	Creativity	Culture	Ethical values	Spirituality
<i>Hellblade: Senua's Sacrifice</i>	+	+	+	+	+	+	+
<i>The Last of Us Part II</i>	+	+	+	+	-	+	-
<i>Detroit: Become Human</i>	+	+	+	+	+	+	-
<i>The Witcher 3: Wild Hunt</i>	+	+	+	+	+	+	+
<i>Life is Strange</i>	+	+	+	+	+	+	+
<i>Heavy Rain</i>	+	+	+	+	-	+	-

Source: own processing

By comparing the protagonists from the analysed digital games, we see ethical and educational values in action. Senua (Ninja Theory, 2017) is driven by love for her deceased partner Dillion, which strengthens her to face her demons. Ellie's love for Joel (Naughty Dog, 2020) guides her sacrifices. Androids Kara and Markus (Quantic Dream, 2018) explore spiritual love and empathy towards humans and androids. Geralt's love for Yennefer and guardianship of Ciri (CD Projekt Red, 2015) showcases a deep, magical connection. Max's love for Chloe (Dontnod Entertainment, 2015) motivates her to protect Chloe by rewinding time. Lastly, Ethan Mars's (Quantic Dream, 2010) unconditional love for his son Shaun

drives him through dangerous challenges to save him. Thus, all characters are driven by deep, emotional, and spiritual love, willing to sacrifice everything to prove their love. According to Vuk-Pavlović, love as an educational value is not merely romantic but also emotional and spiritual, tied to the personal growth of individuals. This cultural significance, highlighted in Vuk-Pavlović's (2016) philosophy of education, speaks to the core values of humanity. In this context of respect, love, and life values, Vuk-Pavlović illustrates a person living a better, more ethical, and appropriate life. This can be compared to the educational, ethical, and cultural values of digital games. A key feature of all the digital games mentioned is the concept of freedom, as they allow players to make decisions that shape the story and the protagonist's fate. In the *Detroit: Become Human*, deontological ethics are manifested through the decisions of androids like Kara, who are guided by strict moral rules and programming to protect humans. Connor's mission to capture rogue androids also reflects a deontological approach as he follows his duty regardless of the outcome. On the other hand, consequentialism is highlighted through Markus's decisions based on results: his actions for the freedom of androids have long-term societal consequences, prompting players to consider the ethical repercussions of their moves. The game's virtue ethics are evident in the development of the characters' moral qualities, such as courage and compassion, as they face difficult moral challenges.

In *NieR: Automata*, Aristotelian virtue ethics are prominently displayed through the evolution of moral characteristics in characters such as 2B and 9S, who struggle with existential inquiries and ethical dilemmas. The virtues of courage, empathy, and justice are essential in their journey, as they endeavour to comprehend their purpose and identity, effectively transforming them into humanized entities exhibiting humanistic traits. These moral tribulations serve to illuminate questions concerning the rights of AI, their ethical behaviour, and their humanity, thereby stimulating players to engage in profound reflection on ethical considerations and the moral ramifications of artificial intelligence. For instance, 2B frequently exhibits courage in combat against hostile machines, often endangering her own existence to safeguard others, thus progressing as a moral agent. Concurrently, 9S's quest for truth and justice regarding their mission underscores his moral maturation. Through these intricate narratives, the game fosters a contemplation of ethical values and AI rights, heightening players' awareness of the intricate ethical landscape surrounding technology and artificial intelligence. In this sense, the characters take responsibility for their actions and fight for their rights. Additionally, these games share a cultural context, exploring themes like post-apocalypse, future, past, and fantasy. Moreover, all the digital games analysed in Tables 2 and 3 examine ethical dilemmas and the consequences of those decisions. When connecting the themes, motives, and protagonists, a central theme in games like *Horizon Zero Dawn* (Guerrilla Games, 2017), *NieR: Automata*, *Detroit: Become Human*, *Deus Ex: Mankind Divided* (Eidos-Montréal, 2016), *Binary Domain* (Sega, 2012), *The Talos Principle* (Croteam, 2015), *SOMA* (Frictional Games, 2015), *Observer* (Bloober Team, 2017), and *Cyberpunk 2077* (CD Projekt Red, 2020) is the humanization of AI and the ethical dilemmas of human-AI coexistence. These games explore AI character development, emotions, consciousness, ethical values, and societies with augmented human.

5 Discussion and Conclusion: Do Android Sheep Dream of Electric Wolves?

In this study, we examined the application of AI in the digital games industry, focusing on two key components: development and themes. We also presented a conceptual model in the form of an equation that illustrates the ideal application of AI both as a tool (means) and as a theme (ethical value). In other words, we showcased a model that reveals and unifies the context of AI development in creating and optimizing digital games (Wu et al.,

2023) along with the context of various themes, motives, protagonists, and ideologies (Kellner, 2004) related to AI. The first context is relatively easy to define and recognize in the creation of digital games since the impact of AI as an assistant, or the programmer's modern extended skin (McLuhan), is quickly apparent. In this context, games like *Detroit: Become Human*, which use machine learning (ML), behaviour trees (BT), and finite state machines (FSM) to create dynamic and adaptive characters, and *Horizon Zero Dawn*, which employs hierarchical task networks (HTN), NavMesh, and sensor systems (SS), exemplify AI assistance. Additionally, games like *The Witcher 3: Wild Hunt*, using procedural content generation (PCG), BT, and pathfinding algorithms, or *The Last of Us Part II*, utilizing FSM, BT, and ML, are prime examples of how much AI techniques enhance and assist in game development.

What is intriguing and opens new questions arises from the relationship between AI and human intelligence. This aspect remains in the subtext of educational values, ethical virtues, and culture. It has become an integral part of our daily lives, games, education, culture (Eagleton, 2016), and entertainment. The development of AI has enabled the creation of complex digital games that offer unique experiences. However, with this progress come important questions about the role of AI in society and its impact on human creativity and emotional depth. This ethical question has been present since the advent of Philip K. Dick's novels. Digital games enriched with AI technology have become a powerful tool for promoting educational, ethical, and cultural values (Magová, 2020; Škripcová, 2022; Jukić, 2023). Through interactive stories and complex ethical dilemmas, games like *Detroit: Become Human*, the Mass Effect series, *NieR: Automata*, and the Life is Strange series (Dontnod Entertainment & Deck Nine, 2015-2024) encourage players to think critically and develop empathy. These games allow players to make decisions with long-term consequences, thereby fostering ethical awareness and a sense of responsibility. As a cultural phenomenon, digital games have become an integral part of modern culture, shaping communication (Bown, 2022), learning, and thinking. However, with these advantages come challenges. One key question is: can AI ever fully replicate human creativity and emotional depth? Games like *NieR: Automata* and *The Talos Principle* suggest that AI characters can develop emotional connections and question their purpose. Yet, the question remains whether they can achieve the level of human originality. Judging by *Detroit: Become Human*, androids exhibit more empathy, ethics, and educational values than humans.

Another important question is how ethical it is to rely on AI in educational and cultural contexts. While AI offers many benefits, such as personalized learning and access to a wide range of content, there is a risk of over-automation, which could reduce human interaction and empathy overall. Concerns about AI algorithm bias also exist. Moreover, in the context of digital games, one potential risk of over-reliance on AI is the loss of creativity, leading to similar games with repetitive missions, characters, and content. With procedural generation, users might experience monotony, as levels may only differ superficially, making the sense of similarity inevitable. The solution lies in equilibrium. Balancing between human and AI is key to success, not just in the context of the model presented in this study, but as a practical application of human-AI collaboration. This *co-op* combines human creativity, intuition, and emotion with AI's data analysis capabilities, processing speed, and precision. Such synergy can create a new Nietzschean *Übermensch* [Overman], blending the best of both human and AI qualities. Reflecting on gaming literacy (Škripcová, 2022), let us replace the Overman metaphor with a chess game metaphor. Picture a chess match between a teacher (human) and a student (AI). If the AI, out of respect, refrains from winning, it could indicate that the AI is developing empathy and understanding. In this scenario, the AI becomes more human-like, exhibiting empathy, compassion, and respect. However, that is still not

the biggest educational, ethical, or cultural problem. The problem will be if AI becomes more human than humans. Are we then, the last of us?

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ARTIFICIAL (INTELLIGENCE) METHODS IN MONETIZATION OF OLD GAMES: REVIVING OLD TITLES FOR A NEW MARKET

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Abstract:

In the contemporary era of advanced gaming platforms and digital distribution, artificial intelligence (AI) could play a transformative role in revitalizing older games. This paper explores how AI-driven techniques and artificial methods are reshaping remasters, remakes, ports, and collections, making classic titles relevant for modern audiences while leveraging new monetization models. For instance, advanced character AI and algorithmic improvements can provide richer, more realistic interactions in remakes compared to their original iterations. The study also delves into the intersection of AI and nostalgia marketing, examining older games. We analyze how remasters improve graphics and sound, while remakes often completely rework AI, gameplay and design. These forms also allow old titles to be updated with enhanced features that were not present in the titles at the time of release, e.g. improved character AI. An important part of the research is also exploring how these approaches are perceived by gamers themselves and how they are rated in reviews. The aim of this exploratory study is to define and describe the current ways of monetising old titles.

Key words:

Artificial Intelligence. Monetization. Nostalgia. Port. Remake. Remaster. Retro.

1 Introduction

The games industry has been undergoing an evolution during which it has established itself in mass culture, generating a turnover greater than that of the television and music industries combined (Arora, 2023). Innovation plays an indispensable role in its development. Firstly, innovations in product design, with game publishers and hardware engineers designing products to meet the needs of an ever wider audience (Wesley & Barczak, 2010). In addition to digital games, the technologies that enable games to be launched and played should also be included under product design innovation. According to Goh et al. (2023), the gaming industry's fast-changing nature is manifested by its rapid adaptation to new technologies. The next innovation could be the AI technology that can help enhance graphics, sound, and gameplay mechanics. For instance, advanced character AI and algorithmic improvements can provide richer, more realistic interactions in remakes compared to their original iterations. However, the constant rapid evolution has led to more and more games no longer being playable. Even the AI tools still can't provide enough technical quality to make old-gen games fully playable on new hardware. A lot of old games still require original devices such as old-gen consoles and TVs to be played and experienced in a proper way.

Secondly, innovations in the monetization of media, which are changing the ways in which media operate and generate revenue, as well as the ways in which people access their products and assess the value of these outputs (Pravdová et al., 2023). According to Newman and Simons (2009), as members of a global industry, we are not encouraged to assign value to old games because the best game is always the next best game. In the same way, AI would approach the evaluation of an older title based on the technical parameters and technologies used. In this way, a game that does not meet the latest parameters of the given attributes would receive a lower rating despite the strong immersion and gameplay experience provided.

Emotions, experiences and memories are tied to human beings (players) who, while playing, create emotions and memories of the game that they associate mostly with their youth. One of the strong human emotions that marketing works with is nostalgia. Bosman (2023) hypothesizes that if most adult gamers started playing games as children or teens in the late 1970s and 1980s to the turn of the late 2000s and early 2010s, they are old enough to develop feelings of nostalgia for the video games of their childhood. Based on this, he defines the modern phenomenon of gaming nostalgia and retro gaming. Thus, old titles have been on sale for some time now, in different versions but mainly available for current hardware. The aim of this exploratory study is to define and describe the current ways of monetising old titles. The study discusses nostalgia marketing as one approach by which older games can be re-marketed at full price, as well as longer-established remasters, remakes, ports and their combination into collections.

2 Nostalgia, Retro and Vintage Gaming

Nostalgia holds a special place in the gaming industry, serving as both a powerful emotional connection and a strategic marketing tool. Nostalgia is generally an effective marketing tool, which according to Holotová et al. (2020) influences consumer behaviour for several reasons:

- Due to advertising overload, consumers are unable to form an emotional bond with a brand, but brands that we consider synonymous with a certain period are able to build on the activation of pleasant memories.
- In a moment of nostalgia, the consumer is taken back to a period in which they felt particularly happy, safe or carefree. Brands aim to recreate positive feelings and create trust with customers.
- Feeling nostalgic can make people feel more connected to others, which explains why brands use nostalgia in their social media content.
- It combines the past and the present. “Retro” is clearly one effective tool to attract consumer interest, but it can be even more effective when nostalgia is combined with innovation.

For many players, video games are not just entertainment but treasured memories from their youth. The rise of retro games, with their simplistic mechanics and pixelated graphics, is a testament to the enduring appeal of nostalgia. For some players, the charm of basic graphics and straightforward gameplay can outweigh the allure of modern, hyper-realistic designs. Retro games remind players that the essence of gaming lies in the experience, not the technical perfection. This perspective raises an important question: Are AI tools always necessary when adapting or remastering older games? While artificial intelligence offers powerful solutions – such as enhancing textures, improving animations, or reworking gameplay – it is not always required to evoke the emotional resonance of a classic game. The beauty of many retro-inspired games lies in their imperfections, which are often intentionally preserved to maintain authenticity.

Of course, there is a difference between emotional connection and nostalgia. Nostalgia is more than mere recollection; it also involves ascribing positive value and meaning to the past. It does not only refer to an individual but also to a collective relationship with the past and involves how one remembers, relates to and reconstructs the past (Jacobsen, 2023). The term nostalgia has been associated primarily with negative connotations, only later it began to be differentiated and associated with the concepts of warm, old times, childhood and yearning (Sedikides et al., 2004). In relation to the romanticised desire to return to a certain past period, Bosman (2023) coins the term *video game romanticism*, which according to the author can

take two forms. Firstly, video games are a medium through which the idealisation of our collective past takes place, creating an appealing digital, interactive and narrative complex. The second form posits video games as an object of idealisation of the past to be desired, where desire can be directed towards software or hardware (Bosman, 2023). In both cases, nostalgia-based marketing works with other terms such as retro and vintage. According to Dam et al. (2024), retro marketing creates brands with an embodied authentic market value of history. In the gaming industry, this manifests itself as the adoption of the aesthetics and/or mechanics of older video games into modern games, i.e. retro gaming (Bosman, 2023). However, it is also used by brands with authentic historical value, where we speak of retro nostalgia, which targets the return of older gamers to the games of their youth, e.g. the second launch of the first version of *World of Warcraft* (Blizzard Entertainment, 2024). The second option is vintage marketing, which can help consumers create meaning through engaging with objects from the past (Dam et al., 2024). The gaming industry uses the concept of vintage play, which, unlike retro nostalgia, targets young gamers who are too young to remember or experience an idealised past (Bosman, 2023). An example is the *ATARI 50 Celebration* (Digital Eclipse, 2022) collection, which contains over 100 Atari games arranged on a timeline and supplemented with additional context.

3 Remasters, Remakes, Ports and Collections

The rapid lifecycle of gaming consoles often forces developers into difficult decisions, such as which generation to prioritize for a game's release. In this context, backward compatibility (BC) emerges as a double-edged sword: while it retains existing users and boosts hardware sales, it can negatively impact software sales on newer platforms. Despite these advancements, the appeal of retro games highlights that AI enhancements are not always necessary. This balance of nostalgia, AI-driven innovation, and strategic monetization not only preserves gaming history but also ensures its continued relevance in an industry shaped by rapid technological change. It is precisely because of the game mechanics that it is necessary for the developers to release the game again - and then it is necessary to choose the right form.

The market has well-established approaches to transforming old games into new versions that enable re-monetization. One of them being **remasters**, **remakes** and **ports**, which make older games accessible to new players, by releasing games on modern consoles and PCs (Bosman, 2023). New enhanced versions often offer added content in the form of making-of materials, commentaries, and other content (Glas, 2024). Technological advances and the rapid arrival of new devices make even titles that are several years old obsolete. When releasing at the end of the lifecycle of one console generation, there is always a dilemma for developers as to which generation to release a game for. As we previously mentioned, in such cases, **backward compatibility** (BC) of some devices is also invoked. This allows the new console to run and enable digital games created for previous generations. According to Narang and Shankar (2022), the reason for its use is also to retain current users and prevent them from switching to a competing platform. While BC can boost sales of new technologies in the form of hardware it can also have a negative effect on software sales for emerging gaming devices (Cox et al., 2023).

Remasters retain some of the code and mechanics with improved presentation (Grabarczyk & Aarseth, 2019). According to Lizardi (2024) they have the potential to redefine how players remember the flaws of the original release. As Švelch (2017) refers to remasters as updates or patches of the older versions, from an economic perspective we can also see them as sequels, which are notably more profitable due to reduced production costs and the potential to allocate additional time for refinement (Newman, 2012). Also, due to the

lack of backward compatibility of PS3 games on PS4, the first episode of *The Last of Us* (Naughty Dog, 2013) came for Playstation 3 after only a year with a graphical update in the form of a remastered version for Playstation 4. This offered all the available DLC and enhanced graphics for the price of a new title, even a year after the original game's release (Furn, 2023).

A **remake**, unlike a remaster, is a more refined version of the game that functions and looks similar to the same, but runs on new code (Grabarczyk & Aarseth, 2019). Such remakes are mostly given to older titles for which a slight graphical overhaul is not enough. Due to the obsolescence and lack of access to the original, remakes and remasters sometimes even become the most affordable way to play a game, or they “modify” the old for a new experience, which is usually presented as the best way to play a game (Glas, 2024). In the same way, the remake of *The Last of Us*, which came out 2 years after the arrival of the Playstation 5 on the market, is presented in marketing communication. The remake, titled *The Last of Us Part I* (Naughty Dog, 2022), is more elaborate than the previous revision in the form of a remaster on PS4. The graphical improvements are more significant this time in the form of new animations, new character models and also a heavily modified game environment, which, however, does not change the gameplay. The AI of a player's companion was also enhanced in comparison with the original game, where it didn't seem plausible and authentic for the players. The companion's AI had problems (in the original game) during stealth stages where it often walked right in the line of sight of the enemies, not getting their attention, but breaking the immersion. Also the enemy AI has been improved, now moving through the environments in unpredictable patterns. They are also more effective at flanking and coordinating in small teams to force the player out of cover.

Porting is the practice of adapting software from one platform to another with little effort (Švelch, 2018). Ports do not bring new content or improved visuals to the game. Grabarczyk and Aarseth (2019) add that it is difficult to label a port as several of today's titles are being developed for multiple platforms simultaneously. One of the most recent examples is *The Last of Us Part I* on PC, which came out half a year after the PS5 version was released. The PC version has an average rating of 59% on Metacritic, while the PS5 version received a rating of 89%. The title itself is rated very positively, the only thing that brings down the PC version's rating is the poor technical condition of the port upon release (Metacritic, n.d.). Also, for games that are too old, releasing individual titles on new devices may not be financially worthwhile. In these cases, **collections** bring multiple games in one package, often from the same developer e.g. *ATARI 50 Celebration* or from the same game series as *Dark Souls Trilogy* (FromSoftware, 2019), have proven to be successful in the market. Collections are also an opportunity to re-charge full-priced remastered versions (remaster and remake), e.g. *Tomb Raider I-III Remastered* (Aspyr, 2024).

4 Conclusion

Artificial intelligence and advanced digital tools have become essential drivers of innovation in the gaming industry, particularly in the revitalization of retro and classic games. AI-powered techniques enable developers to enhance older titles, addressing issues like graphical limitations, outdated mechanics, and non-intuitive controls. These tools also allow for a deeper reimagining of gameplay and character interactions, creating modernized experiences that honor the originals while appealing to contemporary tastes. Whether through adaptive learning for smarter non-player characters (NPCs) or procedural generation for enriched environments, AI ensures that even older games remain engaging in today's market.

Contemporary gaming marketing leverages nostalgia in 4 proven ways. First, targets older gamers by offering them the games of their youth, and has proven successful in relaunching the original 2004 version of *World of Warcraft* (Blizzard Entertainment, 2004-2024) in 2019 and again in 2024. Second, brings old titles to younger gamers who didn't have the opportunity to experience the product at the time, e.g. *ATARI 50 Celebration*, which adds further period context. Third, creates new games using old themes or mechanics. The last one is revitalization of older video games through remasters, remakes, ports, and collections has established itself as a well-established approaches of bringing new experiences to the players. These practices allow developers to reintroduce classic, retro or non compatible titles to contemporary audiences by upgrading audiovisual elements, adapting them to new hardware. In some cases, one title can get various upgraded versions, while maintaining the same core gameplay and visual style, such as the first *The Last of Us*. This title got remaster, remake and port, all in the course of 10 years. We also discussed the collections such as *Atari 50 Celebration*, which complements the remade games with other paratexts providing an important context for old and new players. Nostalgia marketing plays a crucial role in this process, tapping into players' emotional connections to their past experiences while drawing in younger audiences unfamiliar with the original works.

The historical link between AI development and video games further underscores the transformative potential of these adaptations. While early games often faced criticism for imperfect AI, modern reworkings can address these limitations, enhancing realism, logic, and interactivity to deliver a more idealized gaming experience. Even newer games might need some AI refinements, which can be addressed in remake versions like it was in *The Last of Us Part I*. Nostalgia, a powerful driver in this process, often emphasizes and idealizes the positive aspects of these games, allowing new versions to blend familiar themes with enhanced technologies. This synthesis of old and new offers players an enriched experience that bridges the past and present. *Tomb Raider I-III Remastered* bridges the classic and modern version of the game by letting the player actively switch between the original and the new remastered visuals.

Nostalgia thrives on emotion, familiarity, and authenticity – qualities that often don't require cutting-edge technology to resonate. Many retro games derive their appeal from their simplicity and imperfections. Pixelated graphics, limited mechanics, and rudimentary sound design remind players of the formative gaming experiences that defined their youth. Over-refining these elements with AI risks stripping away the quirks and charm that make these games memorable. Meanwhile, re-releasing classic games in their original form or with minimal updates often proves both cost-effective and successful. Collections like *Atari 50 Celebration* emphasize historical context and nostalgia over graphical enhancements. Players often bring their own emotional investment into retro games. The fond memories tied to these titles can compensate for the lack of modern features or advanced AI. For many gamers, revisiting a beloved game isn't about experiencing cutting-edge realism but reliving cherished moments. By capitalizing on these feelings, developers can create meaningful experiences without needing to overhaul a game with AI. Authenticity is critical in nostalgia-driven marketing. Overuse of AI risks altering the original essence of a game, making it feel disconnected from what players remember. Unlike entirely new games, remasters and remakes often reuse elements such as the original narrative structure, gameplay mechanics, or engine framework. This reduces the time and resources needed for development. Remasters and remakes are often sold at premium prices despite lower production costs. Therefore, remasters and remakes have a significant place in terms of monetization in the gaming market.

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ORIGINALITY VS. GENERICITY OF DIGITAL GAMES – THE FALL OF FALL GUYS AFTER CORPORATE BUYOUT

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Abstract:

The article examines the digital game *Fall Guys*, initially developed by an independent studio and later acquired by Epic Games, which introduced monetization strategies like microtransactions and seasonal bundles. The study analyses how this acquisition and commercial tactics affected the creative process, game mechanics, and player experience. It includes a qualitative comparison of the game's design before and after the acquisition, alongside an exploration of player reactions on social media and gaming forums. The content was artificially removed and restored multiple times, which had an impact on game's community. The research draws on concepts from mass culture production, such as standardization and commercialization, to assess the impact on player behaviour, customer loyalty, and brand perception. By focusing on monetization strategies, the article provides a case study on how corporate acquisition influences independent game development, creativity, and the loyalty of gaming communities. This article examines originality vs. genericity in independent and mass production.

Key words:

Artificial Content Modification. *Fall Guys*. Gaming Communities. Genericity. Independent Production. Monetization. Originality.

1 Introduction

Fall Guys (Mediatonic, 2020) was originally released on August 2020 for PlayStation 4 and Windows PC. The game has earned substantial following on various streaming platforms and quickly became a viral hit. *Fall Guys* can be categorized as a battle-royale game. In this genre a large number of players compete against each other, but only one can win the match (the concept has been adapted from the movie *Battle Royale* (Fukasaku, 2000) and later popularized by *The Hunger Games* (Ross, 2012) movie adaptation). Majority of games from the genre are first- or third-person shooters; meanwhile *Fall Guys* can be more aptly described as a “party platformer” conceptually similar to the famous TV show *Takeshi's Castle* (Katsura & Misumi, 1986-1990), making it unique among its competition. Another aspect which could have helped *Fall Guys* gain its initial success was the fact, that it was available as a part of PlayStation Plus subscription, which is mandatory for playing premium online games on PlayStation platforms. Significant portion of the initial player base thus received the game “for free”. The original price was 19,99€, making the amount on par with other contemporary indie games.

During its premium era (now commonly referred to as Legacy), the game had six seasons, each adding new playable maps and cosmetic items. Additional monetization was present in a form of DLC or an ability to purchase currency, which was readily earnable by players by simply playing the game. In 2021, the entirety of Mediatonic was bought out by the gaming industry veteran Epic Games (Oliver, 2021). *Fall Guys* operated under the premium model for another year after the acquisition, until it was repurposed into a free-to-play game in 2022. Monetization is a core aspect of modern game production (see, e.g., Pravdová et al., 2023; Czerkawski, 2024; King et al., 2019) and its change within a singular game is not uncommon, especially in the segment of games-as-a-service, such change always impacts the in-game economy and usually alters the core creative strategies for the future content, in order to better promote newly monetized items.

The main focus of the article is to examine the change in both monetization and game design of the game after its buyout by Epic Games, paying close attention to recirculation of content. We examine the commercialized reuse of assets, as well as artificial content alteration by the studio, such as removal and re-introduction of certain levels. Additionally, we investigate the community reaction to said changes.

2 Methodology

In the research on the impact of corporate acquisition on the game content and community of *Fall Guys*, two key methodological approaches are essential: qualitative content analysis and social media analysis. Both methods are crucial for examining how commercial interventions have influenced creativity and player interaction.

Qualitative content analysis is a suitable method for examining changes in game content before and after *Fall Guys* was acquired by Epic Games. This method is used for the systematic analysis of textual, visual, or multimedia content, allowing researchers to identify patterns, themes, or trends within a structured context (Krippendorff, 2018). After identifying changes, the content is analysed in the context of the corporate acquisition and monetization strategies, focusing on the potential impact on game design creativity and the overall player experience (Hsieh & Shannon, 2005).

It's important to note that audience reception is only of peripheral interest in our study, as the scope does not allow for a deep dive into both aspects. Our primary focus is on tracking the originality of the game's creation and the differences in creativity during the transition from an indie game to the corporate product. In the qualitative content analysis, we will specifically focus on the quality of costumes, the approach to creating new maps and game mechanics, the user interface, and how cosmetic customizations were obtained before and after Epic Games' acquisition of the game.

3 Results

3.1 Changes in In-game Economy

One of the most significant changes that came with the move to a free-to-play model and mandatory connection to an Epic account is the alteration of how the in-game currency works. *Fall Guys* originally had two in-game currencies – kudos and crowns. Kudos, represented by the purple coins, were collected for every round the player passed. At the end of each round, the player would receive a different medal – gold, silver, copper or pink. Gold is for first place in the round and awards the most kudos with subsequent ranks decreasing in handed-out reward. The silver pin is awarded if the player passes the round in the top 20%, and bronze for top 50%. Other passing players get a pink medal. The remaining players drop out and receive a small amount of kudos for participating in the round. However, the difference in kudos for each medal is marginal. The crown could only be earned by winning the whole game – the final round. Thus, a player had to complete multiple consecutive rounds without dropping out and win the game at the end to receive the crown.

The only rewards that could be bought with this currency were cosmetic modifications (skins, colours, faces, nameplates, taglines, emotes and victory animations). Each week, one set was in the store for crowns, and the remaining cosmetic modifications (including the common skin sets) were available for kudos (see Figure 1). The shop in the right corner contained a link to the PlayStation store (or adequate platform storefront), where players could purchase kudos and DLC costumes not obtainable by playing.



Figure 1: In-game shop before Epic buyout
Source: Ok_Cash8046 (2024)

Crowns represented both the desired currency and proof of the player's abilities, while patience and determination were enough for earning kudos, as it was not necessary to win in order to earn it. Kudos also ensured players' willingness to keep coming back to the game and getting new costumes to show off. Although collecting crowns seems rather unattainable for casual players, if only one out of 60 players receive a crown, the intuitive and easy nature of core mechanics and the repetition of the same maps makes it so that any player regardless of skill is able to quickly learn and compete with others.

The crown system is linked to Crown Rank (added in Legacy Season 3), in which player gradually unlocked rewards for earned crowns. This pass contains additional cosmetic modifications, most notably, golden costume variants that act as proof of the player's true abilities, as there was no other way to earn them than by winning games and earning crowns. Since this pass doesn't change over time, players were able to recognize "veteran" stable and skilled players if they chose to wear golden costumes.

The system of crowns was first changed in the transition period, when the game was purchased by Epic but not yet linked to an Epic account. A team play mode for two to four people was added to the game, with the rewards being split and everyone only getting crown shards. The transition to free-to-play model and the link to the Epic account further changed the functionality of crowns by removing them from the list of currencies. Currently, Crown Rank fulfilment is the only remaining use for the crowns and crown shards. Kudos also became unpurchasable after the transition.

Alongside the transition, all non-spent currency crowns have been exchanged for kudos for all players. A new premium currency in a form of Show Bucks was added into the game. It can only be earned in very limited quantities and functionally replaced crowns as a currency. Most of the items previously purchasable for kudos also became exclusively obtainable by spending Show Bucks. This left many veteran players in a position where they could not purchase any new item yet had hundreds of thousands or even millions of unspendable kudos (Firm-Ad1612, 2024). The only items which could be purchased for kudos were nameplates, taglines, colours and a very limited ensemble of skins, which were significantly less detailed than previously obtainable or newly added premium skins. Involved companies informed players that the conversion of crowns to kudos will happen, as well as specified the exchange rate (Fall Guys Support, n.d.), however, they did not share any

information about what will and will not be purchasable with kudos with the new model. The situation has only marginally improved with a small selection of skins being available for purchase each season. The amount of premium skins still overshadows those available for kudos, limiting usefulness of previously integral currency.

3.1 Changes in Cosmetic Items

To accommodate the game to the free-to-play paradigm the studios started adding smaller, less detailed costumes – backpacks, shoes – that is, cosmetic items which had no sets or matching accessories. For a certain period after the transition to free-to-play model, players wearing full sets almost completely disappeared. Veteran players that wanted new content were buying non-set cosmetic modifications, as they were only items available for kudos and they already owned older sets from previous seasons. New players had the option of either buying new in-game hard currency with real money or had to very slowly accumulate kudos through time-gated missions and Show Bucks through season passes. We can find discussions where just new players talk about how they can't afford new costumes if they don't want to pay real money (Evil-Mr-Kibbles, 2022; xnthx, 2022). Show Bucks could be used to purchase most of the costumes from former seasons that could be obtained for soft currencies in the past and appeared frequently in stores, so the possibility of missing out was minimal. Most costumes from former seasons were recycled through the new game menu, so it is no longer clear who bought a costume and who earned it through play. Most of the content available for kudos outside of rudimentary costumes was just recycled content that the player hadn't bought before anyway – mostly items denoted as “common”.

Our examination of the costumes is based on personal experience and anchored by the Fall Guys Wikipedia entries, where tables clearly preserve what costumes were added in each season (Fall Guys Wiki, n.d.). At release, it was possible to get 50 sets (that is, 100 unique pieces of clothing to fill all the sets). Some amount of content recycling could be seen even at these early stages, as developers have already incorporated colour variations of the costumes – specifically Golden Hatchling/Hatchling, Raptor/T-rex, Toucan/Tropics Toucan. We already mentioned that costumes were recycled for the Crown Rank system, incorporating golden variants of already existing costumes. While the amount of recycled cosmetic content was lesser than it is in current version of the game, it was still present even in Legacy version of the game.

The store's content expanded considerably after the Epic buyout. The ability to win cosmetic upgrades have been moved to the season pass system. The season pass also has free content, but most of the rewards are locked and unlock after purchasing the Fame Pass upgrade with Show Bucks. This pass also includes kudos and show bucks, but there is only slightly more than the price of the pass itself. For a new player that started playing after the acquisition, it took three seasons of saving to afford the unlock of premium pass. Legacy players who purchased the game received the first Fame Pass for free. This system also works as a tool for player retention, as some players may feel like they've already invested too much time to at least unlock the basic rewards. They also need to unlock most of the reward track in order to earn enough show bucks to purchase the Fame Pass next season without having to buy them.

After fourth season of free-to-play version, themed seasons and maps are no longer being added. Instead, the pass changes approximately every month, forcing players to play more to get the most rewards and not fall behind with accumulation of premium currency. Season passes still retain a theme, but it is much harder to identify it as although you can identify the main theme – like food – they are interspersed with robotic or animal costumes. The main theme, however, can be somewhat determined just by the number of recycled costumes (see Figure 2).



Figure 2: Recycling of costumes in season pass Tool Up Update
 Source: Mediatonic (2020), own processing, 2024

With the new November '24 Update, there are 22 costume pieces in the pass. 12 of those are just a colour variation of another costume with minor added details. Cerbers and Hoarfrost Hound costumes are just a slight modification of costumes that were already in the game before as Big Bad Costume (base wolf costume). The strategy for the use of recycled costumes is also being expanded. Most of the recycled costumes don't reappear right away but come again after two or more updates. Many of them are originally in season passes and are later sold in the store with different colour variant. But we can see that many season passes are also based on this recycling. We can also see that some costumes come in variations throughout different seasons and events, while other variations are available in the store like tiger skin in Power Party Update and then used in Fall Forever Update and Scrapyard Stumble Update available for available for 1000 Show Bucks (500 each part) (see Figure 3).



Figure 3: Recycling of skins in different updates and in-game shop
 Source: Mediatonic (2020), own processing, 2024

The wolf costume has been in the game since its release and is still used across all seasons, updates and even in the shop (Figure 4). At the same time, the costumes are always named differently so that players don't see them next to each other when changing their avatar, as they are ordered alphabetically by default.



Figure 4: Recycling of skins through the game
 Source: Mediatonic (2020), own processing, 2024

3.1 Changes in Maps

As mentioned above, until the Epic Games buyout, a new themed season was released every three-to-five months, introducing distinctive costumes and new playable maps. Although it is impossible to clearly separate how much the creators had originally prepared in advance, after the sixth Legacy season comes the big reboot. The sixth season had the longest cycles, running from November 2021 until June 2022, lasting almost eight months. It was also the last season before the transition to free-to-play model. After Legacy season 6, season 1 comes around again with the title Free for All. Its aesthetic is more of a throwback to the first

season as there is no clearer aesthetic to identify here. The season can be seen as lightly sports-themed due to the open-air stands in the background, making it seem as if every race is being watched by spectators. However, we can clearly see the difference in approach. The added maps are designed to be much faster. Most have acceleration mechanics and are much more straightforward, and it really comes down to who can get to the finish line the fastest in the race. Although most tracks have multiple paths created, many optional paths are often inefficient and don't even have easier or harder obstacles created on them. The original seasonal maps often offered following alternatives – a shorter but more difficult course with a greater risk of falling or crashing, or a longer route with less obstacles that even a beginner could navigate. The new maps disadvantaged the less skilled players and those starting from the back row. The order in which players are placed on the starting line is randomly generated without any consideration of the player's rank. The following season was more thematic with visible space theme and again brought a lot of new original maps and mechanics. However, many of these racing maps were again poorly balanced, as evidenced by the fact that they were completely removed halfway through the season. Season three only brought 5 new maps, but that number is on par with the second original season of Medieval Knockout.

The last season of Creative Construction was indicative of the game's development. It was thematically disguised as Low Poly, and the costumes were adapted accordingly. Creative Mode was released in this season, allowing players to construct new maps. However, no aesthetics could be created for the new maps, most of them looked like versions that were created for playtesting, or artificial worlds devoid of any deliberate design. Players could only construct maps from a small number of pre-defined objects and could not change visuals or music. After the addition of creative mode, developer-created maps were never added to the game again, putting the entire maintainability of new maps in the hands of consumers and fans. The reduction in styling and return to simple shapes was also a move to prepare for the mobile version, which was eventually confirmed, and *Fall Guys* is now available on mobile devices as of August 2024.

The push into creative mode resulted in even more closed and linear maps. None of the available gameplay modes – solo, duo, squads, event play – existed without the addition of these player-created maps. There were several types of entries and categories for these maps, and the maps could be rated by players after they beat them, turning them into quasi unpaid beta testers. They also offered creative maps where the player did not compete with other players. The player just had to keep playing and once they finished the round on their, they were automatically placed into another similar round. The players of this mode had to manually quit the game and confirm that they wanted to collect the rewards. Even the overview of the time spent in the game mode has been removed. To further push creative maps into the foreground, the developers started to “vault” certain old maps, taking inspiration from Disney and its vaulting of old cartoon movies. Some maps were intentionally made unavailable just to be re-introduced in further season.

Another change to make the game faster can be seen with the reduction of players in a single game. *Fall Guys* originally had 60 player lobbies, which was later reduced to 40 and then further reduced to 32. By doing so, they reduced the number of rounds that had to be played before the player reached the finals. However, it brought another set of problems. Making the player pools smaller made that less players could qualify even through the first round. New and unskilled players often could not beat even the first round. Even though the game was made faster, it also became significantly harder for those, who did not yet master certain maps. By not being able to progress, affected players could not improve on maps which usually appeared later in game, as they were not able to reach them most of the time.

In August 2024, a new mechanic was added to the game with the update. The new mechanic consisted of carrying other players on their backs, where both players had to agree

and confirm by pressing a button that they would carry or be carried. The new mechanic was presented as a casual mechanic to relieve stress. However, the new mechanics also negatively affected competitive game modes for a short time. The reduced number of players who could sign up for duo or squad made it even stronger. In Squads mode, the players very quickly figured out that the most effective strategy is to let the best two of the team play and carry the rest on their backs. Since the game recalculates points for each passing position, if such a pair finished in first and second place, they were automatically awarded points for first, second, third and fourth place. If several teams did this, the game automatically recalculated that the remaining 50% had already won more points and disqualified the remaining players. Paradoxically, this mechanic has never been removed even from races, and this tactic is hardly used anymore, which leads us to two conclusions. Either the players realized that they would ruin the game this way and refrain from using the strategy, or more likely, after the stormy reactions has subsided, enough new or returning players entered the game, which eventually led to the reduction of players who knew this tactic and it became less prevalent. The piggyback was also used by trolls to sabotage the game for others. They let the unsuspecting victim hop on their back and then proceed to drop them off to a pit or out of a stage, while remaining safe themselves.

3.2 Community Response

As with most contemporary digital games, *Fall Guys* has its dedicated social media channels, where players share their opinions, reactions, or just discuss the game with each other. Even though we investigated multiple platforms, we chose to include reddit as main point of reference, as reddit posts can be easily tracked, are publicly available and stay online indefinitely (or until deleted by users or administrator). The consensus found on reddit was largely shared among other social media platforms, making reddit posts a valid reference point for this article. We focus solely on player reception of the game after its transition to free-to-play model in 2022.

The transition itself has seen mixed reactions from the player base. On one hand, veteran players were dissatisfied with the transition to the new model and the way their previously earned currency conversion has been handles. On the other hand, many welcome the ability to play with friends, possibility of larger player counts and cross-platform compatibility of the game.

The reception turned more negative with the introduction of creative mode. The mode itself was deemed lacklustre, missing integral features and was too restrictive. However, the most problematic aspect was the lack of developer-made content after its introduction. Players felt that the creative maps were lacking the polish of in-engine made ones. This sentiment did not change even with substantial expansion of creative mode. Players often marked the game as “dead” even though there was no slowdown in filling up the lobbies. The largest number of negative remarks towards the game is 6 to 12 months old, which was the timeframe during which the game heavily pushed creative mode. Posts like “Fall Guys is DEAD already” (hogwartsa9, 2023), “Creative ruined Fall Guys, and it is still on a massive decline” (Jordikry, 2024) or “Can this game be revived?” (Victorloq, 2024). Some players even stated that they lost their “safe gaming space”, because *Fall Guys* remains as one of few casual-friendly multiplayer PvP games.

The game is currently reversing some decisions made during the creative era. Namely, they returned game modes which do not include any creative maps and unvaulted most of the old maps for said modes. The game has not yet recovered, but the player base is sensing the positive change. According to one of reddit users:

From a player perspective, if fall guys was a stock, and it reached \$100 during the space season, and \$80 during the ocean season, and reached a low of \$30 during the creative season, then now it's about a \$65. (ToastBalancer, 2024)

While the lack of new developer-made playable content still lingers, the recent changes show, that Mediatonic reacts to the feedback.

4 Conclusion and Discussion

We can see that after the Epic Games buyout, the costume business has expanded significantly – the store is more expansive. However, the opportunity to purchase costumes for kudos – the soft currency is minimal. Likewise, we can see that the freely available in-game currency is only enough for one purchase – either one minor costume or paying for a season pass. A season pass contains on average around 20 costumes, but of these, approximately half are colour variations. However, the Season pass is still a bit more enticing as the rewards include variety of items such as name tags, different faces and animations. However, purchasing the pass only unlocks the ability to earn rewards by playing, so it still requires time investment. Tickets earned as the main rewards for play serve no purpose other than to fill up the season pass. At the same time, the kudos rewards are lacking in quality. This creates content that players don't care about and is meant to act as a contrast to the better hard-currency rewards.

Epic Games took advantage of the influx of new players and the expansion of content across all platforms to not have to add new content for two years. Most of the costumes that were previously earnable by playing have appeared in the store with an option to purchase them. This also changed the way the game was played – skins were the only rewards for player abilities. The exclusivity of the costumes has completely disappeared. Instead of gameplay principles based on rivalry and improving abilities, the corporation is incorporating the principles of fear of missing out and other mobile-like strategies. Even the costumes available for premium currency are often a variation of costumes already retired in the past.

Gameplaywise, the studio artificially altered availability of original maps, only to re-introduce them in a later date. Originally, the intention behind the vaulting some of the maps was to ensure compatibility with new platforms. However, it evolved into a deliberate choice to artificially gatekeep content from the players. It also coincides with the release of creative mode. Maps made in creative mode often resembled artificial worlds only created from basic geometric shapes, and lacked the creative freedom seen in the levels created by developers in-engine. This can be seen as an attempt to move the player base in studio-desired direction.

The lack of new maps and visible push to user-created content can be seen as the largest detriment of the game's quality. This can be seen on social media platforms, where users voiced their dissatisfaction with the state of the game, especially during the creative push. The lack of new developer-made levels may also be attributed to a large scale lay-off in 2023, which developers acknowledged by sharing a photo of their logo rearranged into an anagram "DECIMATION" (Carter, 2023). Not enough developers in combination with push for optimization of profits may have put the game in a spot it was in during creative era. The originality of the *Legacy Fall Guys* seasons has been replaced by the generic, albeit player-created levels and recycled content shortly after the formerly independent studio was acquired by a multi-national conglomerate. The developers are slowly amending some of their design decisions, but addition of new original content seems unlikely at least for foreseeable future.

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ARTIFICIAL JAPANESE GAMES MONETIZATION

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Abstract:

The Japanese digital games industry has its own distinct creative and monetization practices, which differentiates it from other global production. Despite the numerous contemporary challenges that the industry faces, such as the growth of AI generated content or artificial intelligence threatening to replace positions of artists, monetization has been a problematic topic for decades and still presents a balancing problem for developers and publishers. This case study points out how artificially incorporating additional levels of monetization can impact digital games content as well as its critical reception. The main focus of this article are games which purposefully omit core gameplay elements, in order to sell them as expanded features. We explore the problematic using the example of Dragon's Dogma 2 and Like a Dragon: Infinite Wealth, which have been heavily criticized for artificially segmenting core parts of the game into purchasable content. We also put the games into the wider context of monetization practices specific for Japanese premium digital games.

Key words:

Artificial Monetization. Dragon's Dogma 2. Japanese Game Production. Like a Dragon: Infinite Wealth. Monetization.

1 Introduction

The production of digital games today represents the most profitable sector within the media industry, generating more revenue than even Hollywood's global film productions, which are known for their high budgets and extensive marketing (Richter, 2022). Over the past two decades, the rise and evolution of various game monetization strategies have played a crucial role in securing this dominant position. As primarily commercial products, digital games are designed to maximize profits, whether as products or as services. The industry has developed new approaches to creating games that enhance profitability, such as paid additional content, microtransactions, and chance-based purchases, among others. Some titles adopt premium models, where the game is sold as a standalone product, while others succeed with free-to-play models that provide the core game for free but generate revenue through in-game purchases or ads. Many modern games blend these models, even offering in-game purchases within premium titles as an added revenue source (Radošinská et al., 2022).

Paid game content for games existed even before widespread internet connectivity, mostly in the form of expansion packs. The adoption of internet connection by general households allowed for experimentation with additional monetization. Despite the internet experiencing its largest amount of growth in the 90s, the largest advancements in the additional monetization of premium games started to appear in the late 2000s, when console digital storefronts became a norm. The most notorious example, which helped to normalize microtransactions in premium games, is the *Horse Armor Pack* (Bethesda Game Studios, 2006a) for *The Elder Scrolls IV: Oblivion* (Bethesda Game Studios, (2006b). The downloadable content (DLC) only provided minor cosmetic adjustments for the rideable horse and was priced at approximately 2€. Even though "the term 'Horse Armor' became a derisive insult within the gaming community", the DLC itself was a commercial success (Shen, 2021, p. 1088). This bold move showed other competitors in the industry that games can be further monetized with bite-size content packs, and nowadays additional monetization in full-priced games has become a reluctantly accepted standard.

This article aims to explore the specifics of Japanese game production regarding its additional monetization practices. Even though the Japanese gaming market is largely mobile-centric, console games manage to thrive and co-exist alongside their mobile counterparts (Yamaguchi et al., 2017). We specifically focus on premium games, as they are already sold as products, and it is easier to trace their evolution. At first, we take a look at the history of additional monetization popular in Japanese premium production. Afterwards, through the lens of qualitative content and discourse analysis, we discuss two cases of contemporary titles which have been criticized by fans for their purchasable content; *Dragon's Dogma 2* (Capcom, 2024a) and *Like a Dragon: Infinite Wealth* (Ryu Ga Gotoku Studio, 2024a). Our aim is to determine whether the monetization practices provide additional value for the players or serves as artificial means to incentivise players purchase behaviour. Additionally, we aim to explore how Japanese-specific monetization practices evolved and estimate their future heading.

2 Specific Practices of Japanese Premium Game Monetization

Even excluding the free-to-play monetization models widespread in the Japanese game industry, such as gacha, lootboxes or monetized timegating, Japanese premium games have a plethora of unique ways in which they can be monetized. Their industry has a rich and unique history of practices, and their gaming culture differs from what is traditional in western territories (see, Koyama, 2023). The following chapter does not represent an extensive list, just a few examples of endemic practices which are rarely used in other parts of the world. Among the oldest forms of Japanese monetization practices, we can point out *fan discs*. A fan disc, contrary to its name, is created by the games developer and aims to expand the plot of an existing game. The most prominent genre they are used with are visual novels. They are smaller in content compared to the western game expansions, mostly following a story of a single character, either flashing out their personality or showing situations not presented in the game itself. They can also serve as prequel, epilogue or transition between two titles. Fan discs are usually priced at around 10€ to 20€, but the price can vary depending on the amount of added content. Some of the notable examples which have gained popularity even outside Japan include *Fate/hollow ataraxia* (Type-Moon, 2005) a pseudo-sequel for *Fate/stay night* (Type-Moon, 2004); *A Requiem for Innocence* (Novectacle, 2015) serving as a prequel for *The House in Fata Morgana* (Novectacle, 2012) or *Steins;Gate My Darling's Embrace* (5pb., 2011), a romantic comedy spin-off of otherwise serious science fiction visual novel *Steins;Gate* (5pb. & Nitroplus, 2009). Most fan discs, however, still remain exclusive to Japan with only fan-made translations being available in the west.

A specific practice used mostly by Japanese role-playing games is to release an expanded version of an already existing game. This practice does not have its own name, but it has its roots in the sixth console generation, when internet connectivity for consoles was highly limited. When developers wanted to expand a game for console, they could not release an expansion pack, as consoles did not yet have a hard drive to store the extra data. They could instead opt to re-release the entire game with added content. The main difference between said practice and the current practice of the widespread release of a complete edition with all extra content included, is that the added content from these versions cannot be purchased separately. It was not seen as an issue during the sixth console generation, however, the trend persists to the present day, and is criticized for its archaic structure, as the content can be easily sold as an expansion or downloadable content and downloaded from the online storefront. Some notable examples are *Monster Hunter* games, where the trend set from the first game and expanded releases were named *Monster Hunter G* (Capcom, 2005a) in Japan and *Monster Hunter Freedom* (Capcom, 2005b) on the global market. The franchise has

only recently dropped the practice, as seen with *Monster Hunter World: Iceborne* (Capcom, 2019a) being sold both as a definitive edition of the game and a standalone expansion. Atlus is known for its heavy usage of this strategy in their flagship franchises Shin Megami Tensei and Persona. The third instalment of the Shin Megami Tensei series had an expanded version subtitled *Maniacs*, which later served as a base for international release. The third, fourth and fifth instalments of the Persona series all received an expanded re-release. *Persona 3 FES* (Atlus, 2007) aimed to expand upon the ending of the game, which many fans found confusing by adding a post-game chapter playable with different protagonist. *Persona 4* (Atlus, 2008) received an expanded release in a form of *Persona 4 Golden* (Atlus, 2012) when it was re-released on PlayStation Vita approximately five years after its initial debut. The questioning of this practice arose from the release of *Persona 5 Royal* (P-Studio, 2019), which was released on the same platforms only three years after the original version. A similar situation could be seen with *Shin Megami Tensei V: Vengeance* (Atlus, 2024), but the reception was more accepting, as fans theorized that the original game was incomplete and *Vengeance* also allowed the game to be played outside Nintendo Switch, as it was released on multiple platforms.

From the seventh generation onward, DLCs became a standardized form of monetization for premium games. During the early years of this trend, some Japanese developers chose to sell crucial story segments of their games as additional content. Konami's *Castlevania: Lords of Shadow* (MercurySteam, 2010) received two story DLCs, of which one is essential to play before the sequel. Without the knowledge of the event from the DLC, the player would not understand the drastic change in the protagonists' personality. Capcom is another company which was criticized for its questionable DLC practices. Like the aforementioned *Castlevania*, their action beat-em-up *Asura's Wrath* (CyberConnect2, 2012) also implemented its true ending as purchasable DLC. To further complicate matters, *Asura's Wrath* and a handful of other games released at the same time had DLC already pre-installed on the games disc, but required payment to unlock it. As trends in monetization later solidified, Japanese games (mostly RPGs) found their niche in providing cosmetic items such as outfits and accessories for playable characters. This trend continues to this day, mostly present in AA or non-mainstream franchises. It is still common to find Japanese games where costumes cost more than the game itself. A notable example is the *Dead or Alive* series, where all of *Dead or Alive 5* (Team Ninja, 2012) DLCs cost over 600€ and *Dead or Alive 6* (Team Ninja, 2019) offers over 460 pieces of purchasable content priced between 2 to 90€. Another trend in Japanese games cosmetic DLCs is the inclusion of swimsuit costume packs for playable characters. The trend is slowly losing its momentum with large companies such as Square Enix, Capcom, and Sega, however, it still prevails within the production of AA studios such as Tecmo Koei, Nipon Ichi Software or Nihon Falcom.

2.1 Artificial Monetization and Critical Reception of Like a Dragon: Infinite Wealth

Like a Dragon: Infinite Wealth stands as the eighth instalment in the *Like a Dragon* (formerly *Yakuza* in western territories) series, excluding spin-offs and the prequel *Yakuza 0* (Ryu Ga Gotoku Studio, 2015). The franchise had problems gaining its foothold outside Japan since its first overseas debut in 2006, until the release of the aforementioned *Yakuza 0* in 2017. The main problem of the franchise laid in the structure of the works, as all the games in the series were direct sequels and required knowledge of the prior instalments to be enjoyed. They were exclusively available on PlayStation consoles, with the first two being available on PlayStation 2 and the third to fifth on PlayStation 3, effectively requiring two different pieces of hardware to experience the entire story. The waning interest in the series can be seen with release of *Yakuza 5* (Ryu Ga Gotoku Studio, 2012), which only received a digital release, omitting physical retail copies at a time when such strategies were rarely implemented by

major publishers. *Yakuza 0* introduced a new starting point into the series, and with the higher acceptance of Japanese pop culture in the west, *Yakuza* quickly grew in popularity. Sega capitalized on its success by releasing remastered versions of all the mainline titles for multiple contemporary platforms, and made the entirety of the story widely available. The seventh instalment *Yakuza: Like a Dragon* (Ryu Ga Gotoku Studio, 2020) introduced the monicker “Like a Dragon” after which further localization of the series was renamed to better reflect the original Japanese name *Ryu Ga Gotoku*. From that point, the series opened up to experimentation with core gameplay mechanics, changing the combat system from real-time to turn-based. Even with this radical change, the reception of the series has been positive, and fans generally did not feel alienated by the new direction of the franchise.

Like a Dragon: Infinite Wealth follows the same mechanics as its predecessor, and yet the reception has been mixed. Before analysing the game and community response, it is important to note that by general review standards, the game itself has an above average evaluation. The user scores on Metacritic fluctuate around 85/100 depending on platform, and Steam has its review score as *very positive*. The negative reception is more visible on social media dedicated to fandoms of the franchise. There are two major factors influencing the negative reception. The first, arguably less prominent criticism, stems from the culturalization of the games content for global audiences. The second is connected to the additional monetization used in the game itself.

Culturalization is a part of localization, where the content is altered to better suit the region in which the content is to be released (Liu, 2024). In the digital games industry, the term localization also encompasses releases of non-English games for globalized Euro-American markets. Some audiences of Japanese media are sensitive to any changes made to the content, as they seek the authentic experience meant for Japanese audiences, made with their sensibilities in mind. In the process of culturalization, changes can range from altering culturally-specific dialogues to modifying visual assets that can be considered problematic, such as nudity or blood. In the case of *Like a Dragon: Infinite Wealth*, controversy arose from an interview with executive producer Masayoshi Yokoyama, who stated that:

Many representations which were normal in Japan in the first Like a Dragon games are no longer acceptable today, [...] We ask our teams in the United States and Europe to read the game’s script, and they tell us if they see things that wouldn’t be acceptable in their country. (Cena, 2024, “No Longer Acceptable” section, para. 2)

Many fans interpreted the statement as pre-emptive censorship of the game and voiced their dissatisfaction on social media. Despite the game content being the same across all regions, they feel that even the Japanese version has been altered to appease modern global social standards.

The most explicitly visible point of criticism is the additional monetization aspect. The game has 19 downloadable content packs available, from which only one has positive reviews on Steam. Even the positive reviews for *Yakuza CD Collection Set* (Ryu Ga Gotoku Studio, 2024b) include negative remarks such as “Don’t know why anyone would want to buy the DLC” or “I wouldn’t bother buying it separately” (Steam, n.d.a) The rest of DLC mostly consists of consumable items which give the playable characters extra experience points and packs of crafting materials used to create new equipment and items. DLCs of this type have already been somewhat standardized, and instead of garnering negative reactions, they are simply overlooked. That is further proved by the fact that none of the DLCs from said category have enough reviews to even receive an evaluation on Steam (the largest number of reviews is four), with most of them having zero user reviews. There are two DLC packs with *mostly negative* review scores; *Sujimon & Resort Bundle* (Ryu Ga Gotoku Studio, 2024c) and *Special Job Set* (Ryu Ga Gotoku Studio, 2024d), and a singular DLC with *very negative*

reviews; *Master Vacation Bundle* (Ryu Ga Gotoku Studio, 2024e). *Sujimon & Resort Bundle* only has 28 reviews and most of them state that the content is obsolete or even harmful for the overall game experience: “This DLC completely trivializes the sujimon and resort minigames” (Steam, n.d.b). The content is only tied to a specific minigame and thus has limited impact on the overall game. The *Special Job Set* adds two new playable jobs to the game, which are akin to traditional RPG classes, such as warrior, mage, priest, etc. It is important to note that this DLC was distributed as a pre-order bonus and was free for early adopters. Most physical copies for consoles in circulation still include the valid redemption code, making it so that a large portion of the player base received this content for free. There are 92 user reviews on steam, with the consensus being that it should have been a part of the main game, pointing out that one of the two jobs is among the strongest in the entire game, positioning players who do not have the set at a disadvantage. The most problematic content is the *Master Vacation Bundle* with 454 user reviews, showing that players are aware about the problematic nature of this specific DLC. The bundle contains an assortment of additional content ranging from consumable items that restore health of playable characters, additional music tracks, cosmetic apparel and a new explorable dungeon. The most prominent feature of the bundle is the ability to start a *New Game +*, which allows players to begin the game anew with most of their unlocked abilities from previous playthroughs. The *New Game +* was a feature available in all prior *Yakuza* and *Like a Dragon* games as a part of the base game, without the need for additional purchase. It is also common in other games outside of the franchise, as it allows for experimentation, rewards players for completing the game and incentivises additional playthroughs increasing the replay value. Players have been vocal about a mainstay feature of the franchise getting paywalled in the latest instalment stating: “gating ng+ as a paid dlc is disgusting”, “I thought people online were crazy about the DLC NG+, but boy they were right!”, “ng+ is base game function, not paid dlc” (Steam, n.d.c). Additionally, another affected group of players are achievement hunters. They aim to complete everything the game has to offer by earning all available achievements; meta challenges not present in the game itself, but on a platform account such as Steam or PlayStation Network. The bundle contains its own set of achievements, but also makes earning all those in the main game significantly easier. One of the achievements tasks players with reaching level 70 with the main protagonist. By the end of a playthrough, most players finish at around level 60 and without the DLC, and they must repeatably defeat enemies near the end of the game for hours to reach the required level. The added dungeon in the *Master Vacation Bundle* is the only place where level 70 can be reached within a reasonable amount of time and without necessitating the repetitive and long grind.

2.1 Artificial Monetization and Critical Reception of *Dragon’s Dogma 2*

Contrary to the lengthy *Like a Dragon* series, at the point of writing this article, *Dragon’s Dogma* only has three games, one of which is the discontinued MMORPG *Dragon’s Dogma Online* (Capcom, 2015), which was officially only released in Japan and was shut down in 2019. The original *Dragon’s Dogma* came out in 2012, receiving one paid expansion a year later. No new game has been released worldwide since (except the PlayStation 4 and Xbox One port in 2017, which was still the same game) until *Dragon’s Dogma 2* in 2024. This can be seen as an attempt to revive a dormant franchise which did not have mainstream appeal but had a strong cult following.

The fan reaction after the announcement was overwhelmingly positive, as it took over a decade for the franchise to release a new instalment. Even from the promotional materials, it was apparent that the game would retain the core mechanics which made its predecessor unique; creation and management of a squire-like Pawn NPC, limited fast-travelling options mostly locked behind rare items which players can place anywhere in the world to create their

own fast-travel points, and the ability to climb on large monsters during combat to reach their weak points while playing melee-centric characters. Five months after the launch, reviews for *Dragon's Dogma 2* are mixed, with Metacritic showing a visible discrepancy between critic and user scores, with critics averaging a score of 86, while users averaging a score of 64. Surprisingly, most of the criticism does not revolve around monetization, but points out objective flaws of the game. Most of the negative user reviews criticize the lacklustre story, shallow exploration and overall minimal improvements over its predecessor, outside the modern graphics.

The situation with downloadable content is similar to that of *Like a Dragon: Infinite Wealth*. There are 21 available pieces of purchasable content, of which only one has positive user reviews. *Dragon's Dogma Music & Sound Collection – Custom Sounds* (Capcom, 2024b) contains the soundtrack from the first game, which replaces the music tracks in the game when applied. The reviews make it apparent that the collection indulges nostalgia for the original game, and that many players prefer the old tracks to the new ones. Other DLCs reception ranges from a single *mixed* to multiple *very negative*, with 10 DLC packs not being rated due to low numbers of reviews. This may be tied to the structure of the DLC themselves, where many of them offer in-game currency in packs of various sizes. Therefore, there are multiple packs with the same name, only differentiated by a capital letter at the end, e.g. *500 Rift Crystals – Points to Spend Beyond the Rift (A)* (Capcom, 2024c), *500 Rift Crystals – Points to Spend Beyond the Rift (B)* (Capcom, 2024d), etc. Only the first pack of each group has enough reviews, but we can assume the same views can be applied to subsequent variants, as they provide identical rewards. Even the singular Crystal bundle with *mixed* reviews has many positive reviews written as satire: “Turns your freedom dollars into crystals that purchase humans. 10/10”, “>The value of a human life has been announced to be £4.45; What did Itsuno¹ mean by this?”, “This is a great DLC. Stop being poor!” (Steam, n.d.d). The remaining 9 DLCs with *very negative* to *negative* user reviews mostly share the same criticism. They provide items which can be obtained in game by standard gameplay, e.g. currency to hire Pawns, resurrection stones and gifts to increase affinity with others. The reviews warn that they are essentially new player traps, as they provide seemingly beneficial effects without prior knowledge of their in-game availability. Some of the purchasable items even have objectively better variants obtainable in game, such as the one-time use *Makeshift Gaol Key* (Capcom, 2024e), which has multipliable variant as quest reward and *Explorer's Camping Kit* (Capcom, 2024f) which has in-game variation that is resistant to monster attack. The only cosmetic-related item obtainable through DLC is *Art of Metamorphosis – Character Editor* (Capcom, 2024g); a single-use item that allows players to change the appearance of either a Pawn or main protagonist. The most notable criticism stems from the inability to use the item multiple times and the fact that it was not a built-in feature in a predominantly single-player game. The last examined DLC, *Portcrystal – Warp Location Marker* (Capcom, 2024h) adds additional fast-travel point which the player can place anywhere within the game's world. These crystals can be found in the game itself, but they are finite in quantity. Including the Portcrystal among purchasable items undermines the lack of convenience the game offers. Lack of convenient ways to traverse the world combined with no passive health regeneration and erratic enemy placement incentivise the players to plan out exploration routes strategically. Being able to purchase a fast-travel point early in the game diminishes the intended experience. The inclusion of these microtransactions sparked controversy among the player base (Borman, 2024). Even though Capcom addressed the problems with the game and even issued a formal apology, the focus of the message was aimed at the technical problems, and microtransactions were only mentioned with a reminder that they can be earned in game

¹ Author's note: Hideaki Itsuno is the creative director of both Dragon's Dogma games.

(Anderton, 2024). Similar strategies could be found in Capcom's prior titles, e.g. *Devil May Cry 5* (Capcom, 2019b), making *Dragon's Dogma 2* a culmination of long-standing questionable monetization practices.

3 Discussion and Conclusion

After exploring some older monetization practices and comparing them to those used in *Like a Dragon: Infinite Wealth* and *Dragon's Dogma 2*, it is apparent that they share some similarities with those which the studios used before. All the downloadable content was available on the day of release, which is similar to DLC on disc in function. DLC on the release date has become the norm with major studio production regardless of region or its content. The quantity of additional purchasable content is comparable to the output of other studios but does not reach the high numbers that series like *Dead or Alive* produce. They do not lock players out of crucial story content; on the contrary, *Dragon's Dogma 2* does not expand its story through DLC at all, and *Like a Dragon: Infinite Wealth* only does so in an inconsequential way in regard to the main storyline of the game.

In the cases of both games, players did not find the content of available DLC worth purchasing. The only community-accepted DLC for each title was the additional music from the prior games. For *Dragon's Dogma 2*, the main reason for dissatisfaction stems from the fact that most of the offered content can be already found within the game or has even statistically better equivalents. The fast-travel item, which sparked most controversy upon the release of the game has levelled out its reviews, and is on a similar ground as the other packs. *Infinite Wealth* on the other hand received accusations of removing content which should have been a part of the base game to sell it for additional profit, as the New Game + mode which is a part of *Master Vacation Bundle* has been an integral part of the franchise since its second instalment. Both games provide consumable DLCs which act as an option to make the playthrough easier. While in *Infinite Wealth*, they are mostly ignored by the player base, *Dragon's Dogma 2* reviewers largely condemn them. The main reason for this difference may be the core gameplay of each game. *Dragon's Dogma 2* strives to inconvenience the player and make them carefully plan their exploration. *Infinite Wealth* is a more laid-back experience, which is also highlighted by the holiday destinations where the game takes place. These types of microtransactions can be seen as inconsequential for said types of game, but inherently clash with *Dragon's Dogma 2* core design.

By examining the DLCs themselves, as well as players' reactions to their implementation, we can see that they have been artificially introduced into the game in order to generate more profit. They have been available alongside the games since their release, provide things which have either been in prior games or are readily available in the main game itself, and fail to provide meaningful content. They have been implemented to quicken the player's progress through the game, add unwanted convenience, or solve problems which may have been created to promote the sale of the DLC (e.g., the lengthy process of obtaining maximum levels without it). The community has been vocal about their problematic nature to the point where, at least in one case, the production studio had to acknowledge the dubious nature of the offered DLC. Similar practices have already taken root in western AAA production. Whether they will become another *Horse Armor*, even in Japan, remains to be seen.

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ARTIFICIAL REALITY IN ADVERTISING: A CASE STUDY OF THE #LEVELUPLYOURLIFE CAMPAIGN

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Abstract:

The utilisation of artificial reality in advertising is not a newly emerging concept. However, while previously such a format was employed at a presentation level to portray companies and brands in a manner that reflected modernity and innovation, the current tools of digital game design and generative AI have initiated a shift in this approach. These tools are now being applied to the production of advertising content, which can even include bespoke design elements inspired by the visual style of advanced 3D digital games. This study aims to reflect on the shift in the use of artificial reality in advertising from presentational appeal or endorsement to generating content related to digital game design. This shift is demonstrated by a case study of the #LevelUpYourLife communication campaign from Česká spořitelna.

Key words:

Advertising. AI. Artificial Reality. Digital Games. Monetisation. Unreal Engine.

1 Introduction: From Presentation to Generating

Animation and fantasy approaches belong to the fundamental executional frameworks, within which advertisements are presented and messages conveyed (Clow & Baack, 2018; Reynolds & Gutman, 2001). Depending on the scale of the artificial reality created for advertising, the result can consist of an augmented or fully virtual environment (cf. Milgram & Kishino, 1994). The intention is to provide consumers with a kind of escapist experience that can influence the purchase behaviour process (Maru & Dey, 2024; Sung et al., 2022). Moreover, the level of processing and presentation of artificial reality can be used as a means of appealing to specific target groups, for example, gamers (Mago, 2022a).

The virtual 3D worlds of digital games have already been generating complex artificial reality representations, even metaverses (Mago, 2022b), which frequently serve as models for creating an acceptable and appealing purposeful artificial reality within the advertisements, or the entire advertising campaigns. It is paradoxical that the integration of advertisements into digital games, for instance through in-game advertising, increases their perceived realism (Nelson, 2002; Lewis & Porter, 2010; Verberckmoes et al., 2016), whereas the integration of digital game elements into advertising, as well as game character endorsements (Mago, 2022a), increases the impression of artificial reality. The employment of available animation techniques and film-level computer-generated imagery (CGI) has typically been utilised to attain a high degree of fidelity, but the advent of artificial intelligence (AI) tools currently has the potential to make a significant advancement in this field. AI has brought democratisation to the advertising sector, opening up the possibility of creating virtual characters to a wider range of people (Lacko, 2024).

The implementation of generative AI is a current topic in the context of advertising (Danesi, 2024; Li, 2019; Sung et al., 2021; Zhu, 2024), particularly in terms of new opportunities for creative professionals, for example, employing virtual influencers and brand ambassadors, which also provide potential for wider communication and monetisation activities (Mago, 2022b). Nevertheless, the considerable potential of generative AI is accompanied by many concerns, including the risk of an oversaturation with ‘artificiality’

(Lacko, 2024). Despite forecasts indicating that by 2025, up to 30% of marketing communications will be generated artificially (Murray, 2024), the audiovisual advertising sector is currently adopting a cautious approach, using a generative AI rather as a supplementary tool. The concerns relate to the possibility that such content may be perceived by the public as non-believable, unlikeable, or even misleading, similar to the phenomenon of fake news (see, Kačínová, 2019) and deepfakes (Campbell et al., 2022). An infamous example is the controversially received campaign by Slovenská sporiteľňa from 2022, in which AI was used to “revive” the actor Július Satinský. Conversely, this provides the opportunity for the other sophisticated content creation tools commonly employed in other industries to be utilised in the field of advertising.

This study aims to demonstrate the trend of the shift from a presentation of artificial reality to its generating in the context of advertising through an intrinsic case study of the #LevelUpYourLife communication campaign from Česká spořitelna, with a particular focus on its audiovisual spot created in Unreal Engine.

2 Case Study: Česká spořitelna #LevelUpYourLife

In August 2024, Česká spořitelna, one of the largest banks in the Czech Republic and a member of the Erste Group, initiated an extensive communication campaign targeting Czech gamers and the wider gaming community. A survey conducted by TIGO DNA in August 2024 revealed that almost a fifth of Czechs aged 16-80 identify themselves as gamers, 43% in the 16-25 age group. Additionally, the survey found that 65% of the Czech population plays games less than 7 hours per week, while 35% of the 16-25 age group play games for more than an hour a day, 8% of whom even more than 20 hours a week (JRC & Smarty, 2024).

The #LevelUpYourLife campaign, with the slogan “Stronger in gaming, #stronger in life too”, expresses the respect and support of Česká spořitelna for the Czech gaming community. The bank positions itself as an institution that aims to facilitate continuous improvement for gamers, offering not only financial and banking services but also support for the development of gaming-related abilities and skills. Moreover, it is evident from the bank’s multiple collaborative and cross-promotional initiatives with local gaming sector subjects. The campaign’s partial objectives can be summarised as follows:

- counteracting gaming stereotypes and prejudices typical of the Czechoslovak region;
- promoting the study of digital games at both secondary school and university level;
- the prevention of game account theft through the dissemination of Scammer Alert videos prepared in cooperation with the Czech eSports organisation Entropic;
- discussing interesting gaming topics through the Twitch series hosted by popular Czech streamer and campaign ambassador Petr “Xnapy” Jiráček (see, “Silnější v gamingu”, n.d.).

The campaign’s message is also integrated within the Česká spořitelna Moneyback programme, which offers a partial refund for purchasing game accessories or programming courses in *Minecraft* (Mojang Studios, 2011) and Unreal Engine. In addition, it contains a limited-time 15% discount voucher for merchandise of the highly anticipated Czech game *Kingdom Come: Deliverance II*, provided by Xzone, as well as thematic skins from this game for virtual payment cards (“Silnější v gamingu”, n.d.).

2.1 Advertising Spot

The campaign has attracted considerable attention, primarily due to the advertising spot that launched the campaign and subsequently became its most notable aspect. This can be attributed to the fact that the advertisement was created in Unreal Engine, a professional game development tool. According to Monika Hovorková, responsible for brand and communication of Česká spořitelna:

[Česká] spořitelna today is equally a bank and a technology company. We focus on digitalisation and technological innovation, and I am therefore very pleased that we are the first large company in the Czech Republic to be able to show gaming enthusiasts a new and creative form of communication based on the modern 3D tool Unreal Engine.¹ (Česká spořitelna, 2024, para. 4)

The spot is the result of a collaboration between the creative agency VML and game studios Fanatic Games, RIG-IT and Three Bohemians. It is set in a computer-generated 3D virtual environment and depicts the meeting of five original characters, each representing a different digital gaming genre and experience (Figure 1). Milan Hrubý, the head of the gaming team at the VML agency, has asserted:

We plan to develop the concept in the long term, and we want to work with it in other spots and communication activities. That's why five characters from the game world appear in it, with their own names, origins, universe, characters and missions². (Česká spořitelna, 2024, para. 6)



Figure 1: Characters featured in advertising spot as part of Česká spořitelna's #LevelUpYourLife campaign
Source: "Silnější v gamingu" (n.d.)

Despite the advertisement's duration of up to 75 seconds, no further introduction of the game's characters was provided, which will presumably be done on an individual basis over a longer period of the campaign. Nevertheless, this step was not necessary in this moment, given that the characters were designed to explicitly intertextually and hypertextually (parodically) reference existing characters from iconic gaming titles, franchises, and genres.

¹ Author's note: Text is translated from Czech original text: "Spořitelna je dnes stejnou měrou banka i technologická společnost. Soustředíme na digitalizaci a technologické inovace a jsem proto moc ráda, že jako první velká společnost v Česku můžeme herním nadšencům ukázat novou a kreativní formu komunikace postavenou na základech moderního 3D nástroje Unreal Engine" (Česká spořitelna, 2024, para. 4).

² Author's note: Text is translated from Czech original text: "Koncept plánujeme rozvíjet dlouhodobě a chceme s ním pracovat i v dalších spotech a komunikačních aktivitách. Proto se v něm objevuje hned pět postav z herního světa, které mají svá jména, původ, univerzum, charaktery i poslání" (Česká spořitelna, 2024, para. 6).

The knight represents the RPG, strategy, souls-like, and historical fantasy genres in general, which includes the game *Kingdom Come: Deliverance* (Warhorse Studios, 2018), the series *Dark Souls* (FromSoftware, 2011-2016) and *Warcraft* (Blizzard Entertainment, 1994-2023), among others. The green-skin orc evokes common portrayals of orcs in digital games across genres, for example, the extensive series *The Elder Scrolls* (Bethesda Softworks et al., 1994-2024) and *Warhammer 40,000: Dawn of War* (Relic Entertainment, 2004-2017); still, when combined with the skull of the undead Lich, it is a direct reference to the *Warcraft* series. The cute pink character, resembling Kirby (HAL Laboratory et al., 1992-2023) from the Nintendo series, stands for games designed for children and the platformer genre. The female footballer represents sport games in general as well as gender equality not only on the level of players, as evidenced by the release of the first dual cover for the game *FIFA 23* (EA Vancouver & EA Romania, 2022), featuring Kylian Mbappé and Sam Kerr. The last one, the robot, is not distinguished. In this case, it may be a placeholder character for personalised game tokens, as robots and androids are frequently stylised as protagonists in games, see the series *Mega Man* (Capcom & Inti Creates, 1987-2018), *Portal* (Valve, 2007-2022), or *The Talos Principle* (Croteam, 2014-2023). They also have a place in online gaming and eSports, for example the *Titanfall* (Respawn Entertainment, 2014-2016) series and some characters from *Overwatch* (Blizzard Entertainment, 2016).

Despite the declared importance and extent of the gaming community within the Czech Republic, as is the case with most commercials from the digital gaming sector, neither this advertisement has been broadcast on local television. It supports the assertion that this region is still not a prospective market for gaming TV commercials (cf. Mago, 2022a). The spot was published on YouTube, Instagram, TikTok, Twitch and selected Czech gaming websites.

3 Conclusion

The use of artificial reality in advertising belongs to the established executional frameworks and appeals, characterised by the employment of advanced animation and CGI. However, the advent of generative AI tools has introduced new creative possibilities that are less dependent on the size of the advertising budget, thereby creating an opportunity for the application of other, yet rarely used tools.

The case study of the #LevelUpYourLife campaign by Česká spořitelna illustrates the potential of utilising primary game development tools, such as Unreal Engine, to achieve effective advertising outcomes while simultaneously cultivating closer links with the gaming community. Instead of introducing five original game-like characters in depth, their discussion was focused on the players who play them. The diversity of gender and age groups of players was explicitly stated, as was the positive impact of gaming on players' personal development, including improvements in visual acuity, mathematical abilities, patience, and the potential for developing other activities with games, such as streaming. These points align with the campaign's primary objectives, while the concept of visual processing simultaneously covers a variety of game genres, types, and playing styles, including online gaming and eSport.

The prospective combination of predictive and generative AI in advertising has the potential to create realistic and effective artificial realities (cf. Timonera, 2024) that do not elicit feelings of misleading, outrage, or oversaturation with 'artificiality'.

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INDUSTRY 4.0 AND DIGITAL GAMES – THE HIDDEN POTENTIAL OF CREATIVE SOLUTIONS

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Abstract:

The intention of the paper is to highlight the hidden potential of creative solutions brought by Industry 4.0 and within it Artificial Intelligence (AI) and the digital games industry. The authors base their theoretical reflection on the issue on relevant studies dealing with the emergence of Industry 4.0 in the second decade of the third millennium and the related innovative technologies associated with AI. Based on the conceptualization of the theoretical background, they formulate a premise on the need to implement digital games in educational and retraining processes. As a result of the application of the latest digital technologies, robotics, automation and the implementation of artificial intelligence, the labour market is being transformed, old jobs are disappearing, and new jobs are being created. The ambition of the study is to highlight the creative possibilities of using digital games to address the transformation of jobs and professions in all areas of economic and social practice. These possibilities are demonstrated through the digital game Command the Stack, which was selected based on its educational potential for professionals in the Army Air Force as well as adepts to these forces.

Key words:

Artificial Intelligence. Command the Stack. Digital Games. Industry 4.0. Jobs. Retraining. Transformation.

1 The Digital Revolution and the Transformation of the Labour Market

The intention of the study is to highlight the creative possibilities of digital games in the retraining of employees. The need for retraining has arisen as a result of the digital revolution, the implementation of AI and the subsequent techno-technological changes in all areas of economic and social practice. In the last two decades of the last century and the two new decades of the new millennium, the changes brought about by the digital revolution in the second half of the 20th century began to be discussed more intensively in scientific and professional circles (see, for example, Toffler, 1970; Toffler, 1981; Fukuyama, 1993; Huntington, 1997; Schwab, 2017; Černá & Staněk, 1996). The authors were interested in the processes of adaptation of companies to new communication technologies, changing managerial, production and administrative processes in all areas of social practice. The authors agree that the greatest benefit of the digital revolution is the possibility of working with huge amounts of data. Such a convenience was not known to previous technologies. Another benefit of digital technologies is the fact that they enable the replacement of human manual labour through sophisticated automation and robotization (Veber et al., 2018). The consequence is a transformation of the labour market as new occupations and jobs are created and old ones disappear or are transformed. In continuity with these processes, the need for retraining of the workforce arises. One effective option for retraining is to take advantage of the givens and creative possibilities of digital games in the context of irreversible changes in the labour market.

1.1 From Digital Revolution to Industry 4.0 to Progressive Artificial Intelligence

The principle of digital technology is that, unlike analogue components, a digital object takes the form of a binary code. The most progressive feature of digital objects is their compatibility. For the first time in history, words, sounds, images or ideas can be reproduced and disseminated almost infinitely, while at the same time different linear production processes can be coordinated. They can be modified, new processes can be created, revised and innovated,

etc. However, digital technologies have brought about the most significant social changes in the second half of the 20th century and the beginning of the 21st century (Chatfield, 2013). In this context, Klaus Schwab in *The Fourth Industrial Revolution* (2017) reflects on all the significant changes brought about by the digital revolution. These are changes at the level of the economy, trade, nation states, global space, social structures, management, work specialisations and identities, as well as the morality of individuals.

Applications from the fields of cyber-physical systems, communication networks, robotics, sensor networks, including the Internet, and various other digital innovations have gradually been implemented in production processes in all major industries. If in the 19th century steam was the main force behind the first industrial revolution, later in the second industrial revolution it was electricity. In the second half of the 20th century, in the third industrial revolution, the era of automation and robotization, the beginnings of computer programs, personal computers and Internet communication began. In the second decade of the 21st century, the term “Industry 4.0” emerged in professional circles in connection with the digital revolution. Industry 4.0 was a response to the new situation within the development of production processes based on digital technologies and to issues of competitive capability in Germany (Schwab, 2017). In fact, the next development phase of the digital revolution entered production, commercial and management processes quite radically. This phase has manifested itself in various variants of fusions of quantum computers, nanotechnology and genetic engineering, i.e. close collaboration between humans and computers. In this context, P. Staněk and P. Ivanová draw attention to the fact that a new phase of development of robotization based on artificial intelligence (AI), new knowledge in the fields of nanotechnology, biology, medicine, genetics, etc. has entered production processes. This fact has radically influenced the production system and job positions (Staněk & Ivanová, 2016). Nowadays, in almost all competitive enterprises we encounter fully automated production or interconnected systems based on smart technologies, IoT, cognitive computing or cloud servers and 5G networks. These interconnected systems are not only able to monitor individual production stages, but are also able to evaluate and predict problems and offer innovative solutions. A. Toffler correctly predicted in the early 1990s that those who missed the onset of the digital technology-computing wave would lose out in the competitive marketplace and their business would fail (Toffler, 1990). It also turns out that AI within production and administrative processes has two sides – progressive and repressive. Within its progressive nature, it is evident that as a consequence of the conveniences of the digital revolution and as an engine of Industry 4.0 innovation processes, including communication practices, it is significantly affecting production systems, increasing labour productivity, streamlining management, administration, as well as all areas of social practice, including lifestyles. AI is autonomous, teachable, capable of reflecting complex systems, and able to react sensitively to impending problems and solve them. It can acquire knowledge and offer solutions based on imitation of situations and learning from experience. On the other hand, it is also necessary to reflect its repressive nature, which stems from the fact that intelligent systems based on artificial intelligence threaten jobs at all levels of social practice. Employees need to retrain if they want to be able to compete in a labour market that requires an adequately skilled workforce.

1.2 The Repressive Nature of AI and the Transformation of the Labour Market

Unemployment has been a threat to people in every form of the Industrial Revolution. In all applications of new technologies, this has been reflected in the structure of jobs and the demands of jobs. Some jobs disappeared, other jobs were created. It can now be said that the assumptions of futurologists have come true when they predicted that the application of new digital technologies to work processes would become a huge shock to many people (Toffler, 1970). The fact is that in the second decade of the 21st century, cognitive AI, together with

automation, have demonstrated that they have great potential to change the map of jobs. It is predicted that by 2030, automation in the United States would affect the disappearance of up to 30% of jobs, in a variety of service industries. This does not mean that jobs will disappear, but there will be a need for employees to retrain to meet the new requirements for innovative job tasks and positions (Ellingrud et al., 2023).

The tremendous momentum in the expansion of AI and automation is beginning to be reflected in the restructuring of all sectors of the economy in the second and third decades of the new millennium. Experts predict that there will be a growing demand for specialised jobs, with expectations for appropriate knowledge, skills, flexibility, creativity and the ability for continuous learning. Individuals in the new jobs should be able to work with information technology and artificial intelligence, as well as be proficient in the mechanical and technical areas of the production processes. Based on empirical evidence, it is also evident that AI and automation are not only related to production processes in industries, but have affected all areas of social practice. Current developments also indicate that the job market is fundamentally changing, especially in terms of the demand for certain competencies and skills of employees. It is therefore more than certain that a number of existing occupations will disappear and, conversely, many others will emerge. K. Schwab. In his view, other factors must also be taken into account which influence the need to transform the labour market. Among these are demographics, which are on a downward trend, geopolitics, the consequences of the development of Industry 4.0, and other, non-technological factors. These are demographic pressures, geopolitical developments, as well as new social and cultural norms that are shaping people's lives. K. Schwab points to disruptive trends according to which the factors of production will depend on the talent of individuals rather than on capital. The lack of skilled labour in the new techno-technological conditions may therefore be a greater risk than the unavailability of capital (Schwab, 2017). In this context, it should be pointed out that views on the greater value of human knowledge and skills than the possession of financial capital were shaped as early as the Third Industrial Revolution thanks to the sociologist P. Bourdieu, who categorised the different types of capital. Of these, cultural capital in particular is, according to him, the initial prerequisite for an individual's personal well-being and social fulfilment, as the acquired education, knowledge and qualifications provide him with various advantages and the achievement of a higher social status (Bourdieu, 1998). This concept is the basis for the generally accepted view of the importance of the education of individuals in creating a knowledge society and economy. P. Rankov is based on a summary of views on this issue. In describing the attributes and characteristics of the knowledge economy in the framework of Industry 4.0. He emphasizes the importance of human capital, which for the first time in human history becomes with its knowledge, i.e. the human mind, the real productive force, the most important factor of the entire production process. Not that the importance of raw materials, labour or capital has declined, but they have become less important compared to the creativity and ingenuity of the human mind (Rankov, 2014).

Human and cultural capital condition the setting of criteria for the expected optimal skills of people working with digital technologies. New workers in such jobs are expected to possess skills such as improved technical skills, soft skills, and to acquire new knowledge as well as work experience (Talmage-Roston, 2024). There is an increasing demand for a workforce that possesses a technical background with an analytical mindset and a sense and aptitude for innovative practices. Important skills also include the ability of workers to communicate, collaborate, solve problems creatively, lead teams, and possess management knowledge, as well as skills in mastering the latest technologies. The highly sophisticated technologies of Industry 4.0 require a workforce that is able to work in professions that require analytical and interactive activities. These requirements are driving the emergence of new jobs and professions (Sakurada et al., 2021). According to data from the Centre for Scientific and

Technological Information of the Slovak Republic (Izakovičová, 2019), it is more than likely that those who do not meet these requirements will work in the service sector, i.e., performing less demanding activities tied to physical and routine work performance. On the other hand, those jobs whose performance is tied to routine operations are also expected to disappear. These are mainly occupations in the fields of production, administration, transport, sales and other services. These changes are related to the unstoppable trend of continuous introduction of robotization and automation in various sectors of economic and public practice. This is one of the reasons why it is necessary to retrain the workforce through effective forms of education. Experts predict the disappearance of more than half of the current professions in just fifteen years and the emergence of professions that are not yet known. However, their emergence is highly probable given the transformation of social diversity.

2 Methodology

Based on the conceptualization of the theoretical background and the outline of the characteristics and benefits of the selected digital game, the aim of the present study is to highlight its creative possibilities that can be used in the retraining of the workforce. The theoretical investigation draws on those prominent concepts of foreign and domestic authors that clearly articulate the implications of the digital revolution in relation to the formation of the labour market and jobs. In this context, we point to the conditions for the emergence of Industry 4.0 and the implementation of automation and AI in all sectors of economic and social practice, including the management and administration of all tasks and processes. We conclude that the innovation of technological and communication processes is both progressive and regressive in nature. We formulate a starting premise according to which digital games can be considered as a suitable means of retraining those jobs that are either disappearing or transforming under the influence of innovative digital technologies. This is because digital games can eliminate the regressive nature of transformation processes at the level of individual jobs. As a demonstration of such a possibility for effective retraining and at the same time deepening the skills and cognitive abilities of trainees, we present the digital game *Command the Stack* (We Are Royale, 2022). This game serves in the refresher training of members of the U.S. Air Force and as a useful manual for potential applicants for positions in this segment. Our research methods employ best practices of logical analysis methods, particularly inference and broad generalization, the descriptive method, as well as analytical procedures characteristic of qualitative inquiry.

3 Results

Developments in the labour market in relation to changing production, management and administrative processes show that it is necessary to develop effective methods of retraining employees as part of the transformation of work processes. HR professionals talk about the need to find new, effective methods of training using the latest digital technologies. New methods of education point to the possibilities of AI and its revolutionary potential. J. Russel and P. Norvig underline in particular the possibilities of AI analysis in identifying problem areas. AI is able to effectively identify the underperformance of retrained persons with an aspect on their individual personalities and needs (Russel & Norvig, 2016). In the context of the digital revolution, AI and the search for optimal retraining methods, a wide range of opportunities have opened up in the field of digital games in recent decades. These can offer concrete instructions to individuals, simulate predictable and unpredictable situations, validate the procedures by which they acquire necessary skills, or translate various abstract theories into visual and interactive experiences to facilitate their understanding of complex topics. According to B.

Gros, the advantages of applying digital games are the possibilities of multimedia design for retraining, training, etc. The positive results are due to the fusion of interactive design with the most effective principles and methods of education (Gros, 2007). The implementation of digital games in retraining and education expands the possibilities of learning and deepens the interactions of people in educational and professional contexts. Digital games should therefore be designed to enhance learning and interaction. Such an approach emphasises the fundamental aspects of learning, i.e. cognitive and affective. This is because these aspects take into account individual and group support for cognitively and affectively meaningful learning (Näykki et al., 2019). The above authors agree that the benefits of such an approach to learning can be very effective when taking into account validated cognitive practices associated with emotional and experiential processes in individuals.

We believe that it is these approaches to retraining employees and teaching them new knowledge and skills based on an individual approach that point to the comparative advantage of digital games over other forms of learning. In this context, it is also important to note that we also consider as retraining games those that have an entertaining and educational character and are used by their users as a complement to other forms of education or training. One such game is the digital game under the umbrella title *Command the Stack* (“Command the stack”, n.d.), which is used by the United States of America (USA) Army Air Force as part of its refresher training. The game is available to players online by registering on the Army Air Forces website. It offers users opportunities to learn skills from a variety of flying situations and in combat against enemies. They have the opportunity to test acquired skills and abilities, from coordination to cognitive reactions to actual flying techniques, including providing assistance to fellow soldiers. The platform or site offers four games. These focus on the player’s skills, which are also used by Air Force soldiers. *Command the Stack* is a mobile game used by the U.S. Army Air Force in improving cognitive skills and mobilizing military morale through experiential gaming. It should be emphasized that *Command the Stack* is intended as both a supplemental educational resource and a very exciting activity. The game simulates combat strategies and situations as they play out in the real world. Airmen in the top, middle, and bottom columns work together to gather information, disable enemies, provide assistance, and ultimately achieve mission success. Players can control all three stacks, team up with other players online in matchmaking, or invite friends to their own private game in multiplayer mode. During the game, they have the opportunity to learn more about each aircraft’s unique capabilities and improve their aerial knowledge and skills, as well as learn how to defend against and combat cyber attacks.

3 Discussion

It should be stressed that the described digital game is presented as a demonstrative and illustrative example and as one of a number of possibilities for retraining and improving the professional skills of its users. In our opinion, the US Army Air Force, through its features, offers the opportunity to gain knowledge, experience and necessary skills. Speaking about the features, we point in particular to fundamental ways that are not only appealing to users, but are also, in terms of educational intentions, very effective. These are, firstly, the stories of airmen deployed in combat operations, which can be seen as a traditionally proven, immersive way of involving game users in game situations. The game environment of the digital game is also engaging, realistic, even magically appealing, which is most characteristic of the slogan of the Aircade series of virtual games, to which the game under study belongs. The slogan contains the following phrases: ‘Virtual games, Real airmen skills’, which clearly indicates the benefits users can gain by playing. The games included contain game mechanics tailored to take advantage of the skills, knowledge and abilities that members or adepts of the Army Air Forces

use in their work. *Command the Stack* is available online and also supports multiplayer play and retention in the form of leaderboards. Missions are used to familiarize the player with the positions that are in the Air Force. The game described by its theme includes action, strategy and challenges aimed at improving the cognitive abilities of individuals. This educational goal is supported by the combination of multiple genre approaches in terms of the construction of storylines, situations, as well as a flexible approach to the development of game mechanics.



Figure 1: Command the Stack
Source: "Command the Stack" (2022)

The advantage of the described game platform is that it provides a view of the units of the US Army Air Forces. In doing so, it uses audiovisual means and sophisticated game mechanics that create an interesting and engaging coexistence of elements. Through modern visuals and the development of mechanics based on the abilities of individual actors and units, it demonstrates how both predictable and unpredictable situations can be handled. At the same time, it allows to learn and understand new knowledge related to combat operations and technical capabilities, thus creating the right conditions for adapting to situations and for acquiring the necessary experience and skills. However, the question remains to what extent the digital game in question corresponds to the latest requirements and demands that are placed on individual positions in a given Air Force area in real work performance. The game *Command the Stack* is publicly available and its action-based platform is primarily used for gaining some experience and improving the skills of professionals as part of their leisure time in an entertaining way. On the other hand, it can also be an interesting marketing and communication tool to reach out to candidates for professional employment in the US Army Air Force. This aside, it is clear that digital games, by virtue of their features and capabilities, can serve as a relevant and effective tool in the acquisition of knowledge, experience and desired skills in the retraining of potential employees. The game *Command the Stack* is an example of this.

5 Conclusion

The intention of the study was to highlight the creative possibilities that digital games have in retraining the workforce to acquire a certain kind of knowledge and skills. We consider digital games as an effective means because they are able, thanks to their multimedia nature, to

attract attention, evoke the desired emotions, concentration and, in the form of an entertaining game, to offer useful information, to cultivate cognitive abilities and to teach certain kinds of skills. Due to the changed conditions in the labour market as a result of the advent of Industry 4.0 and the implementation of AI in all areas of economic and social practice, there is an acute need to retrain or educate people for newly created or transformed jobs. The way of educating and retraining through engaging storytelling and adequate game mechanics of digital games, as well as their occupational and thematic targeting, is not only interesting and appealing, but also useful.

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MORTAL KOMBAT IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE: FROM DIGITAL GAME TO CINEMATIC LEGEND

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Abstract:

The evolution of the Mortal Kombat brand from its original form as a fighting game in 1992 to its film adaptation in 1995 illustrates the unique process of multimedia transmission and highlights the creative possibilities of digital technologies, including artificial intelligence. The original Mortal Kombat, a pioneer in the fighting game genre, contains only minimal hints of story. These basic details about the characters and the tournament were expanded upon through John Tobias' companion comic, which offered players their first glimpse into the larger context of the Mortal Kombat world. The 1995 film adaptation, directed by Paul W. S. Anderson, introduced a deeper story that was missing from both the game and the comic. Technical innovations, including the use of digital effects such as Sub-Zero's ice attacks and Reptile's transformation, greatly enriched the film's visual style and elevated Mortal Kombat to a new level. This process transformed Mortal Kombat from a simple game concept into a complex multimedia phenomenon and laid the groundwork for subsequent franchises and films, making the brand more appealing to a wider audience. This article examines these developments in the context of narrative and technological change, including artificial intelligence, highlighting Mortal Kombat's contribution to shaping pop culture identity and the innovative use of digital technologies in the film industry.

Key words:

Artificial Intelligence. Cross-Media Transfer. Digital Technologies. Fighting Games. Film Adaptation. Mortal Kombat. Pop culture.

1 Evolution of Mortal Kombat

This article examines the process of cross-media transfer in Mortal Kombat, exploring how the series' narrative evolved across various platforms, including games, comics, and films. It also analyzes technological innovations and their role in shaping the brand, which redefined expectations for fighting games and multimedia adaptations. Originally released in 1992 by Midway Games, Mortal Kombat is one of the most significant and influential brands in the history of digital games. However, Mortal Kombat was never just a game – it incorporated elements from the outset that enabled its expansion into diverse media. The original game provides only a basic narrative framework, presented to players through brief character descriptions and details about the tournament. The narrative was significantly expanded by John Tobias' companion comic *Mortal Kombat: The Comic Book* (Tobias, 1992a), offering players their first deeper insight into the Mortal Kombat universe. The comic played a crucial role in connecting the gaming experience to a broader story, laying the groundwork for subsequent multimedia adaptations of the brand.

In 1995, the first feature-length Mortal Kombat film, directed by Paul W.S. Anderson, was released. This film represented a significant step in the brand's cross-media transfer, expanding the game's story and tailoring it for a wider audience. The film also employed innovative digital effects for its time, such as Sub-Zero's ice attacks and Reptile's transformation, pushing the technical boundaries of adapting game elements to the film medium (FANTiM & Yani, 2024). This adaptation not only transformed Mortal Kombat into a multimedia phenomenon but also solidified its position in pop culture.

The purpose of this article is to explore the transformation of the *Mortal Kombat* brand, from its origins as a digital fighting game to its status as a multimedia legend. Special attention is given to the development of gameplay mechanics, technological innovations, and narrative expansion, which collectively shaped *Mortal Kombat* into a cultural phenomenon. In the discussion of *Mortal Kombat*'s cultural impact, Kirkpatrick (2016) highlights how gaming magazines significantly shaped player communities and collective gaming culture. The article also analyzes how the series adapted to changing gaming culture and technological trends, highlighting its impact on the gaming industry and pop culture.

1.1 Evolution of the Series' Narrative and Mechanics

Mortal Kombat (Midway Games, 1992) debuted on October 8, 1992, on the Super Nintendo, Sega Genesis, and arcade platforms, which served as hubs of social gaming in the 1990s. Arcades enabled the game to reach a broad audience, contributing to its cult status, which gradually expanded into other media formats (Adigüzel, 2021; Church, 2022). The arcade experience, including the spectacle of iconic fatalities, significantly boosted the game's popularity (Kennedy, 2022). As noted by Pennix (2024), innovative mechanics like the Fatality system were pivotal in shaping the series' identity.

The game's success laid the groundwork for sequels such as *Mortal Kombat II* (Midway Games, 1993) and *Mortal Kombat 3* (Midway Games, 1995a), which expanded the storyline and introduced new mechanics, including the "Run" button in *Ultimate Mortal Kombat 3* (Midway Games, 1995b), fostering a more dynamic gameplay style. As arcades declined, the series adapted to modern platforms while retaining its dynamic, arcade-inspired gameplay (Nieborg & Foxman, 2023).



Figure 1: *Mortal Kombat* (1992)
Source: Midway Games (1992)

With the release of *Mortal Kombat 4* (Midway Games, 1997), the series entered the 3D realm, marking a technological breakthrough. Weapons and interactive environments enriched the gaming experience, though some innovations faced mixed reception. As Consalvo (2007) notes, controversies such as the "Max Damage" system often sparked debates over ethics and strategies in games. Nevertheless, titles like *Deadly Alliance* (Midway Games, 2002) and *Deception* (Midway Games, 2004) introduced refined fighting styles, allowing players to

customize their gameplay experiences. Newman (2012) highlights how the series successfully balanced simple controls with complex strategies, appealing to a diverse player base.

Following the transition to 3D with *Mortal Kombat 4*, the series experimented with various formats, including crossovers. One notable example is *Mortal Kombat vs. DC Universe* (Midway Games, 2008), which brought together iconic Mortal Kombat heroes and villains with well-known DC Comics characters. According to Štrba (2009), the crossover enriched the game's mechanics but also faced limitations. Nonetheless, the game hinted at the potential for further collaborations, leading to the successful *Injustice* series, which introduced a new dimension to fighting games.



Figure 2: *Mortal Kombat 11* Gameplay (2019)
Source: NetherRealm Studios (2019)

Recent titles, such as *Mortal Kombat X* (NetherRealm Studios, 2015) and *Mortal Kombat 11* (NetherRealm Studios, 2019), feature realistic animations, detailed character models and distinct brutality. In *Mortal Kombat 11*, artificial intelligence (AI) plays a significant role in shaping the difficulty and dynamics of fights, particularly in the “AI Battle” mode, where players customize the attributes of teams of AI-controlled characters. The use of AI makes it possible to customize combat styles and support deeper strategic gameplay. Artificial intelligence also allows players to adjust parameters such as aggression or defensive strategies, increasing strategic depth and optimizing gameplay (Uni, 2019).

The latest title, *Mortal Kombat 1* (NetherRealm Studios, 2023), is a reboot of the series, featuring a modernized story and enhanced mechanics that showcase its evolution. According to Salen and Zimmerman (2004), effective game design requires clear rules and strategic opportunities, a principle exemplified by the game's iconic Fatalities and innovations such as Crushing Blows, which enrich the gameplay experience. The introduction of “Kameo Fighters” allows players to summon assist characters with unique abilities, adding new strategic layers and increasing gameplay variability (Barrett, 2023).

1.2 Comic Expansion as the First Cross-Media Extension

Comics have played a significant role in expanding the mythology of *Mortal Kombat*. The first comic, *Mortal Kombat: The Comic Book* by John Tobias, offers players a broader context of the characters and events, deepening their experience of the game's universe (Church, 2022). Tobias envisioned the comic as an extension of the gaming experience, answering questions about the backgrounds of characters and events that could not be fully explained in the game. The stories expanded on the motivations of characters like Liu Kang, Raiden, and Scorpion, adding layers of depth and establishing an emotional foundation for

future multimedia adaptations. Rivalries and intrigues, such as those between Scorpion and Sub-Zero or Shao Kahn, contributed to the formation of a dedicated fan community that appreciated the intricate details of the universe and its history (Church, 2022).



Figure 3: Mortal Kombat collector's edition comic book (1992)

Source: Tobias (1992b)

The comic represents the first step in transforming Mortal Kombat from a purely gaming experience into a multimedia phenomenon. It introduces foundational elements of the mythology, such as the tournament between Earthrealm's warriors, led by the thunder god Raiden, and Shang Tsung's forces of evil, enriching the narrative of the battle between good and evil. Nieborg and Foxman (2023) emphasize that the comic and other supplementary media allow fans to better understand the backstories and conflicts of the characters, deepening their connection to the brand. Tobias (1992a) highlights that the comic was designed to address questions about characters and events that could not be fully explored in the game, thereby helping to expand the fan base. Conflicts such as the rivalry between Scorpion and Sub-Zero lay the groundwork for subsequent games, film adaptations, and animations, solidifying the brand's status as a cultural phenomenon (Adigüzel, 2021).

1.3 Film and Series Adaptations

The expansion of the narrative extended beyond the games. The 1995 film adaptation, directed by Paul W.S. Anderson, expands the story of the original game, which only outlines a basic narrative structure. The film added depth to characters such as Liu Kang, Johnny Cage, and Sonya Blade, clearly defining their motivations and creating an emotional connection with the audience. This project provided the franchise with a new dimension and laid the groundwork for further multimedia expansions. The 1997 sequel, *Mortal Kombat: Annihilation* (Leonetti, 1997), fell short of expectations, but the 2021 reboot brought a darker tone and greater fidelity to the games, revitalizing the series (Nieborg & Foxman, 2023).



Figure 4: *Mortal Kombat* movie (1995)
Source: IMDb (2024)

The production of *Mortal Kombat* (Anderson, 1995) faced challenges due to technological and budgetary constraints. Paul W. S. Anderson introduced innovations in visual effects, including the digitization of analog formats to create CGI effects. These effects enabled realistic depictions of supernatural abilities, such as Sub-Zero's ice attacks and Reptile's transformation. The blend of practical and digital effects, including the animatronic portrayal of Goro, showcased the team's creativity. The film employed choreography inspired by Hong Kong martial arts and advanced 3D modeling, setting a new standard for video game adaptations (Knight, 2020). Despite production limitations, the movie received positive feedback for its choreography, visual effects, and fidelity to the gaming experience, marking a breakthrough in Hollywood. The film established a new benchmark for game adaptations and solidified *Mortal Kombat* as a multimedia phenomenon, with its simple yet effective narrative structure resonating with audiences.

The 1997 sequel *Mortal Kombat Annihilation*, directed by John R. Leonetti, continues the 1995 adaptation but received mixed to negative feedback from critics and audiences. The narrative focuses on Shao Kahn's attempt to merge Earthrealm with Outworld, aiming for a more expansive storyline and featuring familiar characters from the games, such as Sindel, Motaro, Nightwolf, and Shinnok. However, the film suffers from technical shortcomings, with visual effects considered subpar and often unfinished for its time. The narrative structure collapses under excessive complexity and poorly balanced fight scenes. Special effects intended to showcase supernatural abilities and grand battles have been compared to low-budget productions, adversely affecting the film's reception. This endeavor highlights the risks of adapting game content without a solid narrative foundation and quality execution (Nieborg & Foxman, 2023). The failure of this project significantly delayed future film developments, with the next full-length *Mortal Kombat* (McQuoid, 2021) movie emerging only in 2021.

The 2021 reboot, directed by Simon McQuoid, delivers a darker tone and expands the universe's mythology. The film centers on a new character, Cole Young, and features highly praised visual effects and fidelity to the games, despite criticism of narrative shortcomings (Nieborg & Foxman, 2023). Its aesthetics and fight sequences draw inspiration from *Mortal Kombat X* and *Mortal Kombat 11*, bridging older fans with a new generation of players.

The online series *Mortal Kombat: Legacy* (Tancharoen et al., 2011-2013), directed by Kevin Tancharoen, adopts a more realistic approach to characters such as Scorpion and Sub-Zero, exploring their personal conflicts to deepen the *Mortal Kombat* universe. De las Muñecas San Segundo (2016) highlights that *Legacy* effectively uses digital platforms to engage new audiences and experiment with formats, while maintaining high production quality.

Animated adaptations play a significant role, including the series *Mortal Kombat: Defenders of the Realm* (Savitch et al., 1996), aimed at younger audiences. Although it received lukewarm reviews due to its simplified storyline, it broadened the fan base and introduced the universe to children (Nieborg & Foxman, 2023). Later, the franchise returned with animated films such as *Mortal Kombat Legends: Scorpion's Revenge* (Spaulding, 2020) and *Mortal Kombat Legends: Battle of the Realms* (Spaulding, 2021).

2 Methodology

The article employs descriptive and historiographic methods, along with logical analysis techniques, particularly comparison and synthesis, as well as procedures characteristic of case studies. These approaches enable a detailed examination of the development of the *Mortal Kombat* brand in the context of its technological, narrative, and cultural transformations. The aim is to determine how the brand's narrative expanded through cross-media transfer and how technological innovations influenced its development and impact on pop culture. The case study analyzes the *Mortal Kombat* brand from its beginnings as a fighting game in 1992 to its evolution into a multimedia phenomenon encompassing films, comics, and modern video game titles.

The research categories focus on narrative development across games, films, and comics, with special attention given to gameplay mechanics and visual effects. Film and series productions emphasize the interconnection between media and showcase technological advancements, such as the visual effects in the 1995 film. The scope also includes adaptations like *Mortal Kombat: Annihilation* (1997) and *Mortal Kombat* (2021), the animated series *Mortal Kombat: Defenders of the Realm* (1996), and the films *Mortal Kombat Legends: Scorpion's Revenge* (2020) and *Mortal Kombat Legends: Battle of the Realms* (2021). Additionally, *Mortal Kombat: The Comic Book* by John Tobias, which provides the foundational narrative for the series, is analyzed. This analysis is supplemented by comparisons with academic studies and game reviews, offering a comprehensive perspective on the development of the *Mortal Kombat* brand.

The data is collected from a combination of primary sources, such as direct analysis of games, films, and comics, and secondary sources, including academic articles, reviews, and pop culture platforms like TheGamer and Sector.sk, which offer comparative insights into the *Mortal Kombat* series.

The methodology facilitates a detailed exploration of *Mortal Kombat* as a successful multimedia brand. The inclusion of gaming titles, from the original *Mortal Kombat* (1992) to later releases like *Mortal Kombat II* and *Mortal Kombat X*, and the latest title *Mortal Kombat I* (2023), provides a representative foundation for analyzing the series' narrative evolution, technological innovations, and cultural impact. This approach delivers a holistic view of *Mortal Kombat*'s progression within the gaming industry and popular culture.

3 Results

The analysis revealed that *Mortal Kombat* successfully transformed a simple gaming concept into a complex multimedia phenomenon. The game and its adaptations not only expanded the narrative but also redefined expectations for cross-media brands. The combination

of digital technologies, profound storytelling, and iconic characters contributed to the series' lasting success. These findings confirm that *Mortal Kombat* has become a symbol of innovation in the gaming and media industries. By combining cutting-edge technologies, rich narratives, and cross-media reach, the brand has engaged a broad audience and left a lasting cultural legacy. It serves as a model example of how a brand can effectively extend its influence through cross-media adaptations and technological innovation.

The transformation of *Mortal Kombat* into a multimedia phenomenon was largely achieved through the expansion of its narrative universe. The original 1992 game, with its rudimentary storyline, evolved into a brand characterized by intricate mythology, complex characters, and interwoven plotlines. Key works such as *Mortal Kombat: The Comic Book* by John Tobias, the 1995 and 2021 film adaptations, and game continuations like *Mortal Kombat X* and *Mortal Kombat 11* deepened character motivations and conflicts, captivating a wider audience and strengthening fans' emotional connection to the brand.

Technological progress has played a pivotal role in the evolution of *Mortal Kombat*. The series consistently introduced cutting-edge technologies, from digitized characters in 1992 to realistic visual effects and artificial intelligence in later titles like *Mortal Kombat 11*. AI, in particular, enabled realistic character behavior and customizable combat styles tailored to player preferences. Film adaptations, such as the 1995 movie, demonstrated innovative uses of CGI technology, exemplified by Sub-Zero's iconic ice attacks. These technological advancements not only kept the brand relevant but also pushed the boundaries of the fighting game genre.

Cross-media transfer was fundamental in establishing *Mortal Kombat* as a multimedia brand. Through games, films, comics, and series, the franchise expanded its narrative and enriched the mythology of its universe. The arcade format initially enabled *Mortal Kombat* to reach a broad audience, establishing the brand as a social phenomenon. This ability to integrate gameplay mechanics, visual effects, and narrative elements across various media underscores the series' potential as a model for successful multimedia projects.

4 Discussion

While this article has analyzed the evolution of the *Mortal Kombat* franchise from a fighting game into a multimedia phenomenon, there remains ample opportunity for further research. One promising avenue is to investigate the impact of specific media adaptations on the brand's identity and their appeal to various demographic groups. Expanding research to include studies on changes in player preferences and engagement throughout the series' development would be methodologically valuable. Furthermore, a deeper analysis of microtransactions and monetization strategies in modern titles could provide insights into the economic sustainability of the franchise. Ethical considerations regarding violence in games and its reception in different cultural contexts also warrant further exploration. Future studies could examine how emerging technologies such as virtual and augmented reality might expand interaction possibilities and create more immersive gaming experiences. Another methodological challenge lies in a more detailed exploration of community-driven aspects, such as online tournaments and fan activities, which significantly shape the brand's identity. The long-term development of *Mortal Kombat* is likely to depend on the franchise's ability to integrate new technologies and adapt to the evolving demands of a global audience.

5 Conclusion

The Mortal Kombat series has evolved from a simple fighting game with minimal story to a complex multimedia phenomenon that has shaped both the gaming industry and popular culture, in part with the help of artificial intelligence. Its expansion into a variety of media – including games, movies, comics, and animated series – has allowed the series to reach a wider audience and deepen the mythology of its universe. The film adaptations have provided new perspectives on conflicts and characters, while the comics and animations have added more detail to the background. The expansion of the franchise into various media has contributed significantly to its success and popularity, making Mortal Kombat a cultural icon.

The development of the series in the 1990s was helped by media appearances in gaming magazines, which created a sense of community among fans. Cross-media transmission allowed for the expansion of story arcs across formats, from arcade games to film adaptations and modern titles. These stories have played a key role in fostering an emotional connection with fans. Technological innovations have been essential in maintaining Mortal Kombat's dominance within the fighting game genre. From visual effects in the 1995 film to the realistic character behaviors in titles like *Mortal Kombat 11*, technology has driven the series' modernization. Equally vital has been its adaptability to new platforms and gaming trends, enabling the franchise to sustain its growth. Mortal Kombat has also redefined expectations for fighting games and influenced the creation of rating systems that have shaped gaming culture. The brand stands as a symbol of innovative multimedia storytelling, blending game mechanics, visual effects, and intricate narratives, cementing its legendary status in the history of gaming and media industries.

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VIRTUAL UTOPIA, ARTIFICIAL ADVENTURE AND DIGITAL GAMES INDUSTRY IN SPIELBERG'S READY PLAYER ONE

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Abstract:

Cinematic portrayals of virtual reality are extremely financially demanding and technologically complex simulacra which define the nature of today's science-fiction film. The mainstream film audiences, especially teenagers tend to perceive these spectacles as escapist utopias which are more convincing and immersive than images of the real world. The paper works with the assumption that Steven Spielberg's *Ready Player One* is a prominent example of contemporary cinema's ability to create escapist virtual utopias that are based on aesthetics of digital games, highly immersive and yet able to address the social meanings which outline the human/artificial binarity we are experiencing nowadays. The main goal of the paper is to critically discuss the social meanings present in the movie *Ready Player One* to better understand why virtual utopias and artificial gaming worlds are so attractive for media audiences, based on the definition of the theoretical framework of the given topic and subsequent discourse analysis focused on the given film story.

Key words:

Artificial Gaming World. Digital Games Industry. *Ready Player One*. Utopia. Virtual Reality. Youth Cinema.

1 Introduction

The last two decades have witnessed the rise of feature films appealing to teenagers and young adult audiences. We might mention light-hearted teenage comedies such as *10 Things I Hate about You* (Junger, 1999) and *Easy A* (Gluck, 2010), more serious dramas focused on young people trying to find their place in life, for instance, *The Perks of Being a Wallflower* (Chbosky, 2012) or *Love, Simon* (Berlanti, 2018), but also deeply explorative and thoughtful psychological dramas, e.g., *Virgin Suicides* (Coppola, 1999), *Thirteen* (Hardwicke, 2003) or *Lady Bird* (Gerwig, 2017). Moreover, target audiences can safely confront their own problems and insecurities in a humorous manner, thanks to movies like *Superbad* (Mottola, 2007) and *Love, Rosie* (Ditter, 2014). In contrast, some film dramas have aspired to portray both emotional vulnerability of young people and their struggles related to terminal illnesses. We may mention *Now Is Good* (Parker, 2012) or *The Fault in Our Stars* (Boone, 2014).

However, probably the most commercially interesting variations of youth cinema in the 21st century have been linked to science-fiction and fantasy. For example, we may encounter portrayals of young people able to protect the world from demons in *Mortal Instruments: The City of Bones* (Zwart, 2013), a community of teenagers trying to escape from a lethal labyrinth in *The Maze Runner* (Ball, 2014) and the movie's sequels, the fantasy drama focusing on attractive vampires *Twilight* (Hardwicke, 2008) and its several instalments, a dystopian world dividing people into factions in accordance with their virtues in *Divergent* (Burger, 2014) and its sequels and, above all, the massively popular dystopian young adult fantasy series established by the movie *The Hunger Games* (Ross, 2012). According to Shary (2002), this diverse array of teen experiences results from a more codified approach to films aimed at teenagers applied in the 1980s. Smith (2018) explains that films appealing to young adults often help them construct their identities, as the stories involve communication spaces in which emerging identities evolve and finally consolidate into adulthood.

Considering the previously mentioned spectrum of mainstream films predominantly aimed at teenagers and young adults, we may notice that some of the most commercially successful fantasy or science-fiction projects situated their lead characters within dystopian societies, worldwide crises or seemingly unsolvable conflicts. We define the term “dystopia” as the opposite of a utopia (Cresswell, 2011). According to Buchanan (2018), the term “utopia”, originally coined by Sir Thomas More, refers to any attempt to deliberately construct a world that would be better than the existing world. However, this construct tends to be overcoded as idealist, unrealistic, impossible to achieve, even though More’s original idea emphasised the process of creating a perfect world rather than the final result. Thus, dystopias may be characterised as disorganised, chaotic, violent and lawless worlds or societies where people suffer and experience terror, danger, and/or despair. The globalised mainstream cinema often associates dystopias with grim visions of the humanity’s future. This tendency has been present in a variety of popular movies and cult films as well, for example, in *The Matrix* (Wachowski & Wachowski, 1999) and its sequels, the most recent one being the movie *Matrix: Resurrections* (Wachowski, 2021). This story depicts a dystopian future in which humans are unknowingly trapped inside a simulated reality created by intelligent machines. The simulated images people perceive as their real lives are supposed to distract them, so that they do not realise their bodies are being exploited as energy sources. Similar principles have also been utilised in a variety of science-fiction movies which cannot be defined either as dystopian or aimed at teenagers, e.g., in the conspiracy thriller *Boss Level* (Carnahan, 2020), where the main protagonist is imprisoned in a never-ending time loop, or in *Free Guy* (Levy, 2021), an action comedy depicting a bank clerk who suddenly discovers that he is not a real person, but just a supporting character in an open-world digital game.

Ready Player One, originally written by Ernest Cline in 2011, is a story that involves both a teenager living in a postapocalyptic, dystopian world of the future, and a possibility to escape this unpleasant everyday reality thanks to gaming devices based on virtual reality which provide people with access to a utopia called OASIS, a perfect world everyone can co-create and shape thanks to their own imagination. The story’s remarkable “retro” setting also suggests that the narrative involves certain traits of so-called uchronia, which is a variation of utopia aiming to re-shape real historical events in new, speculative ways. The term is often used as a synonym to “alternative history” (Schmid, 2020). The same creative premise is present in the book’s 2018 film adaption directed by Steven Spielberg. The science-fiction film’s narrative is centred on an orphaned boy who, like much of humanity in 2045, uses the OASIS, a virtual reality simulation, to escape the dystopian real world. The OASIS can be perceived as a metaverse offering a full-fledged life experience, as a much more progressive variation of *Second Life* (Linden Lab, 2003), a multi-player virtual world in which people’s avatars can interact with one another, roaming across a multi-user online environment. The movie’s form and content suggest that the story functions as a simulacrum. According to Buchanan (2018), the term “simulacrum” can be defined as an imitation, a distorted, inauthentic copy of a copy which seems to be more realistic than the actual reality. This definition is based on Baudrillard’s (1994) critical remark that simulation (the act of creating a simulacrum) is a clever strategy which prevents us from either properly interpreting this creation and/or understanding its meaning and true purpose. Barker (2006) argues that production of simulacra deprives us of the ability to reliably distinguish between reality and fiction, public and private spheres, true art and kitsch, etc.

On-screen imaginations of virtual dystopias are necessarily associated with science-fiction. Kuhn and Westwell (2012) claim that science-fiction is a genre involving complex stories based on conflicts between science, technology, human nature, and social organisation. These narratives are situated into futuristic or fantastical worlds. According to the authors, many science-fiction movies offer “an encompassing, visual, auditory, and bodily experience”

(p. 360), as well as distinctive themes and iconographies, which is why some of them eventually achieve cult status and enjoy significant fan followings. Driscoll (2011) mentions narrative conventions that help us define youth sci-fi films, such as the youthfulness of characters and content prioritising images of young heterosexuality. However, there are other narrative variations to consider, e.g., romance plots, conflicts with an older generation, and coming-of-age themes based on various rites of passage (first love, graduation, etc.). Bould et al. (2009) emphasise that the genre has become a global phenomenon. Its popularity is largely associated with the consumption of texts produced in and by the First World. Nevertheless, science-fiction also provides people excluded from the economic and geopolitical core with the experience of (hyper)modernity, focusing on both the past and the future.

Spielberg's *Ready Player One* utilises this binarity of the past and the future as a key narrative element. Even though the main character leads his ordinary, everyday life in a futuristic dystopia in which the world is becoming an overpopulated wasteland, he is able to regularly escape this actual reality. The OASIS, the source of this immersive escapism, offers a virtual-reality environment bound only by the limits of one's imagination, a land of freedom in which vintage artefacts of popular culture are loved and treasured. Most of these popcultural elements date back to the 1980s and 1990s. Thus, the film uses nostalgia shared by its characters as the essential narrative principle. Media and communication studies define "nostalgia" as an ephemeral, hard-to-define sentimentality and idealised desire to experience the past again (Radošinská, 2021). Pallister (2019) explains that media-induced nostalgia is expressed both individually and collectively. A person experiences the individualistic aspect of nostalgia when they seek and/or consume objects, stories, ideas or cultural elements they have encountered a long time ago, especially when growing up. On the other hand, collective nostalgia is based on sharing our previous feelings and entertainment experience with others, especially with those previously unfamiliar with them, exchanging recommendations and knowledge related to cultural realities of the past that possess certain sentimental value. Pickering and Keightley (2006) explain that real people (as well as fictional characters in films, television series, digital games) tend to seek nostalgic returns to the past because they are not satisfied with their everyday reality and/or with society as a whole. We may presume that this kind of nostalgia is present in *Ready Player One*, as the main character is socioeconomically marginalised, and that is why he seeks comfort and entertainment within a virtual-reality gaming platform that represents "the old world", along with his peers. This interpretative community shares the virtual experience and admires long-lost cultural elements belonging to a better, simpler and cleaner world of the late 20th century.

2 Outlines of Analysis

The paper aims to define the social meanings embedded in the narrative structure of the science fiction film *Ready Player One* (Spielberg, 2018). These social meanings serve to strengthen the potential of the examined story in relation to the current cultural formation and the contradiction between the human and artificial aspects of 21st century lifestyle. The previous theoretical reflection on the issue of science-fiction film in the context of film production intended for teenagers and young adults, as well as on the elements of utopia and nostalgia in mainstream film, is followed by a discourse analysis of the named motion picture.

The deliberate selection of this particular film story is based on our belief in the ability of its producers to create a convincing binary opposition between a dystopian, devastated world of people and a utopian game environment based on virtual reality, which brings these people a space for escape and to some extent also comfort and inspiration. As we believe, these are discursive aspects corresponding to the preferences and expectations of the current target audiences. In 2018, *Ready Player One* achieved worldwide revenues from cinema screenings

exceeding 580 million American dollars, and the project thus became one of the most successful films of 2018 on a global level, with the vast majority of this amount being tied to the volume of revenues achieved “overseas”, i.e., in non-American or rather global market (Box Office Mojo, n.d.). On the contrary, the American audience showed a significantly limited interest in this film story. The commercial performance of the analysed film thus demonstrates its ability to reach audiences without a direct connection to American popular culture, and thus geographically dispersed, global film audiences.

We aim to explore the ways in which this fictional narrative represents the genre conventions of science-fiction film intended primarily for young adults and in what ways it reflects a broader spectrum of social meanings that are associated with the content structures of mainstream cinema available on a global level. The process of identifying individual social meanings is based on the principles of discourse analysis defined by Rose (2012). The concept of “social meaning” is closely linked to Turner’s (2006) understanding of film works as important socio-cultural agents. Social meanings allow audiences to identify with film stories and/or characters present within them. Plencner (2008) mentions that social meanings are either initiated by a film’s discourse (the way the story is narrated), or they arise at the moment when film audiences are able to emotionally identify with the depicted main or secondary characters. In connection with the presented analysis, we formulate the following research question:

RQ: What social meanings are present in the feature film *Ready Player One*, and how do those meanings represent the binarity of real-world dystopia and utopia built within the loose confines of gamified virtual reality?

3 Social Meanings in Ready Player One: Nostalgia, Escapism, and Monetisation of Gaming

The feature film *Ready Player One* (Spielberg, 2018) depicts a dystopian society in 2045, a world in which human society is falling apart. Given that everyday reality is anything but ideal or rather unbearable, people use every spare moment they have to escape by entering the OASIS, a gaming-based virtual reality platform offering endless possibilities, a cleverly designed simulation of real life where (almost) anything is possible. *A study guide for Ernest Cline’s Ready Player One* (2019) explains that people living in this overpopulated, grim dystopia largely replace working, attending school, and other mundane activities by losing themselves in the OASIS. James Halliday (Mark Rylance), the creator of this virtual world, has become a billionaire; however, his artificial landscape is still accessible to everyone, even though the environment is heavily monetised.

The OASIS can be defined as a massively multi-player online role-playing game (MMORPG) which allows real people to basically merge with their cleverly designed and original avatars. This means that they not only control how these avatars move across the artificial world, they also experience most of the visually induced sensations, haptic elements and physical contacts thanks to VR devices or even specialised bodysuits they wear. Technology has become a necessary part of their sensational escapist experiences and the OASIS provides those with the means to invest in specialised equipment with a range of opportunities and capabilities not available to “regular” users with limited funds. The urgent need to make maximum use of the OASIS and increase the level of strength, intelligence or skill of avatars (although in this context there is no explicit mention of increasing levels) exposes many people to the risks of so-called debt spiral. Debts and unpaid bills arise not only in connection with the purchase of more advanced gaming equipment, but also in the context of “living” in the OASIS. Organised tournaments, deathmatches or difficult challenges are inevitably connected to the hybrid monetisation system included in the OASIS. Striving to

succeed in these challenges, people buy specialised equipment or magical artifacts that can save their avatars' "lives" or provide them with certain combinations of extraordinary perks. The rewards obtained in the virtual environment can then be sold for real money, or exchanged for more advanced virtual reality devices or, for example, used to improve one's standard of living, etc. Unpleasant scenes of the everyday reality of the crowded American city of Columbus, Ohio, which includes life in high-rise steel structures filled with modest dwellings resembling trailers, are outlined by bizarrely voyeuristic camera movements briefly peering into the privacy of individual residents. Obsessed with the colour, spectacularity and limitless possibilities of the OASIS, people move around inside their untidy, modestly furnished homes, ignoring the burning food on the stove or unpaid bills, wearing their VR glasses all the time. Many see the OASIS as the only chance to get rich.

The virtual reality shown in the film uses a complex system of content monetisation. The game environment employs the so-called free-to-play model, which in practice means that access to virtual reality is available to anyone who has the appropriate peripheral device designed to display it. In the film narrative, this equipment is a standard part of life for people of any age and in any economic situation, from preschool children to the senior population, women and men, all social groups regardless of their ethnic origins and financial status. On the other hand, richer people or those who excel in various challenges or battles occurring within the virtual landscape can afford premium devices. Paradoxically, relatively progressive equipment is also available to the main protagonist and his group of friends consisting of young adults and teenagers. Discussing the free-to-play monetisation strategy, Pravdová et al. (2023) mention that it is a logical consequence of the overproduction of digital games. Free-to-play products are not provided to their end users in exchange for money or some form of regularly paid subscription. Their potential success always depends on the ability to attract the attention of a massive target audience that is willing to generate profit directly, while interacting with the given virtual environment. The OASIS in *Ready Player One* generates its revenue through indirect monetisation based on displaying advertising content. At the same time, however, it also applies direct monetisation strategies and establishes a complicated system of microtransactions, since it is possible to exchange a large number of rare items, rewards, weapons, hairstyles, pieces of clothing or other otherwise unavailable advantages for avatars who use them in virtual reality for both real-world money and in-game (virtual) currency. Using these unique objects allows the avatars (and their owners) to differentiate themselves from the competition.

The main protagonist is a young man named Wade Watts (Tye Sheridan), who lives with his aunt and her violent partner in a high-rise building situated in a slum or ghetto (called "stacks", as the individual trailers are literally stacked upon one another). At one point he exchanges a portion of the virtual currency he earned after completing a challenging puzzle for unique magical items that will save his avatar's (and ultimately his own) life, but also for the most advanced VR bodysuit currently available on the market. This suit includes sensory equipment that allows him to feel almost all the touches and movements stemming from the interaction between his avatar named Parzival and other virtual characters. The users' behaviour related to accumulation and further use of in-game virtual currency largely agrees with Hamari's (2017) six motivations associated with the purchase of unreal objects confined to the virtual gaming environment – removing obstructions to play; fulfilling one's own or everyone else's expectations regarding (virtual) social interaction; obtaining competitive advantage; intrinsic economic rationalisation of the "best deal"; indulging children; and unlocking additional, otherwise inaccessible content. The OASIS is based on a fairly ruthless combat system. The moment an avatar loses in a combat and/or suffers serious damage that results in a virtual version of death, it "zeroes out" and all its previous achievements, items and virtual

assets are claimed by its opponent, requiring a start from scratch, which looks and feels almost like a financial collapse or personal bankruptcy in real life.

However, the development of the film's narrative foreshadows planned, although unwelcome changes to the existing OASIS monetisation system. Sims (2017) argues that Ernest Cline, the story's author and Steven Spielberg, the film's director both work with the idea that the real world is devastated beyond recognition and impossible to save. However, the protagonists, along with their virtual avatars, do not focus on developing and decorating either their virtual or real homes, but rather on battling an evil real-world corporation IOI which would like to inherit the game and utterly change its meaning and purpose. First, IOI aims to perfect its already successful, albeit considerably unethical business strategy, as the company buys up people's in-game debts and then "enslaves" these real human beings through so-called loyalty programmes that are, in fact, detention centres where the indebted are supposed to work off their debts. The programme bears a strong resemblance to slavery, as people are forced to wear VR devices in specialised booths and follow orders related to cementing the company's already strong presence in the OASIS. The corporation's cynical, ridiculous and incompetent CEO Nolan Sorrento (Ben Mendelsohn) plans to assume control over the OASIS in order to expand the existing direct monetisation systems to the point where human field of vision would be almost overshadowed by ads, on the brink of possible seizures. Besides that, the IOI also wants to restrict access to the OASIS or some of its most attractive and lucrative features to people willing to pay for different subscription plans, i.e., gold, silver, and bronze memberships. This means that the OASIS is to become a freemium/premium (or paymium) hybrid, nothing like its creator originally intended and imagined. The main protagonist and its virtual alter-ego (and other people and avatars surrounding them) are convinced that this would mean an end to the OASIS as they have known it, the sheer destruction of its "democratic", egalitarian accessibility.

The virtual environment depicted in *Ready Player One* functions both as a massively multi-player online role-playing game and a virtual society. The founder of the OASIS, James Halliday, was fascinated by Western and Eastern popular culture of the 1980s and 1990s. Thus, the OASIS possesses a distinctive visual aesthetics typical for East-Asian cultures and anime-styled media products (Figure 1). The present artefacts of (predominantly American) popular culture and (pop)cultural references establish a sense of collective as well as individual nostalgia communicated on basis of complex intertextuality. Since the OASIS allows people to experience the cultural environment of the 1980s and 1990s and the key challenges and puzzles cannot be solved without rigorous knowledge of "retro" popular culture, the film successfully works with what Bauman (2017) would call "retropia", i.e., an idea that the only way to create a better reality is to go back in time and symbolically return to the better, cleaner, less complicated, more entertaining world of the past. Such a world is idealised by both those who have experienced it as children and much younger people who just like to watch old movies, listen to timelessly popular music, read retro comic books and play digital games that once formed the foundations of the digital games industry.



Figure 1: Parzival and Art3mis in the zero-gravity dance club The Distracted Globe
Source: IMDb (n.d.)

4 Discussion and Conclusion

The young adult science-fiction film *Ready Player One* communicates the idea that cyberspace is, to certain extent, capable of overcoming any age, racial and gender disparities. A person can become anyone or anything else, swap genders or, for example, physically dominate over their opponents because their avatar is a mighty mythical creature. Moreover, the story prioritises the idea that mere virtual entertainment, if it is meaningful and engaging enough, might become a source of full-fledged civic movement, turning what was designed as a leisure activity into a society-wide anti-corporate protest (Flanagan, 2014).

The movie itself is structured like a digital game played within a fully immersive virtual landscape. Wade Watts seeks three Easter Eggs hidden in the OASIS not to escape from his mundane, desolate reality filled with crime, poverty and collapsing infrastructure, but rather to prove his vast knowledge of retro popular culture and solve James Halliday's riddles to inherit the developer's wealth and administrative control of the OASIS, convinced that it is the only way to save the metaverse and preserve its general accessibility (Sconce, 2019). The film also suggests that the concept of Easter Eggs represents an autonomous marketing strategy with a considerable monetisation potential (see, Mago, 2019). The way Easter Eggs are depicted also refers to their ability to function as essential components of gamification, as the narrative portrays the characters' struggle to find the missing Easter Eggs and assume control over the OASIS as a contest based on the agon principle. Moreover, *Ready Player One* might be a young adult science-fiction dystopia, but it still uses its retrospective, almost sentimental cultural setting celebrating the 1980s popular culture as an additional source of escapism, especially in relation to adult audiences.

The movie works with a range of easily identifiable social meanings (RQ). Its universally experienced social meaning lies in portraying an exceptional individual who decides to shape his own destiny and uses his remarkable knowledge of retro popular culture to directly confront a wealthy, highly influential corporation. However, probably the most obvious social meaning present in the narrative is bound to individual everyday experience, in this case depicted as the representational social meaning of "man against technology". Wade Watts aims to find Easter Eggs hidden by James Halliday within the OASIS, but he cannot achieve this alone. He also needs a group of companions possessing different skills and talents, which is one of the most essential traits of the MMORPG genre. Moreover, he needs to master both popular

culture knowledge which Halliday treasured as dear memories of his rather lonesome childhood, but also technologies used to conquer the OASIS and its hidden features. Being depicted as a dreamer and awkward visionary rather than a clever businessman, the virtual reality's creator eventually admits that no artificial landscape, even the most convincing and immersive one, can fully replace the real world. The plot also clearly suggests that when misused, this kind of technology can easily lead to addiction and symbolical or literal enslavement of people with low(er) social status. Wade Watts is an orphan living in modest conditions, a teenager who seeks approval, admiration, love and a sense of togetherness. That is why he cannot fully focus on his mission and objective; the main protagonist has fallen in love with his friend and ally Samantha/Art3mis (Olivia Cooke), and needs to express his affections. Thus, the motivational social meanings bound to this character include both desire to succeed and the ambition to earn everyone's admiration and find true love.

According to Condis (2016), Ernest Cline's *Ready Player One* illustrates the anxieties and uncertainties of embodiment and identity in the digital age. The story constructs a popular culture "canon", an intertextual complex that all people interested in the digital game culture must know. The texts involved in this "canon" are depicted via a series of references and puzzles that the characters strive to solve. Steven Spielberg's blockbuster adaptation represents young adult science-fiction within a virtual world of unlimited possibilities. On the other hand, it also depicts the design and lore of this world as a retrotopia, recreating familiar environments and cultural realities of the late 20th century. At the same time, the film sequence tied to visiting a heavily simulated version of the Overlook Hotel from Stanley Kubrick's film *The Shining* (Kubrick, 1980) is a kind of pastiche of the original horror, or rather a re-enactment of its most iconic scenes. This is not by any means the first science-fiction work that has returned to the past. According to Leggatt (2021), the film further elaborates this creative principle with intertextual references to the *Back to the Future* trilogy, because Wade's avatar Parzival drives a DeLorean car, and one of the most valuable magical objects in the OASIS is the Zemeckis cube, which can turn back time to 60 seconds earlier, referring to the principles of time travel applied in the aforementioned trilogy and especially to its director Robert Zemeckis.

Given that the film premiered in 2018, it is often considered as a popular story aimed at promoting emerging virtual reality devices and related technologies. However, Harley (2022) explains that the film's source material, Ernest Cline's *Ready Player One*, along with Neal Stephenson's 1992 novel *Snow Crash* were, in fact, largely popular well before consumer VR was released to the public. Nevertheless, Steven Spielberg's immersive vision of what virtual reality visors, omni-directional treadmills, haptic gloves or advanced haptic bodysuits can achieve and what kinds of experiences they may provide in the future, indirectly refers to secondary monetisation strategies associated with the technologically evolving digital games industry.

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DIGITAL GAMES INDUSTRY, POLITICAL CORRECTNESS, AND ARTIFICIAL INTELLIGENCE

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Abstract:

The phenomenon of political correctness has been present in all types of media for several decades, while having an impact on various aspects of social life. Since it is so widely spread not only in nearly all media types and media outputs, the field of gaming and digital games industry, along with artificial intelligence, could not have escaped its reach and influence, either. The paper deals with the reasons and consequences of the phenomenon of wokeness being implemented not only into the language, but also into the topics and settings of the games. As this issue is rather complex as such, while being highly controversial for various reasons in its essence, the same can be stated about its existence in current gaming and digital games industry, its future associated with AI, including the reactions of game creators, and gamers themselves. We offer an analysis of several examples from the contemporary gaming industry showing how political correctness and monetizing may (not) work well together.

Key words:

Artificial Intelligence. Black Myth: Wukong. Concord. Dustborn. Gaming. Monetization. Political Correctness.

1 Introduction: History and Development of Political Correctness

To be able to comprehend the complexity of the subject matter, we have to lean on its brief history and development over the time. Ungerová and Škvareninová (2022) rightly claim that it is virtually impossible to state exactly when the first concept of political correctness was established, understood as the endeavour to avoid being inappropriate, offensive, or even vulgar and, instead, rather obeying certain set good manners in language and way of conduct.

For decades it was believed that the term was coined in the 1920s in relation to newly emerged ideology of communism in countries, such as, the Soviet Union or the People's Republic of China (Browne, 2009). However, recent research indicates that the expression "politically correct" was used as early as in 1793 in one of the written decisions of the US Supreme Court regarding the propriety of the language in terms of both good manners and accuracy (Malik, 2021). However, in those times, the term was neither disseminated into generally used English language, nor did it appear in any dictionary.

It was much later this set expression got noticed by the public and appeared in the English language, namely after the arrival of the new communist ideology following the Russian Revolution in 1917, along with its onset in China with the meaning of adhering to the associated newly set policies, principles, norms, and corresponding language, including, for example, expressions, such as, comrades, proletariat, or imperialism (Browne, 2009). Nevertheless, its usage and understanding were limited mainly to political discussions related to communists and socialists.

The situation, the occurrence and the meaning of the concept changed significantly in the early 1960s with the emerging open public debates led mainly on university campuses on important issues that came into spotlight of the public attention, including multiple forms of discrimination, feminism, status of sexual or ethnic minorities, or the disabled people (Ungerová & Škvareninová, 2022). In the turbulent 1960s and 1970s a new perception of this notion was established, putting emphasis on avoiding any mistreatment, or offence towards the marginalized layers of the population, and, instead, implementing fresh language, attitudes, and

norms to build a better society free of displeasing others. There is no wonder it gained so much ground in the USA, a former British colony with a multicultural population involving descendants of black slaves, Native Americans, or white European immigrants of different backgrounds, with the aspiration to be the world leader not only in the fields of economy, industry, or technologies, but also in building a modern state based on the ideals of equality and same civil rights for every single citizen. It is undisputable that in those times the American society suffered from racism, segregation, and unequal treatment of women or other minority groups. It needs to be added that the notion of political correctness started spreading into other western countries despite their different social and political situations.

Originally, it has undoubtedly brought benefits, while focusing on decency in language and content to vulnerable members of the society. However, in 1980s the term started to be increasingly more criticized and often spoofed as a totalitarian attempt by the left-wing people to control and patronize not only the language, but also the media content, cultural norms, or even thoughts (Malik, 2021).

Due to the growing objection and mockery, the term seems to be perceived as derogatory meaning “the principle of avoiding language and behaviour that may offend particular groups of people” (*Oxford Learner’s Dictionaries*, n.d.a, para. 1), and often used by people who believe that it has gone too far. Recently, it appears to be increasingly more replaced by a shorter term “woke” originally coming from the slang of black people, signifying being well-informed, and up-to-date, to current meaning of being “aware of and actively attentive to important societal facts and issues (especially racial and social justice)” (*Dictionary Merriam-Webster*, n.d.a, “Chiefly US Slang” section, para. 1). Ironically, although originally both expressions tried to raise awareness, and fight against any intolerance and injustice, they ended up being mocked as imposing totality (Malik, 2022), and are now often used as sarcastic terms denoting “politically liberal or progressive in an unreasonable or extreme way” (*Dictionary Merriam-Webster*, n.d.a, “Disapproving” section, para. 1), while the same applies to the related nouns: “wokeness/wokery/wokeism”. As rather controversial are perceived other associated terms and modern phenomena, including “virtue-signalling”, publicly showing off ‘correct’ views (*Dictionary Merriam-Webster*, n.d.b), “cancel culture”, excluding someone from social or professional life, because they have said or done something that other people do not agree with (*Oxford Learner’s Dictionaries*, n.d.b), “social justice warrior”, a mocking term for someone who is regarded as overly progressive (*Dictionary Merriam-Webster*, n.d.c), “thought police”, a group of people viewed as trying to control people’s ideas and stop them from having their own opinions (*Oxford Learner’s Dictionaries*, n.d.c), etc.

Despite its complexity and huge backlash, controversy, criticism, or even mockery, political correctness keeps having a huge impact on all aspects of modern western culture, language, or media, including TV shows, films, books, not excluding video games.

2 Political Correctness, Gaming, and Artificial Correctness

As in any other affected area, wokeness has entered the gaming industry, while being viewed rather controversially. Naturally, all the gamers are different, coming from different backgrounds and having varied attitudes towards the society they live in. The same is true about their stances to the elements of wokery implemented in the games. Some may welcome them, others may feel neutral and indifferent, and a group of gamers may even despise them due to multiple reasons. For example, many players are very serious about the content of the game being accurate in terms of historical context. Thus, it does not make much sense for them to place people of colour into a medieval European village.

Wokeness seems to be needed to be implemented into the games, as there is undoubtedly a lot of toxicity, violence, exploitation, oppression, racism, pain, trauma, misogyny, bigotry,

xenophobia and other negative phenomena in the game culture, not only in the contents of the games, but also in the language and chats. To mention some extreme examples, teams may use sexually violent language, when winning or beating a player is called “raping” them (Melnychuk, 2014).

It appears that gaming is not that much in line with being politically correct in other aspects. In terms of sex, gaming has been recognized as totally male dominated, a typically masculine hobby, however nowadays about 50% of gamers are believed to be female (Mintel, 2024). As a result, majority of games have been targeted at typical male players, thus “young, strong, straight, white men” (Shi, 2021, p. 67). If there are any female characters, they are stereotypically portrayed as hypersexualized, and non-white characters are usually represented as aggressive (Paaßen et al., 2017). Even though the mainstream games industry continues to be dominated by straight white heroes, and sexually attractive and strong women, there also exist people of colour, women, or queer people who create their own specific and diverse video games adjusted to their own liking and preferences.

On the one hand, it is believed that certain elements of the concept of wokeness, especially the ones oriented to fighting against any inequality should be present in the games, however, the opponents will argue that focusing on adding special elements for the reason of just being there and showing them off, may ruin artistic freedom of game developers and may cause more harm than good (Shi, 2021). Nevertheless, there are also views that creative freedom has always had certain borders and limits, usually set by the budget or the target audience. The white heroes of the games sell good, and as in other industries, it also applies that if one does not like something (in this case a game), they do not have to buy or play it. Moreover, it is also true that people may be enjoying something that is not perfectly in line with their opinions and worldviews. A special category of games is those set in real-life settings. If anyone complains about the way of representation, image or stereotypes, the argument of games being a fantasy, ‘just a game’ occur along with the idea of “not taking them seriously” (Shi, 2021, p. 64).

Political correctness may be traced not only in the content, but also attitudes towards games. Gamers enter the world of video games with their identities, backgrounds, varied privileges, or other experiences from the real world. It takes all sorts to make a world and it is not possible to please everyone. In our times, everything offends someone, and the more controversial it is, the larger wrongdoing is claimed (Moriarty, 2017). Moreover, the perceived violation may trigger someone else. It may happen that when a member of minority complains about inequality, they may be accused of playing victimhood. People with the left-wing political views may be denounced as bossy and controlling, people of colour as always demanding affirmative action, and asking for a ban on racial slurs, women as fighting against misogyny, sexual harassment, or sexism. To make it more complex, even the white, male, straight people claim to be discriminated against and depicted as the ones who are racists, sexists, colonialists, and the conservatives complain about being portrayed as intolerant, resisting any change and progress, stuck in the past.

Incorporating wokeness is a tough task and the result may be controversial, even with the best intentions. For instance, the military game called *Call of Duty* has been criticized for lacking higher representation of female and ethnic minority soldiers. However, it turned out that in real combat, there are far more men (most of them white) than women. This game does not reflect reality in other aspects – “it is hyper-frenzied, and in real life, there is much less shooting, and healing takes much longer” (Shi, 2021, p. 64). The game *Battlefield 1*, the first-person World War I military shooting game, originally praised for enabling the players to join the regiment called Harlem Hellfighters, comprising men of colour, was later harshly criticized for making it impossible for them to survive (Pearson, 2016). As a result, creators wanted to be more inclusive and *Battlefield V* got mixed reception (Farokhmanesh, 2018), due to nonsensical deviations from the historical context or blatant disregard for historical events (e.g.,

a British soldier fighting with a katana, a female sniper with a prosthetic arm, too many women as soldiers on the frontlines, and so on).

In our times, we can see the rapid developments in artificial intelligence, first introduced as early as in 1956, and originally focused on solving problems. AI models are now widely implemented in modern technology, including human-computer interaction (Choudhary, 2024), thus affecting the area of digital games. The potential of AI implemented in gaming seems to be huge. According to Madre et al. (2024) AI technology is believed to be able to improve gamer experiences (for example, by personalization based on previous user behaviour and preferences), security (e.g., by analysing typical gameplay, it can identify unusual activities, such as, cheating or hacking attempts), and games themselves (more immersive settings). However, AI driven language models may also show certain bias, which can originate from several sources, including algorithms themselves, the data used to train the models, or the contexts in which they are deployed (Choudhary, 2024).

3 Methodology

The aim of the study is to describe, analyse, and assess the impact of the phenomenon called political correctness on selected currently launched games to illustrate how it can affect them. Based on our own research, we chose three games – *Concord* (Firewalk Studios, 2024), *Dustborn* (Red Thread Games, 2024), and *Black Myth: Wukong* (Game Science, 2024). Within this case study, we wish to focus attention on the growing and often excessive aspects of wokeness interwoven into the language and content of the current games and its related controversy, and backlash.

We divide the analysis of the selected games into three parts, as follows:

- Basic production details, the topic and content of the each examined game, while focusing on the form and way of presence of political correctness;
- Reaction of the producers and gamers to the controversy and backlash related to wokeness, presence of wokery in the communication;
- Success of the games on the market and its connection to the investigated phenomenon of political correctness.

4 Results

The first investigated game called *Concord* was one of the huge gaming news in 2024. It is a 5v5 competitive multiplayer shooter game set in an original sci-fi universe with mercenaries known as Freegunners. The player can choose from 16 different characters, all of them having their unique abilities and weapons. It had been developed for eight years; its makers Firewalk studios were bought by Sony in 2023. It is believed to be very expensive (estimated costs are more than \$100 million) and it was supposed to be a hit for the PlayStation5. The game was launched on 23 August 2024 with the entry fee of \$40. Despite high expectations, it failed spectacularly, it sold fewer than 25,000 copies and made only \$1 million, with barely 697 players playing on its peak. As a result, it was taken offline on 6 September 2024, Sony did not only pull it from sale, but everyone who had bought it on PS 5 and PC was promised to be refunded and its future is more than unclear (MacDonald, 2024).

Several reasons have been mentioned as why it flopped, including bad choice of genre (the hero shooter, in which many players already have their preferred game), along with low-quality marketing (the trailer was shown three months before its launch). The characters and the overall design are also believed to be underdeveloped, unoriginal, and felt as derivative with pulled pieces and parts from other games and movies (Morgan, 2024).



Figure 1: Mila Jam and her voiced character Bazz
Source: Hansford (2024)

One of the arguments for its unexpected and resounding failure seems to be the implementation of wokery, to be more precise especially identity politics. One of the main characters called Bazz was created based on musician Mila Jam, a black trans woman activist, full named Jamila Adderley. Other woke features include, for example, a robot with pronouns (Hansford, 2024). Despite associated harsh criticism, it has to be added that some of the gamers praised the absence of toxicity and the presence of positivity and inclusion (Morgan, 2024). After its withdrawal, Sony made a statement admitting that the initial launch had not landed the expected way (Morgan, 2024), however, at no time did they react to the implementation of wokery and its possible unfavourable effect. It is believed that the game could end up as a free-to-play game.

Another spectacular commercial failure, a game called *Dustborn* is a single-player, story-driven action-adventure game developed by a Norwegian studio Red Thread Games and published by Quantice Dream on 20 August 2024 with the price of £40 in the UK. Unlike *Concord*, this game has intended to be openly progressive and political. It was developed in response to the election of Donald Trump in 2016, with the main character Pax, who is a black pregnant young woman. At its peak it had 76 concurrent players. As for the story, it is about a town infected by ghosts that make people hateful and paranoid. Instead of shooting, the main character uses linguistic superpowers to fight the enemies, such as 'trigger' (making people angry by calling them racist), 'cancel' them which means to get them to self-harm, 'sow discord', or even 'gaslight' which implies to make people turn against each other, manipulate them, and normalize negative emotions. Moreover, the game encourages the player to bully not only her enemies, but also friends to get them do what is wished for. All of this is allowed because a gamer is fighting fascists and racists, while promoting diversity, equity, or inclusion (Hetfeld, 2024).



Figure 2: Pax, the main character in *Dustborn*
Source: Trent (2024)

Again, the game cannot be noted as a success at all, it took eight years to develop and must have cost a lot. Moreover, there immediately appeared a lot of backlash and severe criticism towards its preachy and far-left political bias. The team of creators, Red Thread Games posted a message, claiming they wanted to spark conversation and debate, while looking forward to engaging with their players in a positive and constructive fashion. They also expressed having zero tolerance for hate speech, harassment, and threats of any kind. On top of that they threatened to remove anyone from their community involved in any criticism, while declaring their wish to continue building a world where everyone can feel valued and empowered to share their stories, however, they turned off comments (Trent, 2024).

Another interesting game released in 2024 was *Black Myth: Wukong*. It is an action role-playing game rooted in Chinese mythology, developed by an independent Chinese studio Game Science. The story is based on a 16th century novel called the Journey to the West, one of the Four Great Classical Novels of the Chinese literature. The player sets out as the Destined One to face multiple challenges, to uncover the obscured truth, while enjoying breathtaking and distinctive landscapes (Elliott, 2024). After years of development, it was launched on 20 August 2024, and the game immediately achieved a massive success with 10 million units sold in just three days, and 3 million concurrent players, while being quite expensive costing around \$60 (Lee, 2024). It is believed that its extensive favourable outcome was reached through its ability to promote the Chinese culture to the global audiences in an amazing, unique, and creative way. It may be considered by many as surprising, since the gaming industry is tightly controlled in China, with a heavy degree of censorship, while being the world's biggest gaming market with 700 million players. Nevertheless, certain elements of political correctness can be traced here, too. Critics of the game have been accused of being anti-China, trying to undermine the country's achievements, while Chinese nationalists attribute its success to the country's superiority (Lee, 2024).



Figure 3: Sun Wukong, the Monkey King, in *Black Myth: Wukong*
Source: Elliott (2024)

5 Discussion and Conclusions

The gaming industry started as a small market targeting students, nerds, and geeks. The modern gaming industry has been expanding, generating billions of dollars, and gaming community comprising hundreds of millions of players. Their structure has also been changing, shifting from predominantly white, male players to players involving women, people of colour and gamers of other minorities. The gaming industry has been evolving in line with new technologies: modern games are high quality products, they sound perfect, look awesome with breathtaking images and characters, while focusing on making profits as in any other industry.

There are certainly many stereotypes in the contents of the games, which reflect patterns present in our modern-day societies. People of colour are often depicted as villains, or even criminals, women as visually attractive sexual objects, Muslims as terrorists, white men as bullies, or racists. At the same time, it also applies, as in any other media industry, or any field of society, that it is recommended to avoid any topics for games that feel unsure to handle. For example, to create a game depicting the past or post-apocalyptic setting with accompanying phenomena, such as, slavery, sexism, or racism would undoubtedly spark harsh controversy, strong criticism, and extensive backlash. It might not be enough to show a racist as a despicable character, calling out sexism, and portraying slavery as something deeply disturbing.

Critics of wokery say that video games should be about relaxation and fun, free of political or social bias. Even if desired, this may be impossible to achieve, even though video games are undoubtedly artistic outputs, they represent, at least to some extent, the expressions of their authors.

However, it is disputable if implementation of political correctness even with the best intentions is realistic and feasible. In our times, it is virtually impossible to please everyone, even if you wanted. Despite driven by positive reasons, such as, fight for justice and equality, in reality, many of its hard-core supporters lack tolerance towards other views and opinions and believe that only their stance is the right one. Including politically correct characters and narratives into the games can upset many gamers, while avoiding more diversity and inclusions may be criticized by others.

There is no easy answer to the question if political correctness is to be applied in video gaming or not. Some game creators and gamers would say that it should be banned due to historical or social inaccuracy, others may argue that it is to be portrayed to help improve our society by pointing out many negative phenomena of our times or from the history and thus promote social awareness and understanding.

In our research we managed to show what devastating effects pushing wokeness into games contents might have. *Concord* and *Dustborn* ended up as total failures, though to be fair in case of the first one, there were more reasons for this bad outcome. However, one of the most criticized aspects of the game was the implementation of identity politics, which is something still felt as highly controversial, and it is open to discussion if it was a good idea to do it in a shooter game. *Dustborn* is a textbook example of everything negative related to wokery. Using gaslighting, labelling people as racists or sexists, manipulating them, being rude and unpleasant for the sake of promoting diversity and inclusion shows in bright colours the controversy of being woke. One cannot fight against negative phenomena using contradictory methods. This stance was clearly present in the response of the creators, who when calling for open debate turned off the comments on their post. It would be too simplistic to say that the game *Black Myth: Wukong* has been a blockbuster due to lacking elements of wokery in its content and focusing on the artistic aspect. Elements of wokeness can be perceived in the reactions of the gamers, if you do not like it, you are immediately labelled as anti-China, if you admire it you are accused of supporting China's supremacy. Our small research brought to light another significant issue related to creating of modern games, nowadays to develop a new game is extremely expensive, although it is not easy to get exact figures. Moreover, this process takes several years, and even if the creators want to point out certain issues, they may easily miss the right moment of the launch, especially in our dynamically changing times.

Another important aspect of current and future gaming industry is the pursuit of artificial intelligence. Basic AI elements were used in gaming in 1980s, and many modern games contain at least simple AI structures. Although it is generally believed that the progress in AI may significantly improve gamer experience, fairness, security, but also the setting of the game, there are also undeniable risks related to its possible bias and thus the issue of pushing certain views, which may cause backlash by those opposing them.

Whatever attitude to the phenomenon of political correctness a gamer or a producer may have, it is obvious that it will stay and affect gaming industry. It is up to the game producers to come up with thematically well-balanced, high-quality games, to promote them effectively and clearly, to be open-minded to criticism, to take lessons from possible mistakes, and not to push particular for many radical ideas purely due to virtue-signalling and from fear not to be cancelled. The video gaming industry has been changing, and along with modifications in the group of players, now including more women, and representatives of various minorities, adjustments in the topics do and will appear. Gamers, on the other hand, should try to be more tolerant towards others with different views and preferences, which can be achieved only by promoting tolerance in real lives.

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