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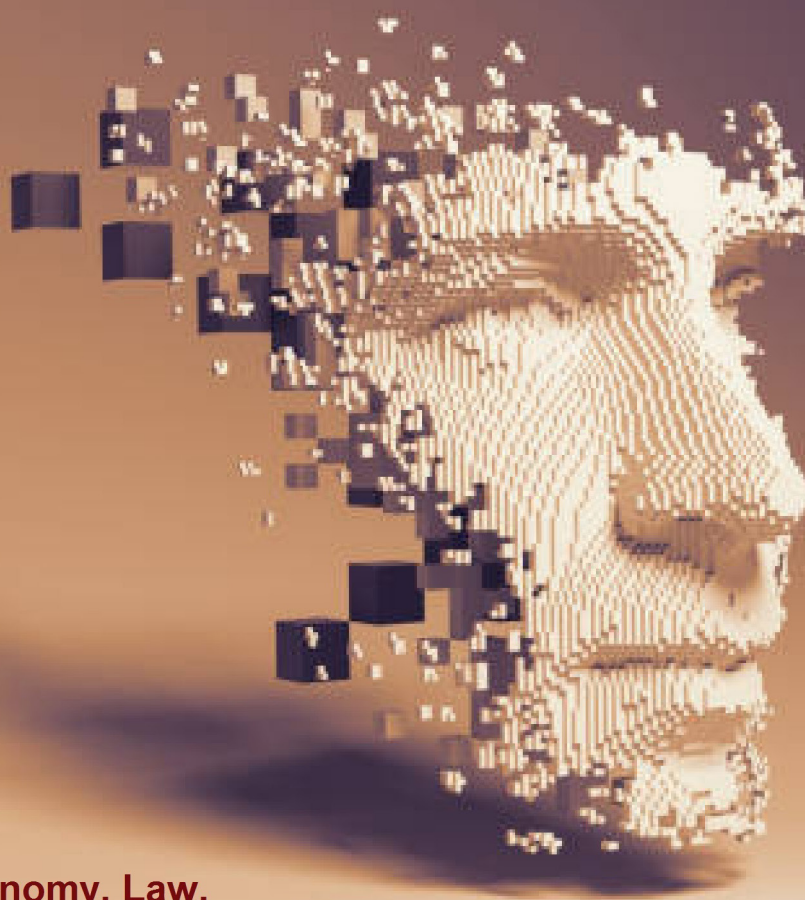
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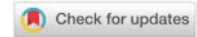
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ART-HISTORICAL APPROACHES IN CONTEMPORARY MEDIA AND MARKETING: A COMPARATIVE CASE STUDY

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Abstract: The paper examines the relevance of art-historical analytical procedures for interpreting contemporary visual communication in media and marketing. Building on theoretical foundations from visual studies, the research introduces the Art-Historical Analytical Model (AHAM)—a methodological framework developed specifically for this study. AHAM systematises four interpretative levels traditionally used in art-historical analysis: formal, iconographic, iconological, and contextual interpretation. The model is applied and empirically tested through a comparative case study to determine its analytical potential for understanding contemporary visual identities systems. The case sample includes six visual systems: three global branding strategies (Gucci under Alessandro Michele, Louis Vuitton's artist collaborations, and Absolut Vodka's art-based branding) and three regional cultural actors (Museum of Contemporary Art Belgrade, Gallery of Matica Srpska, and the EXIT Festival). The results demonstrate that AHAM enables precise identification of stylistic structures, symbolic codes, and cultural references across both global and local contexts. The iconological and contextual layers, informed by visual studies, reveal how images function as cultural agents embedded in networks of visibility, circulation, and power. The study concludes that AHAM offers a coherent and adaptable analytical framework that enhances interpretative depth and cultural understanding in contemporary media and marketing. As a newly introduced model, AHAM shows promising potential for further theoretical refinement and wider application within visual studies, branding research, and cultural analysis.

Keywords: *art-historical approach; visual communication; branding; visual identity; case study*

Field: Social Sciences

1. INTRODUCTION

Visual communication has become a dominant medium through which contemporary culture constructs meaning, circulates values, and shapes identities. Images no longer serve merely as aesthetic objects; they operate as active cultural participants embedded within economic, symbolic, and technological systems. Recent scholarship further emphasises that contemporary visual culture is inseparable from regimes of power, platforms, and visibility that shape perception and cultural authority (Mirzoeff, 2024).

Mitchell (2005) frames images as entities that act, circulate, and negotiate meaning, while Mirzoeff (2016) conceptualizes visibility as a regime that structures perception, behaviour, and cultural interpretation. Branding and media design therefore play a central role in shaping symbolic frameworks through which contemporary societies articulate cultural, ideological, and economic values.

Visual studies emphasise the need to interpret images within their social, technological, and discursive contexts (Rose, 2016; Schroeder, 2020; Mirzoeff, 2023). Visual identities operate through visual grammars shaped by cultural memory, institutional authority, and global flows of imagery. Standard marketing approaches often focus on psychological or behavioural dimensions, but lack interpretative depth regarding symbolic structures, cultural genealogies, and ideological narratives.

Art history provides a robust interpretative foundation capable of addressing aesthetic, symbolic, and cultural dimensions of imagery. Its methods—formal analysis, iconography, iconology, and contextual interpretation—can be adapted to contemporary media systems, uncovering layers of meaning not accessible through commercial analytical tools.

In order to address these analytical challenges, the paper introduces a new methodological framework—the Art-Historical Analytical Model (AHAM). The model systematises core procedures traditionally used in art-historical interpretation and adapts them for the study of contemporary visual communication. AHAM has not been previously defined in the existing literature; therefore, the present study positions it as an exploratory methodological proposal. Its relevance and analytical potential are examined through a comparative case study encompassing six global and regional visual identity systems.

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2. MATERIALS AND METHODS

This research presents the Art-Historical Analytical Model (AHAM) as a newly introduced methodological tool designed for interpreting contemporary visual communication. The model is developed for the purposes of this study and is empirically tested through a comparative case study. AHAM consists of four analytical stages—formal, iconographic, iconological, and contextual—which together provide a structured approach for examining visual identity systems.

2.1 The Art-Historical Analytical Model (AHAM)

(1) Formal Analysis

Focuses on composition, chromatic relations, typographic structures, and spatial organisation. It draws on Wölfflin's formal categories and Arnheim's (1974) principles of perceptual balance.

(2) Iconographic Analysis

Identifies motifs, symbols, and representational elements, clarifying how visual markers acquire recognisability and meaning.

(3) Iconological Interpretation

Explores cultural, symbolic, and ideological meanings embedded within visual systems. It builds on Panofsky's interpretative model and draws upon Barthes (1972) and Bourdieu (1993).

(4) Contextual Interpretation

Situates images within socio-cultural, economic, and technological frameworks following visual studies paradigms (Mirzoeff, 2016; Rose, 2022).

2.2 Case Selection

Because AHAM is introduced here for the first time, the selected cases serve not only as analytical material but also as a testing ground for evaluating the model's applicability, flexibility, and interpretative range. The comparative structure (global vs. regional) allows the model to be assessed across different cultural, symbolic, and communicative environments.

To evaluate AHAM across different contexts, the study includes:

Global cases:

- Gucci (Alessandro Michele era)
- Louis Vuitton (artist collaborations)
- Absolut Vodka (art-based branding)

Regional cases:

- Museum of Contemporary Art Belgrade (MoCAB)
- Gallery of MaticaSrpska (GMS)
- EXIT Festival

2.3 Data Sources

Data include visual campaigns, logos, posters, institutional documents, online communication, and scholarly literature. All cases were analysed using the four AHAM stages to maintain methodological consistency.

3. RESULTS

3.1 Global Case Studies

a) *Louis Vuitton – Art as a Long-Term Branding Strategy*

For more than two decades, Louis Vuitton has systematically used contemporary art as a core branding strategy, making the brand an instructive example within cultural branding theory. Beginning with Takashi Murakami in 2003, followed by Yayoi Kusama (2012; 2023) and Jeff Koons (2017), the brand has constructed a visual identity situated at the intersection of luxury, artistic narrative, and symbolic capital. In this context, the Louis Vuitton identity functions as a cultural interface that connects contemporary luxury with the artistic canon and global visual mythology.

(1) Formal Analysis

Murakami's palette, characterised by flat chromatic fields, bright colours, and clear contours, corresponds to Arnheim's (1974) principles of perceptual balance. The LV monogram grid retains structural consistency across reinterpretations, reflecting Wölfflin's (1932) concept of the "closed form." These formal mechanisms ensure recognisability while enabling stylistic variation. Kusama's dot patterns and Koons's refined surface treatments further extend the brand's formal vocabulary.

(2) Iconographic Analysis

Murakami introduces Superflat motifs—flowers, cartoon-like figures, and ocular symbols—rooted in Japanese pop-cultural visuality. Kusama contributes her signature polka dots, while Koons incorporates

explicit citations from Western art history (Leonardo, Rubens, Fragonard). These motifs form a layered iconographic system combining contemporary pop imagery with canonical European references.

(3) Iconological Interpretation

Following Holt's (2004) cultural branding theory, Louis Vuitton constructs a symbolic universe in which luxury acquires cultural legitimacy through artistic affiliation. Kusama's repetitive dot patterns evoke modernist concerns with perception and obsession, while Koons's borrowings position the brand within discourses of artistic prestige and cultural capital (Bourdieu, 1984; 1993). The brand thus transforms artistic languages into ideological markers of sophistication and exclusivity.

(4) Contextual Interpretation

Within global consumer culture, Louis Vuitton's collaborations function as part of what Barthes (1972) describes as myth-making: art becomes a signifier of prestige. Peirce's triadic sign model further explains the brand's communicative strategy: the artwork (icon), the artist's signature (index), and the monogram (symbol) operate collectively within a global luxury market. Gadamer's hermeneutic framework (2004) helps situate these collaborations as dialogues between historical artistic traditions and contemporary luxury capitalism.

b) *Gucci – Postmodern Visual Identity (Alessandro Michele Era)*

Between 2015 and 2022, Gucci represents one of the most accomplished examples of postmodern visual eclecticism within the luxury industry. Alessandro Michele constructs a layered visual system combining Renaissance elements, Gothic references, Baroque ornamentation, pop-cultural citations, and camp aesthetics.

(1) Formal Analysis

Gucci's visual identity under Michele features dense compositions, chromatic saturation, ornate textiles, and stylistic layering. The brand intentionally destabilises traditional formal hierarchy by juxtaposing Renaissance patterns, Gothic motifs, and camp aesthetics. This produces a visually overloaded surface characteristic of postmodern aesthetics.

(2) Iconographic Analysis

Recurring motifs—serpents (knowledge, danger), lions (authority), bees (collective order), and Gothic crosses (spirituality, mysticism)—form a recognisable symbolic vocabulary. Analysed through Panofsky's (1972) iconographic method, these motifs derive meaning from their deep historical associations and cultural lineage.

(3) Iconological Interpretation

Iconologically, Michele's Gucci operates through deliberate stylistic hybridisation and intertextuality. The brand communicates an ideology of eclectic individuality and cultural fluidity. This aligns with Mitchell's (2005) theory of images as active agents within social practice. The visual system also reflects contemporary identity politics, aligning with Hall's (1997) insights into inclusive and queer-friendly representation. Such strategies align with contemporary cultural strategy models in which brands function as ideological and symbolic actors within broader cultural fields (Holt & Cameron, 2023).

(4) Contextual Interpretation

Within the global fashion system, Gucci's aesthetics function as a commentary on postmodern consumer culture. Eco's (1976) concept of the "open work" explains the multiplicity of readings enabled by Gucci's eclectic visuality. The brand's cultural positioning relies on audiences interpreting its imagery through frameworks of luxury, fantasy, and identity experimentation, situating Gucci within broader discussions on fashion, representation, and cultural performance.

c) *Absolut Vodka – Art as a Branding Framework*

Absolut Vodka provides one of the most sustained examples of art-based branding, having collaborated with more than 600 artists since the 1980s—including Keith Haring, Andy Warhol, and Louise Bourgeois.

(1) Formal Analysis

The Absolut bottle's silhouette forms a stable visual constant, functioning as a formal anchor for continuous variation. Artistic reinterpretations—ranging from Warhol's pop-art surfaces to Bourgeois's sculptural treatments—introduce diverse chromatic, textural, and compositional schemes, while maintaining structural recognisability.

(2) Iconographic Analysis

Each commissioned artwork introduces specific motifs: Haring's outlined figures, Warhol's bold colour blocks, or localised cultural symbols in regional editions. These motifs build an iconographic archive centred on the bottle as a recurring representational form.

(3) Iconological Interpretation

Absolut exemplifies Holt's (2004) model of cultural branding: the brand constructs meaning through

association with artistic innovation, positioning itself as a mediator between mass consumerism and high culture. Artistic collaborations transform the product into a symbol of cosmopolitan modernity and creative identity.

(4) Contextual Interpretation

Within global advertising culture, the Absolut bottle becomes what Barthes (1972) describes as a cultural myth—an everyday commodity elevated to symbolic status. Semiotic analysis following Peirce (1998) clarifies the brand's strategy: the silhouette serves as icon, artistic reinterpretation as index of cultural engagement, and the brand name as symbol of creative lifestyle. This positions Absolut within urban, liberal cultural contexts that value experimentation and aesthetic expression.

3.2 Regional Case Studies

a) *Museum of Contemporary Art Belgrade (MoCAB)*

MoCAB's digital identity merges modernist architectural heritage with contemporary design.

Formally, it uses dominant white surfaces, geometric composition, hierarchy, and negative space, consistent with Arnheim (1974) and Bauhaus clarity.

(1) Formal Analysis

MoCAB's digital visual identity is structured around modernist formal logic: dominant white surfaces, geometric compositions, strong visual hierarchy, and extensive negative space. These formal elements correspond to Arnheim's (1974) theory of perceptual organisation and reflect Bauhaus visual principles. The clarity and structural discipline of the visual system align with Wölfflin's categories of linearity and the "closed form," reinforcing the museum's architectural modernism.

(2) Iconographic Analysis

The most recurring iconographic motif is the silhouette of the museum building itself. As a representational form, the silhouette functions as a direct visual reference to the iconic structure designed by Antić and Ristić (1965). The motif also includes geometric fragments, stylised elevations, and simplified outlines that align with the building's sculptural quality.

(3) Iconological Interpretation

At the iconological level, the building's silhouette functions as a symbol of Yugoslav socialist modernism and cultural progressivism. Following Panofsky's (1955; 1972) interpretative framework, the motif operates on two planes: as a literal architectural form and as a signifier of the ideological aspirations of the period in which the museum was established. The digital aesthetics communicate what Barthes (1972) would call a "myth of modernity," reinforcing ideas of rationality, institutional authority, and cultural continuity.

(4) Contextual Interpretation

MoCAB's digital strategy reflects contemporary expectations of transparency and accessibility in public cultural institutions. Eco's (1976) concept of the open system is evident in interactive formats that invite user participation. Gadamer's hermeneutic principle of the "fusion of horizons" (2004) is activated through micro-narratives—short biographies, curated visual stories, and concise interpretative texts—that mediate between the institution's modernist legacy and contemporary audiences. In this wider context, MoCAB uses digital visibility to reassert its institutional identity within the shifting cultural landscape of post-socialist Serbia. This approach aligns with visual culture theory, which understands institutional imagery as a site where cultural memory, authority, and visual regimes intersect (Dikovitskaya, 2021).

b) *Gallery of Matica Srpska (GMS)*

GMS's visual identity is grounded in national cultural heritage. Formally, muted palettes and heraldic motifs follow Baxandall's (1972) "conditions of visibility."

(1) Formal Analysis

GMS employs muted, historically coded colour palettes (blue, burgundy, ochre), symmetric compositions, heraldic structuring, and stylised ornamental forms. These formal choices correspond to Baxandall's (1972) "conditions of visibility," which explain how culturally embedded colour and form conventions shape aesthetic perception.

(2) Iconographic Analysis

The Gallery frequently incorporates Baroque and Classicist motifs, elements of eighteenth- and nineteenth-century Serbian painting, and ornamental details inspired by historical frames, coats of arms, and ecclesiastical decorative patterns. These motifs constitute a recognisable iconographic system rooted in national artistic heritage.

(3) Iconological Interpretation

Iconologically, GMS constructs a visual narrative centred on tradition, continuity, and cultural authority. Drawing on Bourdieu's (1993) field theory, the institution uses heritage motifs to assert its position as a custodian of national cultural capital. The visual system symbolically reinforces the Gallery's

historical role in safeguarding and interpreting Serbian artistic identity.

(4) Contextual Interpretation

The Gallery's communication strategy responds to contemporary cultural-policy frameworks that emphasise heritage preservation and national identity. Barthes's (1977) model of connotation explains how heraldic and gold elements communicate legitimacy and prestige. Eco's (1976) theory of cultural codes clarifies how traditional motifs are repurposed as contemporary symbols of Serbian cultural memory. In this context, GMS positions itself as both a historical institution and an active participant in modern cultural discourse.

c) *EXIT Festival*

EXIT's visual identity embodies youth, energy, and urbanity. Formally, it relies on contrasts, saturated colours, dynamic compositions, and bold typography.

(1) Formal Analysis

EXIT's visual identity relies on high-contrast compositions, vibrant colour schemes, dynamic spatial structures, and bold typography. These formal elements draw on pop-art, street culture, and early digital aesthetics, producing a visually energetic system aligned with youth-oriented cultural expressions. The intensity of colour and movement corresponds with Mitchell's (2005) argument that contemporary images function as active agents within social life.

(2) Iconographic Analysis

Iconographic motifs include stars, lightning symbols, stylised architectural elements (Petrovaradin Fortress), and digital-era references such as pixel clusters and glitch effects. These elements form a visual vocabulary associated with millennial and post-millennial urban culture.

(3) Iconological Interpretation

Iconologically, EXIT communicates an ideology of freedom, youthfulness, and collective transformation. Following Holt's (2004) cultural branding framework, the festival's visual language embeds values associated with resistance, creativity, and community. The symbolism of the fortress motif reinforces the festival's historical roots in activism and social engagement.

(4) Contextual Interpretation

EXIT operates within the cultural economy of Southeast Europe, where festivals serve as key generators of cultural identity and creative industry development. Using Peirce's triadic model (1998), EXIT's visuals function as icons (illustrations of performers and fortress architecture), indices (the EXIT logo), and symbols (digital motifs signifying youth and futurity). Hall's (1997) theories of representation help explain how EXIT constructs an "imagined community" of participants united through shared visual and cultural codes.

4. DISCUSSION

The comparative analysis demonstrates that AHAM reveals structural, symbolic, and contextual layers across diverse visual systems. Global brands deploy cultural capital, artistic legitimacy, and visual mythology, while regional institutions articulate heritage, institutional authority, and youth identity.

AHAM proves adaptable and coherent, successfully integrating art-historical interpretation with visual studies. The model uncovers how imagery operates as a cultural interface, shaping social meaning and collective perception. Recent research in visual consumption confirms that images operate as active cultural agents within contemporary branding and media systems, reinforcing ideological and symbolic frameworks beyond functional communication (Schroeder, 2023). The findings indicate that AHAM, although newly introduced, demonstrates strong analytical coherence and adaptability across diverse visual systems. Its application in this study suggests that the model offers both methodological clarity and interpretative depth, supporting its potential for further refinement and future use in visual studies, branding analysis, and cultural interpretation.

5. CONCLUSIONS

This study introduces the Art-Historical Analytical Model (AHAM) and evaluates it through six visual identity systems. The findings confirm that AHAM provides interpretative depth and methodological clarity, revealing aesthetic, symbolic, and contextual dimensions of contemporary visual communication.

As AHAM is presented here for the first time, the results of the comparative case study confirm its viability as a methodological framework and indicate that it warrants further theoretical development and empirical validation in subsequent research.

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DIGITAL LITERACY AS A FUNCTION OF SAFETY AND PROTECTION OF CHILDREN IN EDUCATION

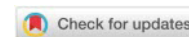
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Abstract: In this paper, based on the review of the latest literature and research conducted in practice, the possibilities of applying information and communication technologies (ICT) in primary education from the aspect of safety and child protection will be investigated. In the 21st century, access to the Internet is increasing, and children of elementary school age are entering online communication earlier and earlier. Children are becoming active users of social networks and digital platforms, which have been expanding for years. However, the results indicate that the use of ICT, although an important educational resource, may pose risks to children's safety and privacy, including exposure to unverified content, cyber threats, and inappropriate use of digital devices. A large number of cases of violence on the Internet with tragic outcomes have led to the fact that today the European Union is considering banning children from accessing social networks. In this paper, we highlight the important roles of parents and educational institutions in protecting the safety of elementary school-age children online. The empirical part of the work consists of empirical research of a quantitative nature, which I conducted using an online questionnaire based on the experience gained from long-term work on the prevention of violence on the Internet within the program of the Institute for the Advancement of Education of the Republic of Serbia, "Safety of Children on the Internet". In this context, the qualitative research collected and evolved the attitudes and experiences of students, teachers, and parents about the challenges and potential risks that digital technologies bring to children in the educational environment from the aspect of child safety. Research indicates that continuous education and information of parents, teachers, and children in primary education is a safe way to prevent and protect the digital safety of children in a virtual environment. Children in primary education have certain skills in using smart devices; however, research shows that children mostly ignore basic safety rules, and thus make it easier for online predators and bullies.

Keywords: *ICT, digital literacy, education, teachers, parents, child safety.*

Field: Education

1. INTRODUCTION

With the rapid advancement of digital technology, the role of ICT in education has become increasingly important, and this importance is likely to continue to grow and develop in the 21st century. Today, children enter the digital world at a younger age than ever before, with every half-second, a child accesses the Internet worldwide, so experts warn that such habits expose them to serious risks (Denić, N. 2016). Modern education relies more and more on information and communication technologies (ICT), which enable children to acquire new knowledge and skills, but at the same time bring certain challenges related to the safety and protection of children. A recent study by the Young & Resilient Research Center at the University of Western Sydney, Australia, and the NGO Save the Children found that children, especially those from low-income families, were 35 percent less likely to block inappropriate or unwanted requests from strangers. According to Hoffman, M. and Blake, J., it is therefore important that the concept of computer literacy evolves and complements in parallel with the development of new technology (Hoffman in Blake, 2023, pp. 221–231). Computers and smartphones have become available to almost everyone and have a huge impact, especially on the younger generation. Especially in the primary education system, where children are still developing critical thinking and digital literacy, planned and controlled use of digital technologies becomes necessary to reduce risks and ensure a safe learning environment. New digital technologies can lead to new forms of inequality and marginalization in society. Especially in the province of Kosovo and Metohija, where the research was conducted, teachers and especially parents do not pay enough attention when children access content on the Internet, believing that they are safer than they are, because they are not in the real world, which presents many dangers. In this regard,

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special attention should be paid to the professional development of teachers, who play a key role in educating children and parents about the safe use of digital devices, as well as in the prevention of risks associated with the uncontrolled use of technology. Many studies have shown that lower socioeconomic status negatively affects the use of ICT technologies and their use among adolescents, affecting not only digital literacy but also the overall quality of life (Ali et al., 2020, p. 2). Young people learn about digital technologies naturally and intuitively and accept them as part of everyday life. However, a paradox arises because children today often have greater digital literacy than their parents and teachers, who still focus on traditional content and values. In this research, we point out the importance of cooperation with parents, who often do not recognize all the risks or use digital tools to facilitate daily tasks, which can increase children's vulnerability.

2. PARADIGMS OF APPLICATION OF DIGITAL TECHNOLOGIES AND TOOLS IN EDUCATION

The use of digital tools is crucial for bringing institutions closer to their educational goal, especially to facilitate the improvement of teaching quality and educational results (N. Denić 2016). Today, access to resources and tools in the field of education has become widely available and simplified, allowing students to learn and access learning materials anywhere and anytime, which promotes flexibility and adaptability in the educational process. The integration of mobile technology into educational institutions thus improves learning opportunities (Efiloğlu Kurt, 2023, pp. 871–873). Some authors emphasize that the portability of smartphones means that learning is no longer limited to classrooms, but that students can learn and access information without spatial and temporal limitations (Marciano et al., 2022; Hartley et al., 2023, pp. 750–751). In addition, the education process itself, i.e., the approach to e-learning, is continuously changing and improving (N. Denić 2016). This opinion is supported by authors who state that platforms for mobile learning (m-learning) and educational applications offer interactive and personalized learning experiences that support different approaches and learning needs (Efiloğlu Kurt, 2023, pp. 871 and 873). For this purpose, users can access news, watch videos, listen to music, search the Internet, and communicate through different social networks on one device (Cashmore et al., 2018). Research shows that in Serbia today, more than 92.6% of the population uses a mobile phone. In this light, digital platforms are emerging, which include YouTube, TikTok, Instagram, Facebook, X (Twitter), LinkedIn, etc., which are used for sharing pictures, watching short and long videos, live streaming, video calling, shopping, etc. In Serbia, 94% of young people have a profile on social networks. Data shows that Facebook is still the most popular social media platform, with just over three billion people accessing it every month, according to data published by Statista in April 2024. In this regard, well-known authors state that social networking applications such as Facebook, Instagram, Snapchat, TikTok, X (formerly Twitter), etc., have become an integral part of social interaction and influence the way individuals express themselves and connect with others (Livingstone and Sefton-Green, 2016, pp. 75–82). According to research, YouTube is the most commonly used social media platform among people aged 18-29, with 93.00% of users actively using the platform (Pew Research Center, 2024). Due to the increasing misuse of artificial intelligence on the internet, Denmark is planning to amend its copyright law to counter the misuse of artificial intelligence to create deepfake content. According to the aforementioned research, Instagram, TikTok, and Snapchat are also platforms that attract a younger audience, as all three platforms primarily focus on visual content such as images or short videos. Statistics show that 78.00% of 18-29 year olds actively use Instagram, 65.00% use Snapchat, and approximately 62.00% use TikTok (Pew Research Center, 2024). Also, according to the Pew Research Center (2024), WhatsApp is the most popular, with 32.00% of people aged 18 to 29 using it to send messages. The most common forms of abuse of children on the Internet: Trafficking, Theft, Online predators, Suggestion, Peer violence, etc. Experts emphasize the lack of research that focuses on individual behavior, interests, and motivations of individuals in their decisions about using the Internet (Slijepčević, 2023).

3. DEVELOPMENT OF DIGITAL COMPETENCES IN THE FUNCTION OF CHILD SAFETY

Digital competences include the skillful and purposeful use of computers at work and in everyday life. Well-known authors Bitham and Sharp (2011) suggest that students who function at the level of the pyramid (Figure 1) have a strongly developed understanding of the value and possibility of using technology to support their learning.

Fig. 1. Digital literacy model



Source: Beetham i Sharpe, 2011, p. 90

Therefore, among scholars who also deal with defining the concept of digital literacy, it is more seen as an “umbrella concept that encompasses the components of ICT literacy, computer literacy, and also information literacy” (Yashalova et al., 2019, p. 214). In this regard, the National Digital Competence Framework of the Republic of Serbia seeks to encompass digital competencies specific to the teaching profession by proposing 24 competencies organized into 6 categories.

Table 1. Digital Competence Framework

Area 1 - digital Environment, encompasses those digital competencies that are a prerequisite for using the potential of digital technologies to the greatest extent possible to build a successful civil society.

Area 2 – refers to the competencies needed to responsibly and effectively use digital resources for teaching and learning purposes.

Area 3 – Teaching and Learning, encompasses those knowledge and skills that are key to planning and creating an authentic and stimulating digital learning environment that respects the diversity of students and contributes to their direct interaction.

Area 4 – refers to modern approaches to assessing and monitoring student progress that contribute to increasing responsibility for independent learning, developing self-regulation, and monitoring personal development in the context of lifelong learning.

Area 5 – Student Support, relates to the principle of equity in education and highlights the potential of digital technologies for working with students who need additional educational support.

Area 6 – encompasses a range of competencies in the context of a teacher's professional engagement.

Source: <https://prosveta.gov.rs/>

4. RESEARCH METHODOLOGY

Initially, a descriptive approach will allow us to conduct a comprehensive review of the literature, including scientific articles, research, books, reports and online resources dealing with the concepts of: the use of ICT in teaching, the digital literacy of parents and teachers in the function of children's internet safety. Using combined methods and the method of analysis, we will review and connect theoretical positions and facts from practice into a whole. The results, that is, the various findings of the authors and their views, will be summarized using the compilation method. Qualitative research is aimed at understanding and explaining behaviour, beliefs, customs, and norms. By analysing the collected data, we were able to interpret, evaluate, and place them in the context of the academic environment. We came to the answer through semi-structured interviews, which represent one of the key qualitative methods of data collection in the social sciences. Given the research topic and issues, and the particularly pronounced multidisciplinary character of the research, a combination of qualitative and quantitative research methods was used for the purposes of the research (Radovanovic, B. 2020).

5. RESEARCH RESULTS

Statistics show that today, more than 4.76 billion people, which represents 59.4% of the world's population, use social networks, and that 72.9% of households in Serbia have an Internet connection. In this regard, research shows that 49% of children before the age of two have experience with smart devices, while at the age of 3-4 years, it is already 62%. Practical experience shows that children and young people start using digital technologies earlier and earlier, so every fourth child already owns a tablet in preschool age. Well-known authors Livingston and Sefton-Green (2016) emphasize that digital technologies, especially smartphones, have given adolescents access to new forms of socialization, and social media platforms such as Instagram, Snapchat, and TikTok have become everyday tools for maintaining and strengthening friendships. The latest data also show that users spend more and more time on these platforms, with the typical user spending two hours and 31 minutes a day, and people under 35 even

more. Research shows that over 74% of children have profiles on social networks and game platforms, and 45% of Serbian children access them every day. From the aspect of Internet security, some authors state that users with a higher level of education and IQ are more likely to be able to detect misleading information (Shu, Wang & Liu, 2020). In this context, Antonsamy and Sivakumar (2022) concluded that technical and cognitive aspects of digital literacy are more important in detecting misleading information. Practice shows that the abuse of the Internet does not only refer to the most common association that occurs in connection with this term - pornography, but also refers to websites with harmful topics, such as suicides, anorexia, kidnappings, abortions, Nazism, drugs, etc. In the EU Kids Online 2020 international survey, the number of children aged 9-16 using the internet increased by 30%. In this context, the main reasons for using social networks are cited by 47.1% of individuals as communicating with family and friends, 36.2% as spending free time, 32.2% as reading news, and 30.3% as searching for content (e.g., articles, videos) (We Are Social, 2023). However, in this sense, according to research, videos are by far the most popular type of content for 54% of children aged 9-11, 72% of 12-14, and 76% of children aged 15-16. Also, the results of the research show that in Serbia, a third of children and young people over the age of 11 accessed pornographic content, 43% of boys, and 6% of girls reported that they visit such sites daily. For the purposes of work in the territory of central Kosovo (Kralj Milutin Elementary School, Knez Lazar Elementary School, and Miladin Mitić Elementary School), an online survey of students, parents, and teachers was conducted to assess the state of security in schools with an emphasis on internet safety. A total of 112 students, 38 parents, and 51 teachers participated in the survey. The survey was conducted in the period from April 3, 2025. until 10.10.2025. in order to improve the safety of students at school and on the Internet.

Table 2. Estimation of the most common forms of violence in percentages
Estimation of the most common forms of violence in percentages

Forms of violence	Students	Parents	Teachers
Verbal	46%	52 %	56 %
Digital	32 %	18 %	22 %
Physical	12 %	23 %	14 %
Without violence	10 %	7%	8 %

Source: Authors' research

Almost half of the surveyed students, i.e., 46%, believe that verbal violence is the most common form of violence at school, followed by digital violence at 32%, while 12% of students mentioned physical violence, and 8% of the surveyed students declared that there is no violence at school. Students spend more than 3 hours a day online, and older people even up to 4.5 hours. In Serbia, 41% of children aged 9-10 years and 72% of 10-11 year olds have accounts on social networks, although the age limit for most platforms is 13 years.

Fig. 2. Teachers' answers to the question of which form of violence is most often found in schools

What do you think is the most common form of it in school?



Source: Authors' research

Parents believe that verbal violence is most often present at school (52%), and the second most common form of violence at school, according to parents, is digital violence. According to teachers (56%), the most common form of violence at school is verbal violence, followed by digital violence.

6. DISCUSSION

We live in a time when almost all activities like politics, entertainment, transactions, education, etc., are fully and partially digitized (Pérez-Escoda, 2024). Research results show that 60 percent of children and young people in Serbia never use the Internet for creative purposes, such as sharing content (videos or music) that they have created themselves. In Serbia, they most often (88%) saw content of a sexual nature in pop-up windows, as well as the fact that 6% of children experience peer bullying on the Internet at least once a month. Building on these results, a study conducted by the Pew Research Center (Anderson et al., 2023) showed that adolescents in the US most often use smartphones for quick communication and social networks, with the YouTube and TikTok applications, which are primarily platforms for sharing and watching video content, standing out in terms of use. At the same time, there is little research on the topic of teaching and the application of ICT in education from the aspect of safety and child protection, which represents a challenge for teachers who, at their own discretion, adhere to certain guidelines and recommendations. The research titled "Addressing the digital skills gap for future education" (Jackman et al., 2021), which was conducted during the pandemic, and which included 145,000 adolescents worldwide, also goes in this direction and highlighted the urgent need to overcome the digital gap in the education system, pointing to the importance of continuous professional development of educators as well as parents from the aspect of informal lifelong learning. Today on the Internet, there are several thousand organizations that deal with some of the many ways of exploiting children. More recently, the massive Blackout Challenge was the most dangerous challenge in 2021, with over 80 fatalities, as it encourages children to hold their breath until they pass out. In this regard, Serbia leads the way in terms of the number of children under 13 who use social networks, according to the Children of Europe on the Internet survey conducted in 19 European countries. A quarter of children who experienced some form of digital bullying did not talk to anyone about it. They ignored the problem, blocked the bully, or stopped using the app. Of those who talked about that experience, 45% confided in peers, 31% in parents, and only 3% in school staff. Some authors emphasize that people with a low level of digital literacy can more easily accept and spread unreliable information (Sirlin, 2022). In the world today, positive legal acts are passed and prescribe procedures for the protection and safety of children on the Internet. In this sense, according to the new legal act called the Internet Safety Act in Great Britain, technology companies will be obliged to take more concrete measures to ensure the safety of children in the digital world. In some countries, such as Germany and Slovakia, less than 10 percent of children aged 9-16 have been bothered by something online, while in the Czech Republic, Malta, Romania, Serbia, Spain, and Switzerland, more than 30 percent of children report being bothered by something online in the past year. A study by Antonsamy and Sivakumar (2022) investigated the role of digital literacy in mitigating misleading information on social media among university students in Malaysia. Using a quantitative approach, the authors conducted a survey among 134 students, in which they discovered, among other things, that technical and cognitive knowledge had a positive effect on the reduction of misleading information, while socio-emotional factors had the opposite effect. According to research in Serbia, there is a significant number of children aged 9 to 16 who have seen images of sexual content during the past year, as much as 50 percent, compared to France, where that number is the lowest (21 percent). Some authors point out that the use of digital technology is one of the ways to improve the quality of education, because its use has expanded to learning in a virtual and digital environment, as well as for project-based and problem-based teaching (Zsankov and Damjanov, 2019). In Serbia, six percent of children experienced peer violence on the Internet at least once a month, and 13 percent several times during the previous year. The smallest number of children experienced peer violence on the Internet at least once a month in Croatia, France, and Italy (two percent), and the largest in Poland and Malta (13 and 11 percent). Well-known authors Samani et al. (2019) emphasize that "mathematics" students are more familiar with digital literacy from the aspect of safe use of the Internet than humanities students. In addition to the above statistics, the data show that in Serbia, a quarter, 24 percent of children saw hate messages once a month or more often, compared to Poland, where that number is the highest (48 percent), and Germany, where that number is the smallest (only four percent).

7. CONCLUSIONS

This contributes to a better understanding of the challenges that the digitization process brings to primary education and provides insight into strategies for the protection and safe use of ICT in educational institutions. Research in practice shows that no child is completely protected from the risks of being in the online world, but the most vulnerable are children who have access to the Internet without parental or teacher supervision. In this context, teachers and parents have a key role in the education and protection of children, through planning preventive activities, providing guidance to parents, and designing the safe use of ICT in teaching. Statistics show that 10-20% of students exhibit some form of digital violence at a certain moment, so a large number of teachers and parents will face this challenge as well. Based on the research, it can be concluded that the effective integration of digital technology into teaching requires teachers to have adequately developed digital competencies that allow them to introduce students to the safe and meaningful use of technology and to deal with potential problems that may arise during its use. The results of the conducted research show that the main problem lies in the fact that parents and teachers today do not have a clear idea about the Internet and the possibilities of its abuse. Most teachers and especially parents pay more attention to the prevention of physical violence, while devoting negligible time to controlling children when they surf the Internet. Relevant literature states that in addition to influencing communication and shaping their digital identities, smartphones enable adolescents to actively participate in various social and cultural debates (Boyd, 2014). For our environment, in addition to the mentioned negative connotations, it is noticeable that Serbia is the first country in Europe in terms of the percentage of children who help their parents when they encounter difficulties, that is, they do not know how to do something on the Internet, 69 percent of children, compared to 12 percent of children in Germany. Research shows that parents and teachers in educational institutions recognize the need for planned and controlled use of digital tools, with continuous monitoring and education of children about the safe use of the Internet and digital devices. In this context, it is evident that the lack of digital skills among adolescents, especially those from socio-economically weaker environments, can be an obstacle to success in the modern digitalized learning environment. In addition, the cooperation of educational institutions with parents is essential, because parents often do not understand all the risks or use digital devices to facilitate daily tasks, which contributes to the reduction of negative impacts and promotes safe learning. Based on the above, it can be concluded that the use of digital tools in teaching must be carefully planned, which includes testing the tools, checking their functionality, and understanding the digital skills of teachers and students who will use them.

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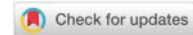
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PREDICTORS OF ARTIFICIAL INTELLIGENCE ACCEPTANCE: FROM ATTITUDES TO BEHAVIOR ACROSS GENERATIONAL GROUPS

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Abstract: The rapid development of artificial intelligence (AI) raises questions about its acceptance across different generational groups, particularly in terms of trust, perceived risks, and actual use. This research, based on the Technology Acceptance Model (TAM), analyzes how generations X, Y, and Z perceive the benefits and risks of AI, contributing to understanding the social implications of AI for ethical and sustainable development. The aim is to identify key predictors of AI acceptance across generational differences. The research was conducted via an online survey distributed via social media from September 1 to 10, 2025, among a convenience sample of 101 respondents from generations X (1965–1980, N=33), Y (1981–1996, N=34), and Z (1997–2012, N=34). The findings indicate the need for tailored educational strategies to increase trust in AI. Future research should examine longitudinal behavioral outcomes and interactions of TAM variables.

Keywords: AI acceptance, usage behavior, generational cohorts, risk perception, trust, regression modeling, risk perception, Technology Acceptance Model

Field: Social Sciences

1. INTRODUCTION

The rapid development of artificial intelligence in recent years has expanded the spectrum of its use in all spheres of life, from education, business, healthcare, professional and private sectors, which has raised questions about the patterns of acceptance and use of artificial intelligence in different demographic groups. Current scientific papers and research indicate that younger generations (members of generations Y and Z) are inclined to use and experiment with artificial intelligence, but at the same time they express an ambivalent attitude towards the risks brought by artificial intelligence. The research problem in this paper is therefore formulated as the question: how do attitudes, risk perceptions, and behavior jointly shape the adoption of AI among generations X, Y, and Z? Previous findings suggest that the relationship between usefulness and use is robust, but that it can be mediated by trust and modified by perceived risks and generational identity — for example, greater exposure to synthetic content can increase risk perceptions and lower trust, especially in older cohorts. The aim of the paper is twofold: to identify key predictors of AI adoption (perceived usefulness, trust, perceived risks, knowledge/AI-efficacy) and to examine generational differences in actual use.

2. THEORETICAL FRAMEWORK

2. 1. TECHNOLOGY ACCEPTANCE MODEL AND EXTENSION – RISK-TRUST DIMENSION

The Technology Acceptance Model (TAM) is one of the most commonly used theoretical frameworks in the analysis of how people accept and use technologies in different contexts. Davis (1989) through TAM highlights two key elements in observing the behavior of an individual in accepting and using information technologies, namely the perception of usefulness and the perception of ease of use. The perception of usefulness refers to the belief that the technology will improve the efficiency or quality of task performance for the individual, while the perception of ease of use indicates the extent to which the user expects the technology to be easy to use. In recent years, the TAM model has been expanded with additional variables that include social influence and cognitive processes such as subjective norms, attitudes, trust, risk perception and user empowerment, which further explains the variations related to the perception of usefulness. In the context of modern digital technologies, such as artificial intelligence, TAM has once again proven to be applicable (Venkatesh & Davis, 2000; Ibrahim et al., 2025). Perceived usefulness is confirmed as a predictor of intention and frequency of use, and perceived ease of use is operationalized through digital literacy, but also self-efficacy. Empirical findings confirm that perceived usefulness is the most robust predictor of intention to use technology, while perceived ease of use acts indirectly, amplifying the effect through user satisfaction and motivation, especially in the education sector and

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among academic staff. The application of TAM in AI research shows the complexity of acceptance across generations. Ibrahim et al. (2025) analyzed the acceptance of AI using an extended TAM, with a special emphasis on the role of trust and risk perception. Their results demonstrate that younger generations (members of generations Y and Z) perceive AI to a greater extent as a useful and reliable technology compared to generation X, which is more likely to emphasize risks, such as security issues, information manipulation, and ethical dilemmas. This indicates a clear generational divide in the acceptance of innovative technologies, leading to the need for targeted education to increase trust and reduce perceived risks, especially among older age groups (Ibrahim et al., 2025). Zaremohzabieh et al. (2025) conclude that family and social contexts shape different motivations and approaches to AI technologies. Younger generations often perceive AI as an aid in everyday tasks, activities, and entertainment. Older generations are skeptical of AI and fear losing control over data and the decisions that AI systems make. Recent scientific works increasingly indicate that trust is a key factor that needs to be integrated into an extended version of the TAM model, especially when it comes to complex and automated systems based on artificial intelligence. Trust then strengthens the acceptance of technology and significantly reduces the perception of risk, as well as reducing ethical dilemmas associated with autonomous decision-making by the system (Gupta & Blanco-Mesa, 2023); Musa et al., 2024). Gupta et al. (2023) points out that TAM models and their extensions continue to dominate research on technology acceptance, but there is a clear need to upgrade the models to better address the specificities of new technologies such as AI, especially with respect to different demographic groups such as generations. Such an approach allows for understanding not only the functional aspects of the technology but also the broader social, psychological, and ethical framework of people's interactions with advanced AI systems (Gupta et al., 2023; Ibrahim et al., 2025). TAM remains key to considering technology acceptance, but in the context of artificial intelligence it should be expanded to include trust, perception, and generational differences in perception and use. Continued research on these dimensions will enable the development of more effective strategies for user education and optimization of the implementation of AI systems in different segments of society.

2.2. GENERATIONAL PERSPECTIVES

Starting from the work of Karl Mannheim (1952), generational divisions represent a conceptual framework for understanding the differences that members of these generations form through common socio-historical experiences. These experiences influence their personal values, attitudes and behaviors within the social cohort. In current research, looking at the generations that dominate the labor market, three generations are often distinguished - Generation X (born between 1965 and 1980), Generation Y (born 1981-1995) and Generation Z (born between 1996 and 2012), but it is emphasized that the boundaries are variable in years. Recent research warns that differences between generations may stem from life cycle or influences rather than generational traits (Schroder, 2023). Considering the concept of artificial intelligence, the degree of media and digital literacy and specific values, understanding the differences according to generations becomes crucial. Their characteristics are significant for the analysis of perception and acceptance of artificial intelligence (Prensky, 2001; Berkup, 2014). Generation X grew up in a time of significant social and political changes, and was also faced with an economic crisis (Jorgensen, 2003). It also witnessed the transition from the analog to the digital age. Generation Y experienced the rapid development of the Internet, social networks and smartphones and is considered the first truly digital generation that integrates technology into all aspects of life (Pew Research Center, 2019). Their early years were marked by a difficult situation on the labor market (Winograd, 2018). Generation Z, known as the iGeneration, grew up in a fully digitized world, marked by the COVID-19 pandemic, climate and political changes, but also the constant availability of information via smartphones (Seemiller & Grace, 2019). Current empirical research shows that the perception of AI differs across generations, with Kozak et al. (2024) showing that age is associated with trust in artificial intelligence, and higher technological competence and use predict higher levels of trust. Younger generations (Y and Z) show more frequent use, while older generations (X) seek transparency and reliability. Mistrust and negative risks towards AI are more pronounced among Generation X than among younger generations. (Diel et al. 2024).

3. HYPOTHESES AND METHODOLOGY

The research instrument was an online survey questionnaire. The questionnaire was distributed via social networks and emails, with clear instructions about anonymity and the purpose of the research. Data were collected during 2025 in the area of northwestern Croatia. The Google Forms tool was used to conduct the survey. The software packages SPSS and Excel were used to process the data. Descriptive statistics methods were applied, HI square test and Cramer's V test. Three hypotheses were set:

H1: Perceived usefulness positively predicts the frequency of AI tool use, with this relationship being stronger when task technology fit is high and weaker or insignificant when it is low.

H2: Higher perceived riskiness of AI negatively affects trust in AI, and perceived transparency (explainability) moderates this relationship by reducing (mitigating) the negative effect of riskiness.

H3: Knowledge about AI positively affects AI acceptance, and technological self-efficacy moderates this effect so that the effect of knowledge is stronger at higher self-efficacy and weaker or insignificant at lower self-efficacy.

The hypotheses were operationalized in a survey instrument with the aim of quantitatively examining the attitudes of individuals.

4. RESULTS AND DISCUSSION

The survey was completed by 101 respondents, of whom it can be seen that 34,7% of respondents were male, while 65,3% were female. When asked which generation they belong to, 32,7% stated Generation X (1965-1980), 33,7% stated Generation Y (1981-1996), while 33,7% stated Generation Z (1997-2012). When asked what their level of education is, 2,0% stated primary school, 16,8% stated high school, 28,7% stated undergraduate studies, 46,5% stated graduate studies, while 5,9% stated postgraduate studies. When asked what their employment status is, 21,8% stated student, 40,6% stated employed - private sector, 25,7% stated employed - public sector, 4,0% stated self-employed, -entrepreneur, 6,9% stated unemployed, while 1,0% stated retired (Table 1).

H1: Perception of usefulness positively predicts the frequency of use of AI tools, with this relationship being stronger when task suitability is high, and weaker or insignificant when task suitability is low. From the answers to the survey question "Do you think that the use of artificial intelligence is useful nowadays?" It is evident that all generations find AI useful. Generation X 87,9%, Generation Y 88,2% Generation Z, 97,1% (Table 2.). So Generation Z sees the greatest benefit from AI. When we look at the graph of results of which industries you think can be improved by using AI, we see that the most votes were received by Manufacturing, Healthcare, Education and Entertainment, while Agronomy, Sales, Military, Legislation and Politics received fewer votes regarding the room for improvement (Figure 1.). Table 2. shows that differences between generations regarding attitudes toward artificial intelligence were examined using the chi-square (χ^2) test of independence. This test was applied because both the independent variable (generation) and dependent variables (attitudes and perceptions related to artificial intelligence) were categorical in nature. Statistical significance was set at $p < 0,05$. The association between generation and self-assessed understanding of artificial intelligence was close to statistical significance and showed a small-to-moderate effect size (Cramér's $V = 0,27$), indicating meaningful generational differences in perceived AI knowledge. No statistically significant association was found between generation and general opinion toward artificial intelligence ($p = 0,523$). The effect size was small (Cramér's $V = 0,16$), suggesting largely similar attitudes across generations. Perceived usefulness of artificial intelligence did not differ significantly between generations ($p = 0,324$), with a small effect size (Cramér's $V = 0,15$), indicating a broadly shared perception of usefulness. Support for the further development of artificial intelligence showed no statistically significant generational differences ($p = 0,540$).

Table 1. Sociodemographic indicators,

		N	%
What is your gender	Male	35	34,7%
	Female	66	65,3%
	Other	0	0,0%
	Total	101	100,0%
What generation do you belong to	Generation X (1965-1980)	33	32,7%
	Generation Y (1981-1996)	34	33,7%
	Generation Z (1997-2012)	34	33,7%
	Total	101	100,0%
What is your level of education	Elementary school	2	2,0%
	High school	17	16,8%
	Undergraduate	29	28,7%
	Graduate	47	46,5%
	Postgraduate	6	5,9%
	Total	101	100,0%
What is your employment status?	Student	22	21,8%
	Employed - private sector	41	40,6%
	Employed - public sector	26	25,7%
	Self-employed - entrepreneur	4	4,0%
	Unemployed	7	6,9%
	Pensioner	1	1,0%
	Total	101	100,0%

Source: Authors' research

The observed association was weak (Cramér's $V = 0,19$). A borderline statistically significant association was observed between generation and the belief that artificial intelligence worsens daily life ($p = 0,050$), with a small-to-moderate effect size (Cramér's $V = 0,24$). A statistically significant association was found between generation and the perception that artificial intelligence can be harmful ($\chi^2 = 10,84$, $p = 0,004$), with a moderate effect size (Cramér's $V = 0,33$). This indicates meaningful generational differences in risk perception related to AI. Associations between generational groups and categorical variables related to attitudes toward artificial intelligence were examined using the chi-square test of independence. When expected cell frequencies were low, results were interpreted with caution. Effect sizes were assessed using Cramér's V to estimate the strength of associations. Values of 0,10, 0,30, and 0,50 were interpreted as small, medium, and large effects, respectively. Although most generational differences were not statistically significant, effect size analysis revealed small to moderate associations in several dimensions. In particular, perceptions of AI-related risks showed a moderate effect, indicating that generational belonging plays a meaningful role in shaping concerns about the potentially harmful consequences of artificial intelligence. This suggests that differences between generations may be more nuanced than significance testing alone indicates. The thing is that there are already certain solutions that have already been proven in practice from these industries in which further possible improvement has been recognized, on the other hand, when it comes to Politics, Legislation and Military, certain technical solutions encounter ethical and moral obstacles to the use of artificial intelligence. AI already has good results in pattern recognition solutions, which is important in recognizing diseases and weeds in Agronomy, in addition, using multi-criteria algorithms capable of recognizing trends within certain defined models, they are important for meteorological forecasting and disease diagnostics. The mentioned mechanisms are also important for the recognition of individual patterns and diagnostics in medicine, where artificial intelligence is used in diagnostics, reading medical findings, etc. Linguistic models are used in the generation of marketing and sales solutions, as well as in the entertainment industry. So, we can conclude that where artificial intelligence has already shown some progress in performing simpler tasks, that the respondents recognized the usability of the mentioned technology and that they accordingly assumed that further progress is necessary to make the AI algorithms more precise, faster and reliable, thus confirming hypothesis H1.

Table 2. Comparison of understanding, usefulness and use of AI with respect to the observed generations

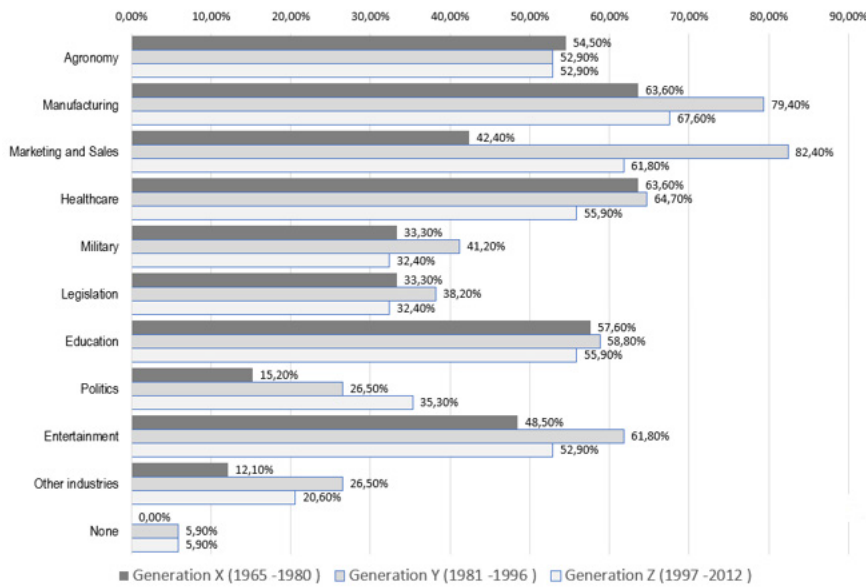
	Generation X (1965-1980)		Generation Y (1981-1996)		Generation Z (1997-2012)		Total		p	X ²	V
	N	%	N	%	N	%	N	%			
How would you describe your understanding of the term artificial intelligence?											
I am familiar with the term, and can describe such technologies in detail	5	15,2%	3	8,8%	10	29,4%	18	17,8%			
I am familiar with the term, and can describe such technologies relatively well	13	39,4%	21	61,8%	18	52,9%	52	51,5%			
I am familiar with the term, but my understanding of such technologies is limited	13	39,4%	9	26,5%	5	14,7%	27	26,7%	0,063	14,80	0,27
I am familiar with the term, but I do not understand such technologies	0	0,0%	1	2,9%	1	2,9%	2	2,0%			
I am not familiar with the term	2	6,1%	0	0,0%	0	0,0%	2	2,0%			
Total	33	100,0%	34	100,0%	34	100,0%	101	100,0%			
What is your opinion on artificial intelligence?											
Very positive	2	6,1%	2	5,9%	6	17,6%	10	9,9%			
Mostly positive	22	66,7%	18	52,9%	17	50,0%	57	56,4%			
Neutral	7	21,2%	11	32,4%	8	23,5%	26	25,7%	0,523	5,16	0,16
Mostly negative	2	6,1%	3	8,8%	3	8,8%	8	7,9%			
Very negative	0	0,0%	0	0,0%	0	0,0%	0	0,0%			
Total	33	100,0%	34	100,0%	34	100,0%	101	100,0%			
Do you think the use of artificial intelligence is useful nowadays?											
Yes	29	87,9%	30	88,2%	33	97,1%	92	91,1%			
No	4	12,1%	4	11,8%	1	2,9%	9	8,9%	0,324	2,25	0,15
Total	33	100,0%	34	100,0%	34	100,0%	101	100,0%			
Do you support or oppose the further development of artificial intelligence technologies?											
Fully support	16	48,5%	11	32,4%	12	35,3%	39	38,6%			
Partially support	13	39,4%	14	41,2%	13	38,2%	40	39,6%			
Neither support nor oppose	3	9,1%	7	20,6%	4	11,8%	14	13,9%	0,540	6,97	0,19
Partially oppose	1	3,0%	2	5,9%	4	11,8%	7	6,9%			
Fully oppose	0	0,0%	0	0,0%	1	2,9%	1	1,0%			
Total	33	100,0%	34	100,0%	34	100,0%	101	100,0%			
Do you think that using it will worsen or degrade our daily lives?											
Yes	8	24,2%	18	52,9%	15	44,1%	41	40,6%			
No	25	75,8%	16	47,1%	19	55,9%	60	59,4%	0,050	5,98	0,24
Total	33	100,0%	34	100,0%	34	100,0%	101	100,0%			
Do you agree with the statement: "The application of artificial intelligence can also be harmful"?											
Yes	28	84,8%	34	100,0%	34	100,0%	96	95,0%			
No	5	15,2%	0	0,0%	0	0,0%	5	5,0%	0,004	10,84	0,33
Total	33	100,0%	34	100,0%	34	100,0%	101	100,0%			

Source: Authors' research

H2: Higher perceived riskiness of AI negatively affects trust in AI, and perceived transparency (explainability) moderates this relationship by reducing (mitigating) the negative effect of riskiness. When answering the question "Do you agree with the statement: "The use of artificial intelligence can also be harmful?" it is evident that respondents are aware of the dangers that AI can cause (Generation Y and Z are 100% sure, (Figure 2.)), but still respondents do not believe that AI will worsen everyday life (Generation X 75,8%, Generation Y 47,1%, Generation Z 55,9%), similarly, from the answers to the survey question "Do you think that the use of artificial intelligence is useful today?" it is evident that all generations consider AI useful. Generation X 87,9%, Generation Y 88,2% Generation Z, 97,1%. This alone confirms the second hypothesis H2.

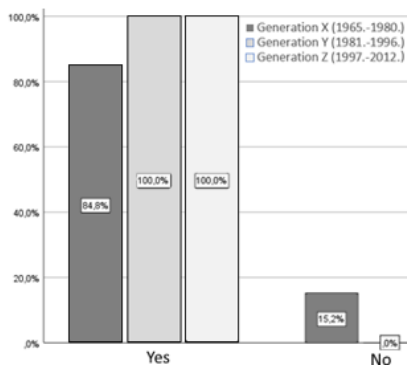
H3: Knowledge about AI positively influences AI acceptance, and technological self-efficacy moderates this effect so that the effect of knowledge is stronger at higher self-efficacy and weaker or insignificant at lower self-efficacy. The answers to the question "How would you describe your understanding of the concept of artificial intelligence?" show how individual generations expressed their understanding of AI. When we compare these results with the answer "What is your opinion about artificial intelligence?"

Figure 1. Which activities do you think could be improved by using AI?



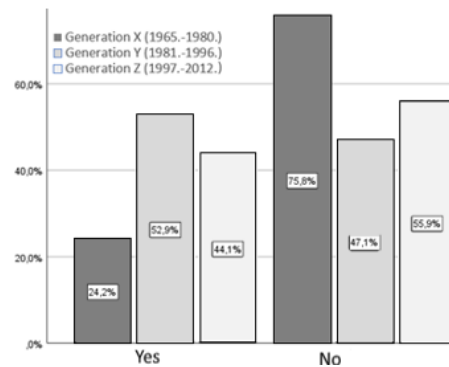
Source: Authors' research

Figure 2. Can the use of AI be harmful?



Source: Authors' research

Figure 3. Do you think that the use of AI will degrade everyday life?



Source: Authors' research

It is clear that where the answers to the first question about understanding AI are positive in relation to the answers to the second question, we prove the H3 hypothesis. Figure 3. shows what respondents think about whether AI will degrade everyday life, we see that generations X and Z think not, while generation Y thinks that it is possible. In general, knowledge and understanding of a particular technology reduces the uncertainty of the behavior of individual systems during operation and exploitation, reduces unexpected outcomes, and thus reduces the predictability of system behavior to the highest possible level.

5. CONCLUSION

This research paper, which included an extended technology acceptance model, provides insight into the predictors of artificial intelligence acceptance among generations X, Y, and Z through the prism of perception, usefulness, risk, and knowledge held by members of the generations, or respondents. While a high perception of usefulness is recorded, respondents also confirm that they are aware of the potential harms brought by artificial intelligence and the risks associated with disinformation. In addition to showing greater knowledge and more frequent use of artificial intelligence tools, respondents from generations Y and Z also show less skepticism compared to generation X. Confirmed hypotheses based on the analysis conducted indicate that perception across all generations is positive in the usefulness of artificial intelligence tools, and perception of risk reduces trust. The theoretical paper contributes to the literature through the application of the extended TAM model, especially in the context of the application of artificial

intelligence, regulatory regulations such as the EU AI Act, which should strengthen trust among users, and through transparency and ethical compliance. At the same time, it can be concluded that targeted education on AI tools is necessary for Generation X, aimed at reducing risk perception and strengthening digital literacy, and for younger generations, at responsible use, especially in the educational and entertainment fields, for which they most often use them. Despite limitations, primarily due to the limited sample, this work and the analysis of the research indicate the importance of generational perspectives and their understanding of AI. Future research should also include longitudinal studies, a larger sample of respondents from different fields, in order to better understand the long-term effects of technological advances on user behavior.

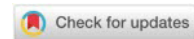
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THE DIGITAL MINISTRY IN THE REPUBLIC OF ALBANIA – POLITICAL CONTROVERSIES AND ECONOMIC MOTIVES

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Abstract: The unusual announcement by Albanian Prime Minister Edi Rama regarding the establishment of an executive branch featuring an “artificial minister” soon became official with the formation of Albania’s new government in September 2025. This visionary idea inspired research into the socio-economic rationale, legal-technical feasibility, and political implications of a virtual form of governance. The development dynamics of advanced generations of artificial intelligence should not be ignored; rather, they should be analyzed as products of imaginative engineering. The main intention of the authors of this paper is focused on evaluating both the initial motivations for starting the process of digitizing public administration in the Republic of Albania and the rational elements of political resistance to the implementation of these innovations, taking into account, above all, the complex normative assumptions of its unhindered existence in legal life. The methodological framework of this paper begins with a dogmatic-normative analysis of the initial case and subsequently applies axiological and sociological research instruments. Through a joint effort, the authors explore the potential prospects of such technological intervention in the sphere of state administration, assuming that the idea of an automated government might one day become reality. A retrospective glance at the late 20th and early 21st centuries, marked by the rapid growth of modern technologies, reminds us that societies must be prepared for the challenges these innovations bring. The complacent expectation that such a future lies far ahead - and therefore merits little attention - reflects a broader unwillingness to face change and a latent fear of the unknown.

Keywords: *artificial intelligence, state governance, public procurement, legitimacy, democracy.*

Field: Social Sciences

1. INTRODUCTION

Albanian Prime Minister Edi Rama introduced the idea of establishing an AI-driven government, thereby bringing artificial intelligence into an entirely new dimension. In anticipation of the first steps toward the formalization of this concept, Albania has already been widely discussed as the first country in the world that could inaugurate AI ministries - thus creating a precedent of global resonance. The news, announced in August 2025, initially sounded like a scene from a science-fiction film, especially given the reputation of a state that “carries the legacy of foreign occupation, dictatorial rule, and neglect” (Huisinga, 1998, p. 18). Since the beginning of its democratic transition in 1991, Albania’s fragile rule of law and pervasive corruption have been identified as its primary social problems (Cierco, 2014, p. 468).

Among the potential advantages of introducing AI into the executive branch are impartiality and transparency in combating corruption, as well as the country’s progress toward European Union accession. The goal certainly appears optimistic, considering that Albania ranks among the countries with a high corruption index (Eurostat, 2025) and that corrupt practices “pervade most of the country’s institutions” (Sikkema & Peci, 2010, p. 116).

That the Albanian Prime Minister is an atypical politician inclined toward eccentric behavior has become well-known to both Balkan and European audiences. Yet the question remains: is his conceptual projection of an AI-based government merely a performative political gesture? At the congress of the Socialist Party of Albania (of which Rama is the leader), the Prime Minister introduced Diella - the first minister in history created through artificial intelligence - assigning her field of activity to public procurement and tenders. What began as a party-stage message soon took a more serious path, culminating in the Presidential Decree of September 12, 2025, by which Rama was appointed Prime Minister following the completion of parliamentary elections (Dekreti për emërimin e kryeministrit, 2025). Thus, the legal nucleus of this innovation was initiated through the presidential act of appointing the Prime Minister, which carries a specific political weight, given that the AI entity Diella was mentioned in the very act that led to the formation of the central organ of executive power.

This brief factual overview opens questions about the constitutional and legal foundations of the conduct of executive officials. The issue here is not merely the extraordinary setting of a parliamentary

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session featuring the virtual presence of Diella, but rather two legal acts: the presidential decree granting the proposed Prime Minister the authority to establish an AI minister, and the Prime Minister's proposal of the new cabinet composition.

According to the constitutional framework, the head of state is obliged to appoint a Prime Minister based on the proposal of "the party or coalition of parties holding the majority in the Assembly" (Kushtetuta e Republikës së Shqipërisë, 1998, Art. 96). In accordance with Article 98 of the Albanian Constitution, the President of the Republic - again on the proposal of the parliamentary majority - submitted to the Assembly a decree with the proposed composition of the future government. Since Diella was not included in the list of proposed ministers, the question arises whether the President possesses the right to instruct or shape the cabinet composition beyond the formal proposal containing the precise names of ministerial candidates. There is little doubt that by mentioning the AI minister, the President implicitly accepted the proposal of the parliamentary majority, thereby - at least in our view - acting beyond the constitutional framework. The act of appointing the Prime Minister is of a strictly formal character and represents the legal expression of the functioning of central political institutions. Such matters must be regulated in a way that precisely defines and limits the powers and responsibilities of the highest officials of both the executive and representative branches.

Furthermore, Article 5 of the Constitution of the Republic of Albania stipulates that only an adult citizen of Albania (18 years of age or older) may be elected to office. The appointment of a minister constitutes the exercise of passive electoral rights, which presupposes the fulfillment of constitutional requirements - conditions that a virtual "person" obviously cannot meet. It should also be noted that the weaknesses of Albania's representative system "stem from the fragility of constitutional concepts, norms, and institutions, indicating that the Constitution - despite progress - has not yet become an undisputed reference point for politics and citizens alike" (Krasniqi, 2018, p. 1).

2. ECONOMIC VS. POLITICAL MOTIVES OF THE DIELLA PROJECT

Even in its initial stages of institutional emergence, the Diella project revealed numerous potential applications of artificial intelligence „in enhancing administrative transparency and controlling public expenditures“ (Aldemir & Uçma Uysal, 2015, p. 15). Current socio-political debate in Albania focuses on the multifaceted challenges related to the adequacy of the normative and institutional framework to properly absorb such an ambitious project as the digital ministry. Meanwhile, a deeper analysis of the reasons for its introduction into the system of public management remains in the background. Perhaps more than the idea of installing a digital minister as an institutionalized component of top-level public-sector management, what captured public attention was the "location" of this political experiment. Consequently, attempts to decipher the genuine economic and/or political motives behind its realization in an economically fragile, technologically underdeveloped, and corruption-burdened post-transition Balkan economy have become increasingly relevant.

According to the Corruption Perception Index, Albania (alongside Ghana) ranked 80th out of 180 countries included in the 2024 survey (Transparency International, 2024). The country's efforts, as an EU candidate, to demonstrate tangible results in fighting corruption remain heavily constrained by its decades-long communist legacy - under which the very term corruption was "virtually non-existent and used only marginally and rarely" (Kajsiju, 2013, p. 1009).

In principle, several logical economic and political motives can be isolated to explain the Albanian government's promotion of the digital ministry concept. Some relate to the potential performance of the digital instrument itself, while others stem from the specific characteristics of individual political actors and the broader socio-political environment in which such an innovation is to operate.

First and foremost, given that the digital ministry was conceptually positioned within the field of public procurement, it is understandable that its proponents emphasized the goal of curbing widespread and highly complex corrupt practices in this domain. The area of public procurement, both in Albania and in other post-transition economies of Southeast Europe, has long represented the epicenter of deeply entrenched corruption. In states where the rule of law is degraded, such practices have shown remarkable resistance to various reform attempts initiated by political actors.

Public procurement in Albania was first regulated by law in 1995. However, in the following decade, it became evident that the effective and independent application of legislative solutions remained more a matter of political populism than of genuine enforcement (Kashta, 2020). Thus, the intention to introduce an automated managerial authority precisely within the domain of public procurement appears, at least at first glance, entirely logical. The sector already rests upon a well-developed legislative framework, rich in technically precise provisions, which offers an excellent foundation for algorithmic reasoning - and

thereby a positive indication for the introduction of automated decision-making models. Nevertheless, even in the realm of public procurement, the “substance” of algorithmically generated decisions would have to transcend the content, purpose, and objectives of the existing legal norms - raising the problem of “decoding” the concept of public interest.

Beyond the specificities of the legal framework, which relatively align with the idea of digitalization, public procurement is also an obvious choice for another reason. Globally, public managers increasingly seek to align taxpayer money allocation with the triad of principles known as value for money - efficiency, effectiveness, and economy (Glendinning, 1988). The operationalization of this principle relies on the establishment of measurable indicators for decision-making performance, which are far easier to process algorithmically in procurement procedures than in other domains of public decision-making.

However, the declared aim of eliminating corruption in public procurement - the central official justification for introducing the digital ministry - can also be analyzed from a different perspective. From this viewpoint, the seemingly positive economic motives of the Diella project are overshadowed by certain unintended political effects. Drawing on the premises of the well-known public choice theory, the Diella project can be understood as a specific political product - designed, like all political products, to generate favorable perceptions among the so-called “median voter.” Its theoretical compatibility with proclaimed economic and political objectives in combating corruption makes the project an affirming political artifact that naturally appeals to the electorate’s rational expectations. Yet, the mere fact that a digital mechanism of governance is being inaugurated as a primary decision-making authority implicitly entails at least three unspoken „admissions“ by its political promoters: 1) that the existing human holders of managerial functions in the given sector are insufficiently competent to achieve the expected results; 2) that no other politically credible individual within the ruling elite can be found to meet these objectives; and consequently, 3) that corrupt behavioral patterns are so inherent to human nature that it is no longer worthwhile to entrust decision-making in corruption-sensitive fields to human agents at all.

Viewed together, these admissions transform the digital ministry - as a political product - into its own relative antithesis.

3. AI, DEMOCRACY, AND STATE GOVERNANCE

The experiences of transition and post-transition economies demonstrate that “surveillance capitalism challenges democratic norms and fundamentally diverges from the centuries-long evolution of market capitalism” (Zuboff, 2015, p. 75). The Albanian project of an AI minister raises questions about the maturity of social experience with representative democracy, where the “popperian dilemma - partocracy or democracy” - emerges as one of the central issues of scholarly debate (Ibraimllari, 2017, p. 90). It provokes reflection on the vulnerability of representative democracy in contemporary conditions: has society become oversaturated with the existing model of governance? Can the prevailing form of representative democracy withstand the growing crises of the established value system, which threaten the essence of freedom and the stability of peace both within and among states? Since 2018, there has been a steady rise in governmental strategies and programs dedicated to the development of AI and the identification of potential fields for its application (Bredt, 2019).

Let us therefore allow a bit of imaginative engineering to envision what democracy might look like under the governing power of artificial intelligence. Without attempting a theoretical definition of democracy, for the present context we can isolate two of its key identifiers: participation and information.

Understood as the rule of the people, democracy implies the participation of all, a majority, or at least a portion of the community’s members in decision-making processes. It can by no means be reduced to a mere “organizational framework.” The numerical scope of such participation depends on the specific model and the prescribed rules for the validity of direct popular involvement (elections, referenda, citizens’ initiatives, etc.). In modern political systems, elements of direct participation are introduced as attempts to legitimize representative democracy, given the practical impossibility of realizing the Athenian ideal of direct deliberation. In this respect, the Republic of Albania is no exception: its Constitution provides that popular sovereignty is exercised through elected representatives or direct participation (Article 4), although in practice, “popular sovereignty remains unimplemented in Albania and far removed from reality” (Tafari & Sina, 2020, p. 186).

Artificial intelligence, however, offers the potential for an enhanced level of immediacy through virtual models of participation by all community members. This may be viewed as a significant initial advantage of introducing advanced technology into the very nucleus of democracy. The opportunity for all citizens to participate directly in decision-making processes already exists in the current political framework - but is rarely exercised.

Naturally, the same factors that reduce citizens' participation in traditional democratic processes could also be expected in the digital environment. Yet, it is plausible to assume that the number of participants would increase under conditions of digital voting, thereby raising the representativeness of political processes. This, of course, presupposes the establishment of a reliable, verifiable, and strictly controlled system - what might be termed, for present purposes, "political artificial intelligence." Citizens must trust that the parameters of the software used for voting meet the democratic standards of universality, secrecy, and direct personal choice. "However, even if the conditions of digital literacy among voters and the political neutrality of the e-voting system are simultaneously met, the question remains whether electronic voting truly enhances the quality of the democratic process through higher turnout. It is worth asking what the nature of that improvement is, since the causes of civic apathy and insufficient representativeness in modern democracies are far deeper and more complex than could be remedied by technical conveniences such as voting from home or weeks in advance" (Marković, 2023, pp. 440–441).

The citizens' level of information regarding the issues on which they express opinions provides the foundation for the democratic value of political processes. The availability and truthfulness of relevant information directly affect the objectivity and quality of political outcomes.

Technology companies that design algorithms targeting the electorate possess the power to influence voter preferences - and consequently, election outcomes. The intertwining of politicians and these corporations creates fertile ground for covert pacts and the subversion of freedom as a fundamental democratic value. "If a handful of giant corporations can suppress or marginalize the convictions of large segments of the citizenry, political life becomes less pluralistic and less democratic" (Volokh, 2025, pp. 273–274).

In academic reflections on the phenomenon of artificial intelligence, it is no longer uncommon to find views that characterize this technological leap as a hostile creation and a threat to democracy, insofar as it is fundamentally aligned with technocracy (Risse, 2023). Starting from the notion that "there are two types of trust - interpersonal and social" (Schneier, 2025, p. 29), and that these categories are often conflated, it must be emphasized that strengthening social trust is vital for the acceptance of AI mechanisms. When it comes to state governance, artificial intelligence deserves to be treated as a high-risk domain. Based on the experience of modern public administration, the control of financial flows - and of those who manage them - represents one of the greatest challenges faced by both national and global economies. Accordingly, one must be concerned about the direction in which a community may evolve if governance were to be entrusted to artificial intelligence. "The rule of AI threatens to further concentrate power in the hands of unaccountable bureaucrats, technocrats, and, in some cases, autocrats" (Schmidt, 2024).

Moreover, the political art of governance cannot be reduced to a purely technical endeavor. Decision-making in politics is not a simple operation; it involves a complex interplay of unpredictable variables inherent to the richness of political life. Often, the pursuit of the public interest requires political compromise to maintain social balance - an inherently human capacity that remains beyond the reach of algorithms, at least at their current level of development.

When it comes to emerging technologies, the legal function of maintaining social order has been partially eroded, as laws are increasingly described as "outdated" (Jammet, 2014, p. 2). The rapid development and application of generative AI have outpaced traditional regulatory mechanisms, creating an urgent "need for comprehensive governance frameworks" (Vatamanu & Tofan, 2025, p. 6). Given that AI solutions depend on the data fed into their "intellectual reservoirs," the key question becomes the nature and quality of that data - particularly with respect to political instrumentalization - and the need for an effective legal framework to regulate it. As "artificial intelligence is supplied and guided according to the planned value assumptions set at the beginning of the process by humans - that is, by the governing system itself" (Đorđević & Matić, 2025, p. 97), the insertion of value-laden data is inevitably a source of conflict, since its political coloring poses the main challenge to the impartial and objective conduct of a digital government.

It is important to distinguish between two fundamental types of values within a legal-political order. The first consists of those universally accepted through constitutional compromise, representing a firm societal consensus. In a modern constitutional state, the foundational data that AI would use as core societal values derive from the constitution itself: democracy, free elections, human rights, equality, popular sovereignty, social justice, free markets, the separation of powers, and judicial independence. The second type of values is determined by the shifting political will of the people - a variable category. "In a democratic state, governments responsible for gathering and acting upon public opinion must establish and implement policies in accordance with the public will. However, determining an objective method to confirm which laws or policies genuinely reflect that will remains a challenge" (Kim, 2024, p. 547). The

expression of the popular will is cyclical, shaped by elections that direct the course of social development. Yet, an AI system would likely reject positions that contradict or threaten the established framework of foundational constitutional values. The dominant electoral will, embodied through parliamentary majorities, constructs the operative instruments for implementing political programs. Within this context, the imperative of strengthening Albania's fragile civil society must not be overlooked, as it "stands between the individual, the state, and the market, mitigating negative political trends, creating social capital, and nurturing new values and traditions" (Shehaj, Krashi & Gjonaj, 2017, p. 430).

The case presented in Albania raises a series of not only constitutional but also numerous other legal dilemmas. To begin with, it is reasonable to inquire into the legal personality and legal responsibility of an "artificial minister," which represents a serious challenge. The well-established experience of legal civilization, whereby human beings are the original holders of legal personality, is not undermined by the fact that objective law grants personality to legal entities as artificial constructs. However, an "AI minister" confronts the legal order with practically unsolvable challenges—ones that legal theory, legislation, and legal practice must jointly attempt to address. Contemporary legal approaches "call into question the central role of the human subject in law, suggesting that artificial intelligence may function as a legal actor within hybrid governance systems" (Minghirasi, 2025, p. 88).

Furthermore, the question arises as to how the activities of an "AI minister" could be legally and technically harmonized with a key principle of modern European data protection legislation: "individuals have the right not to be subject to decisions based solely on automated processing, including profiling, if such decisions produce legal effects or similarly significant impacts" (Minghirasi, 2025, p. 89). The "Albanian case" is, in fact, an example of a project expressly designed to automate decision-making in the governance of certain state activities.

The legal controversy is further intensified by the problems that arise in the field of human rights protection. "These systems may have a profound impact on individuals' lives. Their inadequate application can undermine fundamental rights, such as the right to social protection, non-discrimination, human dignity, or an effective legal remedy" (Cvetković, 2022, pp. 79–80). It is particularly important to emphasize that the classical understanding of discrimination acquires a new dimension in the context of artificial intelligence. Earlier forms of discrimination—whether carried out by public authorities or private actors—were relatively easy to detect, whereas potential algorithmic discrimination is characterized by a higher level of opacity, making it significantly more difficult to eliminate. "Unlike rule-based systems, where decisions can be traced, machine-learning systems often cannot provide a clear causal link between input data and resulting outcomes... which essentially means that identifying discriminatory patterns or contesting erroneous reasoning becomes nearly impossible" (Lendvai & Gosztonyi, 2025, p. 10).

The automation of legal decision-making processes is classified as high-risk artificial intelligence because of the danger that society might become the object of inadequately controlled algorithmic mechanisms. Attention should also be drawn to the risks associated with the allocation of sources of legal authority, for such power could shift from the social sphere to the ownership capital of the creative industries behind advanced generations of contemporary technology. However, in a foreseeable future, the pendulum of political influence on the law may swing "directly into the hands" of those who possess the largest concentrations of digital capital, resulting in the erosion of the democratic capacity of the legal order.

4. CONCLUSION

The official introduction of the idea of an AI minister in the Albanian government marks 2025 as the beginning of a new phase in the evolution of modern technology. The pendulum of technological innovation is now swinging toward the governance of the state and society, signaling the emergence of new centers of power. The fact that the promoter of this idea is a statesman known for his atypical political behavior may suggest that the initiative represents a marketing maneuver aimed at supporting Albania's accelerated path toward European integration. Implicit in this, however, is a hidden acknowledgment that the state lacks the human resources to effectively confront corruption - the country's most pressing problem and the chief obstacle on its road to the EU.

Nonetheless, this should not deter us from contemplating the potential perspectives of "political artificial intelligence" and its possible impact on governance processes. The use of digital methods in certain states has already demonstrated how technological innovation can influence the very structure of modern democracy. It may reasonably be assumed that systems of online voting could gradually mitigate the problem of indifference of citizens toward electoral participation. For this to happen, however, voters must first have confidence in the preservation of democratic principles - directness, secrecy, and equality

- as well as in the authenticity of official election results. Equally important is the level of trust in the state that organizes elections and in the expectation that political actors will not betray the citizens' faith in the fulfillment of campaign promises. Can artificial intelligence foster such trust?

Judging from current experience with tools of "political artificial intelligence", their role has largely been limited to that of auxiliary technical instruments, with little observable contribution to enhancing the democratic capacity of political processes. We maintain that the democratic quality of social life depends on citizens' trust in government, through which state authority attains legitimacy.

The automation of governance decisions through advanced technological tools presupposes that citizens possess sufficient knowledge to understand how these systems operate. A lack of both general and individual digital literacy undermines the principle of equality - an indispensable element in the process of establishing democratic legitimacy.

Accordingly, it is essential to establish an appropriate legal framework to regulate the reliability, accountability, transparency, and acceptability of "political artificial intelligence," whose algorithms must not contain "black boxes" or generate hallucinatory outcomes. Such problems are already observable in the use of advanced generative AI technologies and would be wholly unacceptable within the political domain. The impact of AI systems on democracy is of such magnitude that it must be treated as a matter of high institutional risk. The absence of trust in artificial intelligence - and in its capacity to promote democracy - further deepens crises of legitimacy and weakens public confidence in governance.

Summing up the research inspired by the idea of an AI minister in the Government of the Republic of Albania, and expanded through reflections on a hypothetically new model of state administration, it is reasonable to conclude that the dangers posed to democracy significantly outweigh the potential benefits of applying artificial intelligence within the political and administrative sphere of society.

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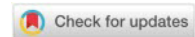
(UN) EQUAL POSITION OF BUSINESS ENTITIES IN PRACTICE – THE CASE OF SERBIA

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Abstract: Business entities in the Republic of Serbia are, by law, granted equal position, whether the business activity is conducted individually or collectively. Since the major reform of company legislation in 2004, there has been a significant increase in the number of newly established business entities, both entrepreneurs and companies. However, only a few years later, legislative changes placed entrepreneurs at a disadvantage compared to business companies. Moreover, small companies in practice face numerous challenges, due to which many of them cease operations and are removed from the business register. Although the conditions for establishing a business are relatively simple, access to sources of financing is quite limited. As a consequence, in many businesses, the personal assets of the owner of capital are confused with business assets. Besides that, bankruptcy and enforcement laws, in particular, fail to ensure equal treatment of business entities. As a final outcome, there is a high level of illiquidity among small businesses and an increased number of bankruptcies and liquidations. Therefore, it is necessary to consider legal instruments that would restore the balance between business entities established by the constitution and laws, but disrupted in practice. The aim of this paper is to highlight the need to restore equal treatment of all business entities in the Republic of Serbia — during establishment, operation, and voluntary or compulsory liquidation — through a fair and balanced legal framework. It will also propose possible legal solutions adapted to modern market trends and the harmonization of legislation with the EU *acquis*. The analysis employs normative, logical, comparative, and statistical methods.

Keywords: *business entities, legal position, equality, Republic of Serbia.*

Field: Social Sciences

1. INTRODUCTION

The freedom of enterprise belongs to the group of relatively early-won freedoms, in comparison to human and civil rights acquired just over two hundred years ago. As such, it represents a precursor to a free society and market. Since the adoption of the current Constitution of Serbia, but also during the validity of the previous one, Serbian legislation is based on a modern approach that guarantees the equality of all economic entities, regardless of the form of ownership. In the process of continuous modernization of regulations and harmonization with the legislation of the European Union, small business development strategies were adopted as the backbone of the domestic economy. Contrary to the proclaimed principle, in practice there are different situations in which business entities are treated differently. The difference can be seen both in legal regulations and in business. The number of such situations results in factual inequality. This is especially reflected in the approach to small businesses and entrepreneurs. In addition, they face the problem of illiquidity due to difficult sources of financing. Finally, when business entities are faced with difficulties in doing business, the legislator does not take into account their specificities, but treats them unequally. The analysis of this topic is based on the normative framework. Then, illogical phenomena in the legislation will be reviewed. In order to substantiate the presented theses with facts, a statistical data will be presented. Relatively little has been written about this topic in domestic legal literature. Also, there are only a few proceedings conducted, mostly without success, before the Constitutional Court of Serbia. Thus, the first part of this paper discusses the legal framework in the Republic of Serbia. The second part analyzes cases of inequality among business entities in law and practice. Finally, the third part focuses on proposals to mitigate such disparities and improve the legislative framework.

2. LEGAL FRAMEWORK OF BUSINESS ENTITIES IN THE REPUBLIC OF SERBIA

The legal framework for conducting business in the Republic of Serbia is based on the Constitution from 2006 (Art. 82–86 Constitution of the Republic of Serbia). Specifically, it stipulates that all participants have equal position in the market; that it is prohibited to restrict free competition contrary to the law by

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creating or abusing a monopolistic position; and that foreign persons are equal to domestic ones in the market (Art. 84, Constitution). Furthermore, the Constitution guarantees equality of all forms of ownership. In addition, Serbia has adopted numerous international standards and, since 2012, has been formally obliged to harmonize its legislation with the legal framework of the European Union. The EU *acquis* is based on the principle of a free market where all participants are equal (Art. 28 to 37 of the TFEU). Specifically, Chapters 6 and 8 of the EU *acquis* relate to company law and competition policy, respectively.

The modernization of legislation began with the adoption of the Law on Business Companies in 2004. However, it was only the first step and in 2011 a new Law on Business Companies was adopted. This law regulates the legal position of companies (legal persons) and other forms of organization, especially their establishment, management, status changes, changes in legal form, termination and other matters of importance for their position, as well as the legal position of entrepreneurs (natural persons as business entities) (Art. 1 al. 1 Law on Business Companies). Building on the constitutional framework, the Law on Companies of 2011 plays a key role. However, the question in the practice remains whether legally proclaimed equality really imply the absolute equality of all business entities.

3. UNEQUAL POSITION OF BUSINESS ENTITIES IN PRACTICE

As it is mentioned above, the Constitution of Serbia proclaims the equal legal position of economic entities on the market. However, practice in the Republic of Serbia provides many examples of unequal treatment of business entities. This inequality stems not only from differing legislative approaches but also from a combination of legal and factual disparities. Legal inequality can be observed through company law, contract law, competition law, accounting regulations, and bankruptcy law.

Unequal treatment appears already at the stage of establishment and registration. The fixed registration costs do not take into account the entity's legal form, size, or financial capacity. Entrepreneurs and micro-enterprises find it difficult to obtain financial resources for starting a business, so they are already faced with serious costs in the initial phase (Serbian Business Registry Agency, Fees for establishing a business company, 2025). Especially, parafiscal duties represent an important burden. Taxes and contributions on wages are a high burden on incomes and amount to almost 64 %. In Serbia, almost 30 % of small business entities cease to exist already in the first year after their registration (Begović, 2022). These factors burden new and small enterprises and often follow them until they cease operations.

After registration, particularly new businesses face the absence of systemic investment and incentive programs, despite the growing number of registered start-ups. According to research, 85% of small businesses in Serbia are started with their own funds (NALED, 2025). Namely, as a rule, commercial banks set strict conditions for the approval of loans, credits and other financial means to finance the start of business. They often require collateral, which new business entities cannot provide. In contrast to them, larger and well-established companies do not have such a problem, because they can provide various means of security for loans and credits (Serbian Business Registry Agency, Info Graphics, 2024).

With the Law on Companies 2012 allowing for the establishment of limited liability companies with a minimum founding capital of only 100 dinars, distrust arose among creditors, especially banks, to provide financing without solid collateral — something small and new businesses typically lack (Art. 145 Law on Companies). This made it easier to legally establish business companies. However, the founders are mostly persons without special assets intended for business. Often, their personal and business assets are not clearly separated, leading to reduced liquidity. This is especially important for commercial banks as potential creditors of financial assets (BizSrbija, 2025).

During business operations, the environment is frequently marked by legal uncertainty and unpredictability. Frequent regulatory changes are an example of it. Additionally, a trend of decreasing competition particularly harms micro and small enterprises. Micro, small, and medium enterprises, which form the largest category of business entities, face a legislative framework largely designed for large corporations, which make up less than 5% of all entities (Statistical Office of the Republic of Serbia, 2023). Legislation in Serbia only recognizes the difference between micro, small, and medium enterprises (MSMEs) in the accounting sense (Art. 6 Law on Accounting). It was only a few years ago, with amendments to the Bankruptcy Law, that such a difference was recognized in terms of prepayment of the costs of starting bankruptcy proceedings (Serbian Business Registry Agency, Info graphics, 2024). However, it is only one step forward in a number of challenges for MSMEs. Still, this is not a situation typical solely for Serbia; similar challenges exist in EU member states, where recent regulations aim to support MSMEs (Guerrera-Martínez, 2021, p. 56–58).

Furthermore, inequality exists between domestic and foreign business entities and their treatment. Subsidy programs often favor foreign investors in Serbia, while domestic businesses face numerous

administrative barriers or are effectively excluded. The EU required from Serbia to abolish by 2027 all direct subsidies to foreign investors (Stevanović, 2024). In this sense, foreign companies are given numerous tax incentives, in order to attract them to open their production and service provision in Serbia (Stjepanović, 2024).

Although the subsidies provided by the Government have been significantly increased and have a wider scope, they are often not affordable for small companies. In order for a company to receive incentives, it generally has to have higher production and a plan to hire more workers (Ministry of Economy, SMEs and Entrepreneurship, 2025). On the other hand, the incentives intended for smaller companies, especially in the field of agriculture and processing industry, are limited and many companies that are interested cannot get them (BizSrbija, 2025)

The price at which domestic companies get money is not a negligible factor in the whole situation, and economists generally agree on that. The reference interest rate is still relatively high, and one of the main problems for small businesses and business beginners is limited access to sources of financing, which is why it is necessary to include private domestic and foreign funds in the capital market (BizSrbija, 2025).

In 2023, the economy in Serbia increased its annual profit by 12%, to 972.4 billion dinars, but this growth was significantly weaker compared to 2022, when annual earnings were higher by a quarter. At the same time, there is an increasing concentration on the domestic market. Over two fifths of last year's total earnings were made by only one hundred companies. They had a profit of 576 billion dinars, and the five leaders realized more than half of that amount, while that share in 2022 was below 43% (Stjepanović, 2024).

Finally, Serbia's bankruptcy legislation treats business entities differently depending on their legal form. The Law on Bankruptcy applies only to legal entities (corporate bankruptcy) (Art. 1 st. 1 Law on Bankruptcy). The previous Law on Bankruptcy Procedures prescribed the bankruptcy of entrepreneurs, but those provisions were absent in the new law (Radović, 2017, p. 109-112). Serbian legislation does not recognize the bankruptcy of a natural person, whether it is an entrepreneur or a consumer (A. Sekulić, 2023, p. 528-529). Creditors' claims against entrepreneurs can only be enforced through civil execution procedures (Art. 30 Law on Enforcement and Securities). It often results in the seizure and sale of personal assets of entrepreneurs and small business owners — leading to their financial ruin and business closure. In this way, there is no legal possibility to recover their business and return to the performance of economic activity (Đurić, Jovanović, 2024, p. 141). This unequal treatment of different business entities is strongly supported by the banking sector in Serbia, as the current enforcement model best suits banks' interests.

Such situations found their outcome in several cases in the constitutionality assessment procedure of various legal regulations before the Constitutional Court of Serbia. Thus, in the last years of validity of the previous Constitution from 1990, proceedings were initiated in connection with the equal position of business entities in the performance of public transportation of passengers and goods. The aforementioned Constitution regulated the equal position of economic entities in a similar way as the valid one. In the specific case, the special conditions set by the Law on the Transport of Passengers in Road Traffic (1995) for the performance of a certain type of this transport were disputed. The Constitutional Court of Serbia then assessed that the aforementioned provisions of the law are not incompatible with the Constitution, because the legal regulation of the conditions for the performance of activities is within the scope of the legislative body's authority. Namely, this includes regulating the conditions for performing activities and the rights and obligations of companies and entrepreneurs who perform economic activities. In addition, the legislator is authorized to assess the nature and importance of the relationship in question, the effects that are intended to be achieved thereby and the social justification of regulating such relationships. Therefore, according to the position of the Constitutional Court, by prescribing special legal conditions for economic entities that are in the same legal situations, the principles of free, independent and equal performance of economic activities, under equal conditions, are not violated, nor are such economic entities placed in an unequal position on the market in relation to others in the same activity. Finally, the Constitutional Court of Serbia took the position that the principle of equality, i.e. equality in the management of companies and other forms of organization, does not imply their absolute equality. That principle implies that economic entities enjoy an equal legal position in terms of business conditions in the same types and forms of economic activity, bearing in mind the specific form of activity. Prescribing special conditions for the performance of certain forms of concrete activity is a consequence of their character and specificity, which are regulated by law (Const. Court Dec. 2004.)

4. RECOMMENDATIONS FOR REDUCING DISPARITIES

To avoid an exclusively critical analysis of laws and practices in this paper, it is necessary to consider possible solutions. These solution should mitigate in the short term all effects resulting in unequal position of business entities in the practice and in then, in the longer term reduce the inequality to the legally acceptable level.

Among important steps, in the future, proportional regulation of fixed establishment costs should be considered. That will allow the small businesses to concentrate their finance to the planed start business activity. For new entrepreneurs, systemic investment programs in start-ups would be of great importance. Such a program should be provided not only by the state, but by the business banks, which would unburden the state budget. Besides, the establishing the special business development bank would stimulate business support. Additionally, the formation of cooperatives among small businesses in the same sectors could strengthen competitiveness of their operations. This is especially important for domestic business facing the strong foreign competition.

Regarding the company law reform, along with the existing legal form of the limited company, an additional form with the higher capital requirement. This would allow to select small business forms with the available capital from those lacking capital for starting the business (Đurić, Jovanović et al., 2024, p. 59). Introducing new models of cooperatives, would allow small business to acquire new customers and markets. Finally, the adoption of unified bankruptcy legislation for all business entities would allow entrepreneurs to reorganize their businesses when facing probable or imminent insolvency (Vallender 2021, S. 202).

5. CONCLUSION

Based on the above, it can be concluded that although the Constitution of Serbia guarantees equality among business entities, the legislative framework built upon it maintains both legal and factual inequalities. These factual inequality leads to the relativisation of the proclaimed legal equality of economic entities. They are evident in company law, contract law, competition law, accounting, and bankruptcy legislation. However, the principle of equality, does not imply their absolute equality. That principle implies that economic entities enjoy an equal legal position in terms of business conditions in the same types and forms of economic activity, bearing in mind the specific form of activity. Therefore, prescribing special legal conditions for the performance of certain forms of concrete activity is a consequence of their character and specificity. Experience shows that while the legislative system is largely designed for large companies, it is precisely these entities that most often seek financial assistance from the state budget — funded by all business entities. Conversely, the state rarely, if ever, provides support to small businesses. It is necessary to restore an equal treatment of all business entities in the Republic of Serbia — during establishment, operation, and voluntary or compulsory liquidation — through a fair and balanced legal framework. Therefore, it is essential to reduce the legal inequalities between small and large business entities and to ensure equal rights for all. Justice will reach everyone — sooner or later.

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HUMAN RESOURCES IN THE MEDIA: CONTINUOUS EDUCATION AS A KEY TO CONTEMPORARY BUSINESS

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Abstract: The rapidly growing media industry operates under conditions of constant and dynamic change within a highly competitive environment, which constitutes a key prerequisite for its survival and further development. In this context, organizations are increasingly focusing on strategic human resource management, particularly in the areas of recruitment and retention of qualified personnel, as well as on enhancing overall employee productivity. Changes in the contemporary world of work, driven by the development of new technologies, tools, and methodologies, render continuous learning a necessity, as relevant skills quickly lose their currency. At the same time, the achievement of organizational goals requires a workforce capable of adapting to market changes, with human resources management playing a crucial role in anticipating competency gaps and planning training activities. Moreover, continuous education contributes to attracting and retaining talent, as modern employees increasingly value opportunities for professional development and career advancement.

Primary research was conducted to examine the extent to which institutional practices of education and professional development in media organizations contribute to the development of employees' professional competencies, their adaptability to contemporary professional demands, and their alignment with strategic objectives and professional standards. The research sample was based on purposive sampling and included employees of media organizations in the Republic of Serbia ($n = 274$). Data were collected between December 2025 and January 2026. The findings demonstrate that continuous education has a dual effect in the media sector: it increases employee motivation and strengthens the capacity of media organizations to adapt to market changes, which has significant implications for strategic human resource management in contemporary media.

Keywords: *human resources, media, education, competencies, professional development*

Field: Social Sciences

1. INTRODUCTION

Continuous education and professional development of employees within the contemporary media system constitute one of the most important segments of human resource management in media organizations. Changes in media content production processes, digital platforms, and the normative framework of media discourse necessitate the ongoing development of professional competencies and the capacity for professional adaptation among media employees. The development of employee competencies, including those of media professionals, is based on the integration of formal, non-formal, and informal learning, implemented through internal educational programs, specialized training, mentoring, and work-based learning. These mechanisms contribute to the enhancement of employees' technical, analytical, and ethical competencies, as well as to the strengthening of organizational efficiency. In this regard, Becker et al. (2006) observe that major U.S. daily newspapers tend to employ only experienced journalists, suggesting that media organizations will need to invest in training if they wish to ensure that more experienced journalists keep pace with technological advancements.

Contemporary human resource development is shaped by interconnected trends that significantly redefine the role of the HR function. Digitalization and the adoption of HR technologies, including analytics, applicant tracking systems, and employee engagement platforms, enable data-driven decision-making and improve the efficiency of HR processes. At the same time, the growing focus on employee experience, well-being, and work-life balance requires HR professionals to develop a deeper understanding of human behavior and the factors influencing productivity and employee retention. Processes of globalization and the increasing diversity of the workforce further impose the need for the development of cultural competence and the ability to manage complex intercultural relationships. Finally, the integration of artificial intelligence and automation in recruitment, performance management, and training is transforming traditional HR practices and expanding the strategic role of HR professionals (Westover, 2025).

In the contemporary business environment, characterized by accelerated technological change and increasing competition, human resources have become a key driver of organizational efficiency and

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sustainable competitive advantage. Employees' knowledge, skills, and adaptive capacity are increasingly recognized as central organizational resources, particularly in information- and creativity-based sectors such as the media. In this context, employee development transcends the framework of occasional training and becomes a strategic component of modern human resource management (Drucker, 1999; Dessler, 2020).

The media industry, confronted with digitalization, media convergence, and transformations in professional roles, is particularly dependent on the continuous enhancement of employees' knowledge and competencies. Changes in technology, work processes, and relationships with audiences require media professionals to constantly adapt and acquire new skills in order to maintain content quality and professional standards. Research indicates that flexibility, lifelong learning, and professional development have become indispensable elements of work in contemporary media organizations (Deuze, 2007; Castells, 2010; Pavlik, 2013). In this context, continuous education of media employees represents a key mechanism for responding to the structural changes of modern business. It enables not only technological adaptation but also the strengthening of organizational capacities, innovativeness, and the long-term sustainability of media organizations. Contemporary approaches to human resource management therefore emphasize systematic investment in employee education and development as a prerequisite for successful performance in a dynamic and uncertain media environment (OECD, 2019; Dessler, 2020).

2. LITERATURE REVIEW

The contemporary, highly dynamic media environment has led to significant changes in the labor market, creating a complex and challenging framework for strategic human resource management in media organizations. At the same time, accelerated technological development imposes the need for continuous and adaptable forms of employee education in order to keep pace with emerging media practices. Finally, the growing role of social media has increased the visibility of both internal and external actors, further affecting organizations' capacity to manage crisis situations effectively (Costello & Oliver, 2018).

Continuous learning is an integral component of adaptation to constantly evolving trends and technologies. HR professionals must be well acquainted with the latest marketing strategies in order to build a strong workforce capable of meeting contemporary business demands in a globalized and high-technology business environment (Huynh, 2024; Holistique Training, 2023). In this context, continuous improvement and learning are not optional but represent essential elements of human resource management in modern organizations (Rode et al., 2022). Research indicates that organizations investing resources in continuous education experience enhanced workforce flexibility, efficiency, and innovativeness, which is crucial for maintaining competitive advantage in the digital economy (Hasan et al., 2024). A similar argument is advanced by Benabed and Messaoudi (2025), who emphasize that contemporary HR management plays a strategic role in achieving organizational objectives and that continuous employee education is a key factor in fostering flexibility, innovation, and business sustainability. The role of HR professionals is rapidly evolving, requiring continuous education to manage digital transformation and maintain relevance in modern business markets (Zhang & Chen, 2023). Dabić et al. (2023) go a step further by arguing that digitalization has fundamentally transformed the nature of work, making continuous education indispensable for HR in supporting sustainable human resource management. Effective management of human capital through continuous education contributes to the strengthening of organizational culture and overall business efficiency, which is of critical importance for media companies in the contemporary era (Siocon, 2023).

3. DATA, METHODOLOGY AND STYLIZED FACTS

The primary research was designed to examine the manner and extent to which institutional practices of education and professional development within media organizations contribute to the development of employees' professional competencies, their professional adaptability to the contemporary demands of the media profession, and the alignment of these practices with organizational strategic objectives and prevailing professional standards. In this regard, two research hypotheses were formulated:

H₁. Continuous education significantly increases the motivation of media employees.

H₂. Media organizations that invest in employees' knowledge adapt more easily to market changes.

Data were collected using Google Forms. The research sample was based on purposive sampling and consisted of media employees in the Republic of Serbia. Prior to the construction of the final version of the questionnaire, a pilot study was conducted on a sample of 25 respondents in order to examine the

content validity of the measurement instruments used in this research. Based on the results of the pilot study, appropriate revisions were made, after which the final version of the questionnaire was formulated. The main study was then conducted on an independent sample of 274 respondents ($n = 274$). Data collection was carried out between December 2025 and January 2026.

The questionnaire consisted of three sections. The first section included general questions regarding gender, level of education, age, type of sector in which respondents were employed, work experience in the media, and the position they held within media organizations. In the second section, respondents assessed the significance of continuous education for media employees, while the third section focused on evaluating education and professional development practices in the media organization in which they were employed. For the purposes of statistical processing and data evaluation, methods of descriptive statistics were applied, including measures of central tendency, dispersion, and distribution asymmetry. Non-parametric techniques were used for hypothesis testing. The data were processed using the IBM SPSS software package.

4. EMPIRICAL RESULTS AND DISCUSSION

The study sample comprised 274 respondents employed within the media sector. Females were slightly more represented (55.1%) compared to Males (44.9%). In terms of educational attainment, the largest proportion of participants hold a university degree (40.1%), while nearly one-fifth possess a master's degree (18.2%), and a small minority hold a doctoral degree (PhD) (1.5%). With respect to the type of media, the majority of respondents are employed in television (53.6%), followed by print media (17.9%) and online media (17.2%), whereas radio and news agencies are less represented. Employment is predominantly concentrated in the public sector (90.5%).

Regarding professional experience, most respondents reported more than ten years of work in the media industry (70.1%), indicating a highly experienced sample structure. In terms of organizational position, journalists (35.4%) and editors (27.0%) constitute the largest groups, while technical staff, management, and other positions are less represented. Further details are provided in Table 1. The average age of respondents is 47 years, with a Median of 48 years and a Mode of 44 years.

Table 1. Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	123	44.9	44.9	44.9
	Female	151	55.1	55.1	100.0
	Total	274	100.0	100.0	
Level of education	High school	79	28.8	28.8	28.8
	Higher school	31	11.3	11.3	40.1
	Faculty	110	40.1	40.1	80.3
	Master	50	18.2	18.2	98.5
	PhD	4	1.5	1.5	100.0
	Total	274	100.0	100.0	
Type of media organization in which you are employed	Print media	49	17.9	17.9	17.9
	Television	147	53.6	53.6	71.5
	Radio	27	9.9	9.9	81.4
	Online media / portal	47	17.2	17.2	98.5
	News agency	4	1.5	1.5	100.0
	Total	274	100.0	100.0	
Employment sector	Public	26	9.5	9.5	9.5
	State sector	248	90.5	90.5	100.0
	Total	274	100.0	100.0	
Work experience in the media sector	Less than 2 years	18	6.6	6.6	6.6
	2–5 years	27	9.9	9.9	16.4
	6–10 years	37	13.5	13.5	29.9
	More than 10 years	192	70.1	70.1	100.0
	Total	274	100.0	100.0	
Your position within the media organization	Journalist	97	35.4	35.4	35.4
	Editor	74	27.0	27.0	62.4
	Producer	10	3.6	3.6	66.1
	Technical staff	39	14.2	14.2	80.3
	Management	38	13.9	13.9	94.2
	Other	16	5.8	5.8	100.0
Total	274	100.0	100.0		

Source: Author's calculation

Only 13.1% of organizations reported that they regularly provide seminars and training programs for their employees, while 46.4% do so occasionally, 30.3% rarely, and 10.2% never.

A chi-square test of independence revealed a statistically significant association between responses to the question "Does your organization provide training programs/seminars for employees?" and the type of media in which respondents are employed, $\chi^2(12, n = 274) = 24.756, p = 0.016, \phi = 0.301$.

As shown in Table 2 (Crosstabulation), the values of the Adjusted Residuals indicate that employees in print media were significantly less likely than expected to report Yes, regularly (Adjusted Residual = -2.5), while the category Never was significantly more frequent than expected (Adjusted Residual = 3.1). Conversely, for employees in television, the number of cases in the Never category was lower than expected.

Table 2. Crosstabulation

Crosstab		Does your organization provide training programs/seminars for employees?				Total	
		Yes, regularly	Occasionally	Rarely	Never		
Type of media organization in which you are employed	Print media	Count	1	18	19	11	49
		% within Type of media organization in which you are employed	2.0%	36.7%	38.8%	22.4%	100.0%
		Adjusted Residual	-2.5	-1.5	1.4	3.1	
	Television	Count	25	70	44	8	147
		% within Type of media organization in which you are employed	17.0%	47.6%	29.9%	5.4%	100.0%
		Adjusted Residual	2.0	.5	-.1	-2.8	
	Radio	Count	3	12	8	4	27
		% within Type of media organization in which you are employed	11.1%	44.4%	29.6%	14.8%	100.0%
		Adjusted Residual	-.3	-.2	-.1	.8	
	Online media / portal	Count	7	23	12	5	47
		% within Type of media organization in which you are employed	14.9%	48.9%	25.5%	10.6%	100.0%
		Adjusted Residual	.4	.4	-.8	.1	
	News agency	Count	0	4	0	0	4
		% within Type of media organization in which you are employed	0.0%	100.0%	0.0%	0.0%	100.0%
		Adjusted Residual	-.8	2.2	-1.3	-.7	
	Total	Count	36	127	83	28	274
		% within Type of media organization in which you are employed	13.1%	46.4%	30.3%	10.2%	100.0%

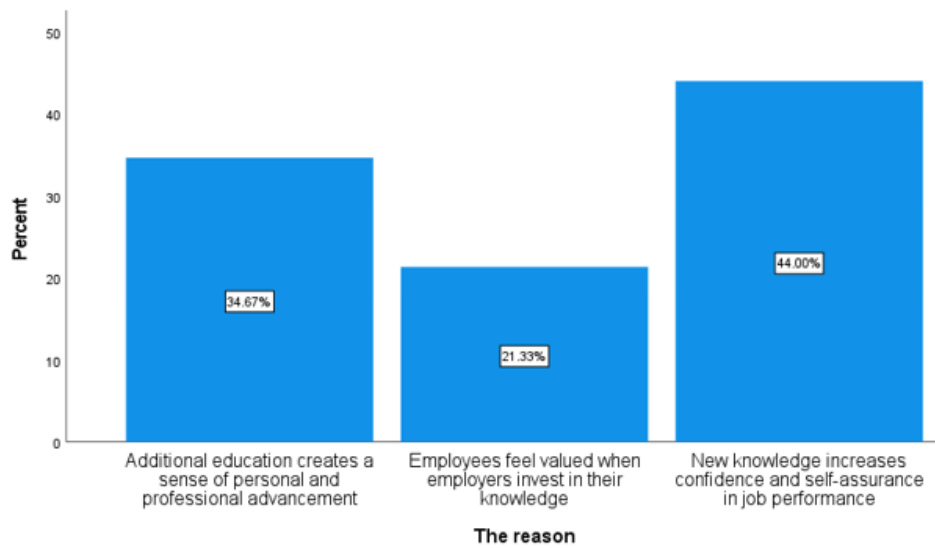
Source: Author's calculation

Within media organizations, the most common form of employee professional development is internal training programs (39.8%), followed by external seminars (19.7%), conferences (16.8%), and self-directed learning (16.4%), while online courses are the least represented (7.3%).

A chi-square test of independence revealed a statistically significant association between the form of professional development and the type of media in which respondents are employed, $\chi^2(16, n=274) = 28.580, p=0.027, \phi=0.323$. The highest proportion of employees in print media and television (42.9% each) reported participation in internal training programs. Employees in radio were most frequently engaged in external seminars, whereas those in news agencies were equally represented in external seminars and conferences (50% each). Online courses were reported only by employees in print media (14.3%) and online media/portals (12.8%), while in other media organizations they were negligibly represented.

Respondents evaluated the statement "Continuous education increases employee motivation" with an average score of 5.62, a median of 6, and a mode of 6. The first quartile (Q1) was 5, indicating that 25% of respondents rated the statement with 5 or lower, while the third quartile (Q3) was 7. The variable demonstrated relatively low variability (CV=26.71%) and strong negative skewness (Skewness=-1.102). This view was consistently expressed across gender, educational levels, organizational positions, employment sectors, and years of professional experience in the media. Among respondents who rated the statement with 5 or higher, the most frequently cited reason was "New knowledge increases confidence and self-assurance in job performance" (44%), followed by "Additional education creates a sense of personal and professional advancement" (34.67%), and "Employees feel valued when employers invest in their knowledge" (21.3%).

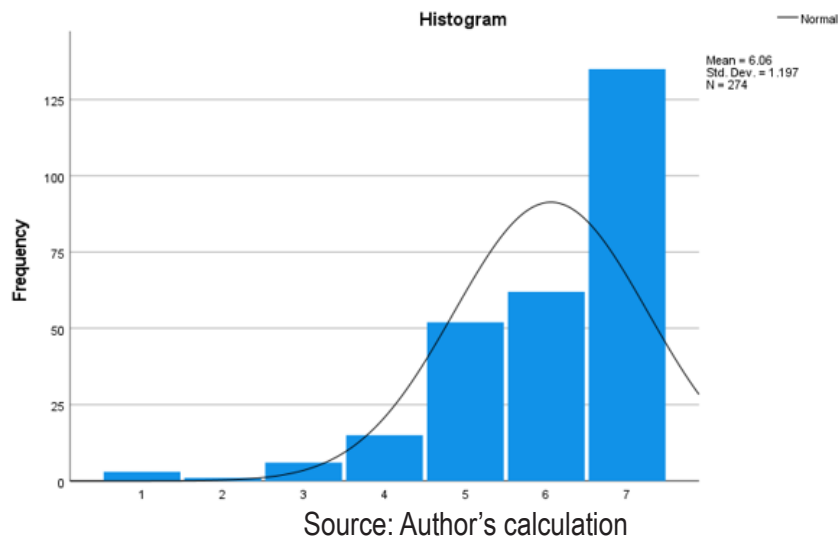
Graph 1. Reasons for the positive impact of continuous education on motivation



Source: Author's calculation

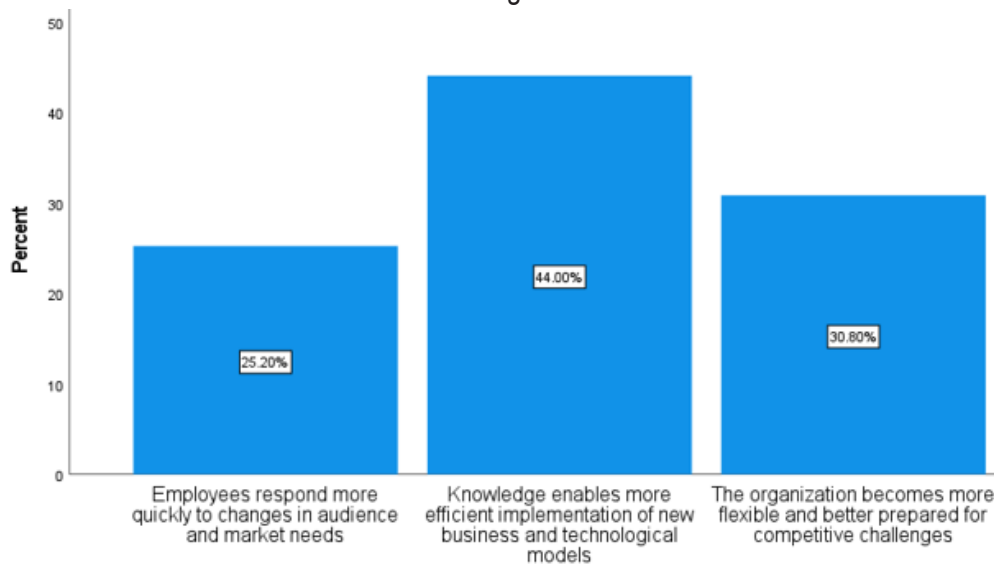
Respondents evaluated the statement "Media organizations that invest in knowledge adapt more easily to market changes" with a very high average score of 6.06, a Median of 6, and a Mode of 7. The variable exhibited strong negative skewness (Skewness=-1.521) and relatively low variability (CV=19.75%). This view was consistently expressed across gender, educational levels, organizational positions, employment sectors, and years of professional experience in the media. Among respondents who rated the statement with a score of 5 or higher, the most frequently cited reason was "Knowledge enables more efficient implementation of new business and technological models" (44%), followed by "The organization becomes more flexible and better prepared for competitive challenges" (30.8%), and "Employees respond more quickly to changes in audience and market needs" (25.2%).

Graph 2. Assessment of the statement "Media organizations that invest in knowledge adapt more easily to market changes"



Source: Author's calculation

Graph 3. Reasons for the positive impact of investment in knowledge on adaptation to market changes



Source: Authors' calculation

A strong linear relationship was observed between the items “Continuous education increases employee motivation” and “Media organizations that invest in knowledge adapt more easily to market changes”, with a correlation coefficient of $r=0.714$. Furthermore, significant linear associations were found between “Training programs and seminars improve the professional skills of employees” and “Continuous education increases employee motivation” ($r=0.586$), as well as between “Training programs and seminars improve the professional skills of employees” and “Media organizations that invest in knowledge adapt more easily to market changes” ($r=0.579$).

Table 3. Correlations

	1	2	3	4
1. Continuous education is essential for high-quality work in contemporary media	-			
2. Training programs and seminars improve the professional skills of employees	.424**	-		
3. Continuous education increases employee motivation	.393**	.586**	-	
4. Media organizations that invest in knowledge adapt more easily to market changes	.412**	.579**	.714**	-

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Author's calculation

5. CONCLUSION

This research study contributes to the development of future directions in human resource education within the media sector by identifying potential trends, emerging best practices, and key competencies required of media professionals in the contemporary digital environment. Particular emphasis is placed on a strategic approach to business operations, as well as on competencies of critical importance for the planning, implementation, and evaluation of training programs, grounded in an interdisciplinary approach and the principles of continuous professional development. In the context of accelerated and profound transformations of the media landscape, the need for new, innovative, and creative human resources is becoming increasingly pronounced. The research findings indicate that training and professional development programs in media organizations remain insufficiently systematic, as only 13.1% of organizations regularly organize seminars and training activities, while in the majority of cases such programs are implemented occasionally or rarely. Nevertheless, a statistically significant association between the frequency of training provision and the type of media confirms that the institutional approach to employee education depends on the media sector. These results demonstrate that the structural characteristics of media organizations influence employees' educational practices. A significant

relationship was also identified between the forms of employee professional development and the type of media, further confirming that different media sectors adopt different models of knowledge development. Internal training represents the most common form of professional development, particularly in print and television media, whereas external education programs and conferences are more characteristic of radio stations and news agencies. Online courses are poorly represented and largely limited to print and online media, indicating the underutilized potential of digital learning formats.

Regarding respondents' attitudes, continuous education received a high mean score of 5.62, with a strong level of agreement among respondents regardless of gender, educational background, job position, employment sector, or work experience. The most significant reasons underlying this perception relate to increased self-confidence gained through new knowledge, a sense of professional advancement, and the perception of being valued by the organization. This pattern of responses clearly indicates that continuous education has a strong motivational effect on media employees, thereby confirming Hypothesis H1. The statement that media organizations investing in employees' knowledge are better able to respond to market changes was rated with a very high mean score of 6.06, accompanied by low variability and a high degree of consensus across all sociodemographic and professional categories of respondents. Key reasons include more effective implementation of new business and technological models, greater organizational flexibility, and faster responses to changes in audience needs and market conditions. These findings clearly demonstrate that investment in knowledge represents an important mechanism of adaptability for media organizations, thus confirming Hypothesis H2.

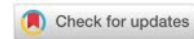
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NORMATIVE ANALYSIS OF THE EUROPEAN MEDIA FREEDOM ACT

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Abstract: The European Media Freedom Act (EMFA) constitutes the first binding EU legal framework systematically dedicated to the protection of media freedom and media pluralism. It was adopted after a long period in which EU media regulation remained fragmented: audiovisual services were regulated mainly through the AVMSD, while major online intermediaries were addressed through the DSA/DMA framework. The EMFA shifts the focus from isolated sector rules to a common set of directly applicable standards that target the conditions in which media operate in the internal market. The paper first explains this regulatory background and the reasons why a single EU regulation became politically and legally plausible. It then offers a normative analysis of the EMFA's main chapters, with attention to editorial independence, safeguards for journalists and sources, public service media standards, the new framework for regulatory cooperation, rules relevant for media market concentration, and the legal relationship between media service providers and VLOPs (very large online platforms). The analysis suggests that the EMFA introduces a new governance architecture and strengthens procedural guarantees at EU level, mainly through common standards and coordinated regulatory work. At the same time, many mechanisms still depend on national institutional arrangements and on the manner in which Member States apply and enforce the new rules. For that reason, the EMFA should be read as an important normative step, but not as a self-executing solution: its impact will largely be determined by implementation practice.

Keywords: *EU media law; European Media Freedom Act; regulatory cooperation; media pluralism; media freedom; very large online platforms.*

Field: Social Sciences

1. INTRODUCTION

Media freedom is regarded as one of the fundamental values necessary for the functioning of a democratic society. Rooted in freedom of expression, it enables the public to be provided with information on issues of general interest, ensures the plurality of opinions, and acts as a corrective to political power. For this reason, the level of media freedom is often perceived—both in theory and in practice—as an indicator of the overall democratic development of a society. Contemporary understandings of media freedom, however, go beyond its reduction to a purely individual right and increasingly point towards its institutional and systemic dimension.

Media freedom is today increasingly understood as an instrumental right, justified by the democratic function of media institutions rather than by their autonomy as such (Tambini, 2021, p. 147). This approach implies that safeguarding of media freedom cannot be limited to the mere prohibition of direct state interference in editorial policy, but must also include the creation and preservation of a broader normative and institutional framework within which the media can operate independently, pluralistically, and professionally. Within this perspective, media freedom is progressively constituted as an institutional guarantee of democratic pluralism, rather than as a mere extension of individual freedom of expression (Tambini, 2021, p. 138).

From an EU perspective, this approach was for a long time not accompanied by an adequate and unified regulatory framework. Media freedom initially relied primarily on non-binding instruments, after which regulatory attention shifted towards audiovisual services and subsequently towards digital services, while many issues of fundamental importance for the functioning of the media remained within Member States' regulatory competence. It is within this context that the European Media Freedom Act was adopted, as the first binding legal instrument of the European Union systematically dedicated to safeguarding media freedom and media pluralism. Its normative significance lies in the shift from an exclusive focus on individual freedom of expression towards the structural conditions necessary for the functioning of independent media systems (Lamour, 2025, p. 1371). Therefore, the paper first outlines the regulatory background against which the EMFA was adopted and then proceeds to a detailed normative analysis of the Regulation as a whole.

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2. REGULATORY BACKGROUND OF EMFA

As already noted, comprehensive regulation of the media at the EU level remained unattainable for a long time. The European Union relied primarily on fragmented, sector-specific instruments, while key issues of media freedom and pluralism largely remained within the regulatory competence of the Member States. Among recent developments in EU media law, a more substantial normative step occurred in 2010, when the Audiovisual Media Services Directive was adopted and functioned as the primary legislative framework governing the sector at that time (Directive 2010/13/EU). This Directive regulated traditional television broadcasting as well as on-demand services, thereby responding, for the first time in a systematic manner, to changes brought about by technological convergence.

The process of convergence, together with the growing influence of video-sharing platforms, led to the revision of the Directive in 2018 (Directive (EU) 2018/1808). Through these amendments, its scope was expanded, with specific regulatory implications for video-sharing platforms; at the same time, social networks and other online platforms continued to be regulated only partially and indirectly. In parallel, it became increasingly evident that issues related to the functioning of digital services required a distinct regulatory approach, separate from traditional media law. In this context, the European Union adopted the Digital Services Act (DSA) in 2022, aiming to introduce harmonized regulatory requirements applicable to digital services, including online marketplaces, social media platforms, application stores and other intermediary services (Regulation (EU) 2022/2065). In parallel, the Digital Markets Act (DMA) was adopted, focusing on the regulation of so-called gatekeepers, large digital platforms engaged in the provision of online search, application stores, and messaging services (Regulation (EU) 2022/1925). Through these instruments, the framework governing audiovisual media and digital services was largely completed, marking an important step forward in the governance of the digital environment.

Despite this regulatory development, a number of fundamental issues related to media freedom remained outside the scope of binding EU legislation. Print media and radio were not covered by the aforementioned directives and regulations, but even more importantly, core values of the media system continued to lack systemic protection at the Union level. Editorial autonomy, safeguards for journalistic sources, the independence of public service media, and transparency in media ownership and funding arrangements, as well as the influence of state and economic actors on the media, were not normatively addressed within the existing regulatory framework. In this sense, the core normative postulates of journalism remained outside the focus of both the AVMSD and the DSA/DMA package.

The need for a common legal framework was further reinforced by the unevenness of media regulation across Member States and by the different levels of protection of media freedom in practice. There was a clear need for EU-level harmonization to prevent fragmentation of the internal media market, as divergent national rules risk undermining editorial independence and the effective protection of journalists' work (Brogi, Borges, Carlini et al., 2023, p. 72). In such a fragmented regulatory landscape, the absence of common and effective safeguards contributed to situations in which editorial autonomy and journalists' safety were increasingly exposed to systemic risks in certain Member States. The murders of journalists in Malta and Slovakia served as a strong signal of systemic weaknesses in the existing framework, while contemporary reports continue to document widespread violence and pressure against journalists. Thus, the Liberties Media Freedom Report 2025 notes that physical violence against journalists has been recorded in numerous Member States, including Croatia, Germany, Greece, Italy, Slovakia and Slovenia, while in some countries incidents of violence were linked to the actions of police forces (Liberties Media Freedom Report, 2025, p. 7).

Within such a normative and social context, it became clear that a fragmented approach to media regulation could no longer respond to contemporary challenges. The need for a single, binding instrument at the EU level, capable of systematically addressing the fundamental issues of media freedom and pluralism, became increasingly apparent. The importance of addressing this issue was further highlighted in the context of the Conference on the Future of Europe, which subsequently prompted the European Commission to put forward, in September 2022, a legislative Proposal for a Regulation establishing a common framework for media services in the internal market (COM/2022/457 final). The proposal emphasized the necessity of reinforcing safeguards for media pluralism, journalistic independence and the resilience of media systems against political and economic pressure.

Following the legislative procedure and the exchange of positions between the EU institutions, the European Parliament and the Council adopted the final text of the European Media Freedom Act in April 2024. The Regulation formally entered into force in May 2024, while its application was deferred until 8 August 2025, in order to allow Member States sufficient time to adapt their institutional and organizational frameworks to the new obligations. As an EU regulation, the EMFA applies across all Member States

without requiring transposition into national law, with the aim of avoiding further disparities in the level of protection of media freedom and additional fragmentation of the internal market. In this sense, the EMFA also introduced a new governance architecture by transforming earlier coordination mechanisms under the AVMSD into a more structured and permanent framework of regulatory cooperation within the internal media market (Trevisan, pp. 196–197). At the same time, the Regulation lays down concrete and directly applicable rules governing the position of media service providers, regulatory authorities and platforms within the internal market.

3. NORMATIVE ANALYSIS OF EMFA

The European Media Freedom Act establishes, for the first time, a single and directly applicable set of rules governing media services across the European Union. Unlike earlier sector-specific instruments, the Regulation does not merely coordinate national systems, but substantively regulates key aspects of media freedom, media markets and regulatory cooperation at Union level. Its normative content is organized into four chapters: General Provisions; Rights and Duties of Media Service Providers and Recipients of Media Services; Framework for Regulatory Cooperation and a Well-Functioning Internal Market for Media Services; and Final Provisions. The following analysis examines these chapters in turn, focusing on their legal structure and regulatory implications.

The General Provisions chapter is significant as it determines the scope within which the Regulation applies, its relationship with other legal acts (which it complements rather than replaces), and provides precise, harmonized definitions. “This Regulation lays down common rules for the proper functioning of the internal market for media services and establishes the European Board for Media Services, while safeguarding the independence and pluralism of media services” (EMFA, Article 1). At the same time, In compliance with Union law, Member States may adopt more detailed or stricter rules in areas governed by the Regulation. Equally important is the section that contains the definitions of key concepts: media service – a service primarily intended to make programs or press publications available to the general public, under editorial responsibility, for the purpose of informing, educating, or entertaining; media service provider – a natural/legal person who professionally provides a media service and determines the selection and organization of its content; public service media provider – a media service that, under national law, operates under a public service remit and is financed through public funds in order to fulfil that remit; editorial responsibility – the effective control exercised over the selection and arrangement of programs or publications within a media service; intrusive surveillance software – software that exploits vulnerabilities of digital products for covert surveillance, including the collection or analysis of user data; audience measurement – the gathering and processing of data concerning the size and composition of an audience, for purposes such as advertising, pricing, and distribution planning; state advertising – promotional or informational messages disseminated by public authorities or entities under their control, in exchange for payment or other consideration; media literacy – the knowledge and skills enabling citizens to use media safely and critically, including the ability to distinguish facts from opinions (Article 2).

The chapter Rights and Duties of Media Service Providers and Recipients of Media Services addresses the duties of media service providers as well as the safeguards designed to secure the independent operation of public media services. It guarantees the right of recipients of media services to have access to pluralistic and editorially independent media content, while obliging Member States to create conditions for the protection of that right (Article 3). As for the rights of media service providers, the Regulation guarantees the freedom to carry out their activities without restrictions within the internal market, except for those permitted under EU law (Article 4). Member States are required to ensure respect for editorial freedom and independence of media service providers and must avoid interference in editorial policies or decision-making. In particular, Member States are prohibited from requiring the disclosure of journalistic sources or confidential communications, as well as from detaining, sanctioning, intercepting, or conducting surveillance of media service providers, members of their editorial staff, or persons associated with them for the purpose of obtaining such information, including through the use of intrusive surveillance software. However, the Regulation also provides for certain limitations, allowing Member States to require the disclosure of sources and impose sanctions on journalists under specific conditions: when such measures are laid down in national or EU law, when the principle of proportionality is respected, when a prevailing public interest exists, and when the measure is based on a decision of a judicial authority or an independent body.

The Regulation also provides for the possibility of Member States applying intrusive software in the context of investigations concerning particularly serious criminal offences. However, such surveillance

measures and the use of software-based technologies requires continuous oversight by a court or an independent regulatory authority, in accordance with EU law. The Regulation guarantees the right to judicial protection for journalists, editors, and other associated persons, as well as the right to seek assistance from regulatory or self-regulatory bodies in exercising that right. Article 5 introduces safeguards for the independent functioning of public media services. It enshrines editorial and operational independence, requiring Member States to ensure transparent, independent, and non-discriminatory procedures for the appointment and dismissal of management, accompanied by judicial protection. The financing of public media services must be based on pre-established, transparent, and objective criteria that secure stable and predictable funding. The implementation of these provisions is monitored by one or more independent bodies, whose findings must be made publicly available to ensure accountability. Finally, the Regulation outlines the duties of media service providers, primarily aimed at strengthening transparency and editorial independence. Providers are required to make publicly available information concerning their legal name, ownership structure, and any financial support received from state advertising or from third countries. All such information is entered into national databases maintained by competent authorities. Providers of media services that produce news and current affairs content are required to put in place safeguards ensuring editorial autonomy and to make transparent any existing or potential conflicts of interest (Article 6).

The Framework for Regulatory Cooperation and a Well-Functioning Internal Market for Media Services structures regulatory cooperation among national regulatory authorities, in coordination with the newly established European Board for Media Services, while also addressing the proper functioning of the internal market through mechanisms such as media concentration control and transparency of financing. The chapter can be divided into six sections: Independent Media Authorities, European Board for Media Services, Regulatory Cooperation and Convergence, Provision of and Access to Media Services in a Digital Environment, Requirements for Well-Functioning Media Market Measures and Procedures, and Transparent and Fair Allocation of Economic Resources.

In the Independent Media Authorities section, Member States must ensure the establishment of independent regulatory authorities responsible for implementing this chapter in coordination with other relevant bodies, and to provide these authorities with adequate resources. National regulatory authorities may, within a reasonable timeframe, request from any relevant natural/legal person the information and data necessary for the performance of their competences (Article 7).

A very significant part of the Regulation concerns the establishment, structure, independence, and tasks of the European Board for Media Services. The Regulation establishes the Board as the body replacing ERGA, with its independence from governments, institutions, persons, or bodies explicitly emphasized (Articles 8–9). The Board consists of members appointed by national regulatory bodies, elects a Chair and a Vice-Chair for one-year terms, establishes its internal procedural framework and adopts decisions supported by a two-thirds majority. The Commission is represented in the Board's work but without voting rights, and meetings may also be attended by experts and permanent observers (Article 10). In addition, the Board is supported by a Secretariat, which provides administrative and organizational assistance in the performance of its functions (Article 11). The Board takes decisions in the field of audiovisual media, continuing the work of the former ERGA, but for all matters outside this field it must consult representatives of the relevant media sectors, with the procedure for such consultation further detailed in the procedural rules (Article 12). The following article enumerates the tasks of the European Board for Media Services: it provides technical expertise to the Commission; supports coordination between national authorities and the dissemination of effective regulatory approaches; issues opinions on technical and factual matters; provides opinions on requests for cooperation and enforcement measures in cases of disagreement; issues assessments of national measures relating to media services originating outside the EU; upon request of a media service provider, participates with opinions in disputes with VLOPs; issues opinions on measures that significantly affect the operations of providers; provides opinions on draft assessments of national authorities; expresses views on media market concentrations; assists the Commission in preparing guidelines; mediates in disputes among authorities; promotes cooperation regarding standards for devices and user interfaces; coordinates measures toward services outside the EU that threaten public security; organizes structured dialogues with VLOPs, media, and civil society; exchanges practices regarding audience measurement and media literacy; and publishes an annual detailed report, which the Chair presents to the European Parliament upon invitation (Article 13).

The next section, Regulatory Cooperation and Convergence, concerns the collaboration of national regulatory authorities and their coordination to secure uniform application of the EMFA and the AVMS directive, particularly regarding cross-border issues and content originating outside the EU. Cooperation begins with a formal request, specifying the purpose and reasons for collaboration, which may only be

refused for the exhaustively listed grounds, with justification. If the authorities fail to reach an agreement on cooperation, the matter may be referred to the Board, which, in coordination with the Commission, issues opinions and recommendations for consideration by the authorities. In urgent cases, accelerated cooperation within a 14-day period is provided for (Article 14). The section also regulates the mutual cooperation of national regulatory authorities concerning the obligations of video-sharing platforms (for example, YouTube). In case of disagreements, the matter is referred to the Board, which issues recommendations and opinions, after which the authority receiving the request notifies the Board, the Commission, and the party concerned of the actions already undertaken or envisaged (Article 15). The Board promotes the exchange of experience among national regulators and assists the Commission in issuing guidelines and opinions on the application of the Regulation. In the case of guidelines relating to the AVMSD, the Commission additionally consults the Contact Board (Article 16). The section then addresses measures concerning media services outside the EU: at the request of at least two national authorities, the Board coordinates measures where such services target or reach audiences in the EU and pose a serious risk to public safety. The Board, together with the Commission, establishes criteria that national regulatory authorities take into account when performing their tasks (Article 17).

The next section concerns Provision of and Access to Media Services in a Digital Environment. Under these provisions, very large online platforms (VLOPs) are obliged to provide media service providers with opportunities to verify their status, legal and editorial independence, to comply with requests from regulatory authorities, to refrain from offering AI-generated content without human oversight, and to display relevant contact information. These platforms may also suspend their intermediary services, but only after providing a prior explanation for the refusal and allowing a 24-hour response period. The platforms are obliged to ensure the prioritized handling of complaints from media service providers and to engage in dialogue with them if providers consider themselves repeatedly and unjustifiably restricted. In cases where no agreement is reached, provision is made for mediation and other forms of out-of-court dispute resolution, and platforms are, at the same time, required to publish annually data on content restrictions, the reasons for their imposition, rejected or withdrawn statements, and dialogues conducted with media service providers (Article 18).

The Regulation also provides for a “structured dialogue” between VLOPs, media service providers, and civil society organizations to exchange experiences, promote the diversity of independent media, and monitor initiatives against harmful content, with the Commission being informed of these activities (Article 19). Finally, users are guaranteed the right to independently and easily adjust the settings of devices and interfaces through which they access media services, while manufacturers and developers must ensure the continuous and the clear recognisability of media service providers’ visual branding. Member States supervise the implementation of these obligations, and the Board encourages cooperation between media entities and standardization bodies to develop common standards for devices, interfaces, and digital signals (Article 20).

The Requirements for well-functioning media market measures and procedures section of the Regulation governs national measures, the evaluation of concentration levels in media markets, alongside measures aimed at safeguarding pluralism and editorial autonomy as conditions for a properly functioning media sector. National measures adopted by Member States must be justified, proportionate, and implemented within predetermined deadlines without unnecessary delay, while media service providers are granted access to an appeal procedure conducted by an independent regulator or a court. If a measure could significantly have an effect on the operation of the internal market, the Board or the Commission may issue a publicly available opinion, and national authorities are obliged to provide all necessary information for its preparation without delay (Article 21). Member States must put in place a framework for the assessment of media concentration where such concentration may have a significant impact on media pluralism and editorial independence. The framework should be based on transparent, objective, and proportionate rules, applied by clearly identified competent regulatory authorities and guided by predefined criteria and time limits.

The assessment considers the impact on pluralism and public opinion, measures to safeguard editorial independence, the economic sustainability of entities, findings from the annual Rule of Law report published by the Commission, and any obligations of the parties to preserve pluralism. If there is a suspicion of harmful effects from concentration, the national regulatory authority consults the Board, which issues an opinion and forwards it to the relevant national authority and the Commission, after which the national authority is obliged to adopt that opinion to the greatest extent possible (Article 22). In cases where no national assessment or consultation has been carried out and media concentration may affect the internal market, the Board may, either on its own initiative or at the request of the Commission, issue an opinion on its impact on pluralism and editorial independence (Article 23).

The final section is entitled Transparent and Fair Allocation of Economic Resources and addresses the rules for audience measurement and the allocation of public resources for state advertising purposes and media contracts. Audience measurement systems must be transparent, impartial, verifiable, and independently audited, while operators of these systems are obliged to provide media service providers and advertisers with free access to information regarding methodology and measurement results, with the possibility of the Commission's adoption of codes of conduct and the issuance of guidance (Article 24). The final article of this chapter addresses the use of public funds in relation to state advertising and media contracting. It stipulates that fund allocation must be carried out on the basis of predefined criteria that are transparent, objective, proportionate, and non-discriminatory, and published in advance and implemented through public procedures. Annual expenditures for state advertising in Member States must be distributed across the widest possible circle of media while respecting national and local specificities. Public authorities shall publish yearly data on state advertising expenditures, including the legal names of media and platforms receiving funds, information on their affiliation to business groups, and the amounts allocated. Regulatory authorities oversee and publicly report annually on this distribution and may request additional information from competent authorities to verify the completeness and legality of allocations (Article 25).

Final Provisions constitute the concluding chapter of the Regulation and concern its monitoring and evaluation. The Commission conducts an annual market monitoring exercise on media services across all Member States, assessing levels of concentration, risks of foreign interference, the state of pluralism and editorial independence, the impact of platforms, as well as the allocation of public funds for state advertising. The results of this monitoring are reviewed within the Board and the contact committee and are presented to the European Parliament (Article 26). The Commission must also conduct an evaluation of the Regulation by 8 August 2028, and subsequently every four years, submitting a report to the Council, the Parliament, and the European Economic and Social Committee. For this purpose, Member States and the Board make relevant information available, while the Commission, in its assessment, takes into account EU institutional documents and positions, monitoring findings, and other sources (Article 27). The last two articles address technical amendments and the entry into force and application of the Regulation, with specified deadlines for certain provisions. It should be noted that Article 20, concerning the right of users to adjust the provision of media services, will become applicable two years later, on 8 May 2027 (Articles 28–29).

4. CONCLUSION

The normative analysis of the European Media Freedom Act indicates the objective that its adoption aimed at achieving – the creation of a common regulatory framework at EU level, covering the core standards relevant for the functioning of contemporary media systems. These standards primarily concern editorial independence, the protection of journalists and journalistic sources, mechanisms for ensuring media pluralism and transparency, as well as the interaction between the media sector and digital platforms. The need to regulate these issues emerged at a moment of intensified threats to media freedom in Europe, including political interference, media capture and growing risks to journalists, while the normative ambitions of the EMFA may be constrained by structural weaknesses affecting its effectiveness in practice (Horton & Assersen-Skadberg, 2026, pp. 3–4).

The General Provisions play an important role as they establish common conceptual foundations at the level of the Union. Precise and harmonized definitions contribute to reducing the differences that previously existed between national legal systems and enable the creation of a shared regulatory basis for a unified European media space.

The Rights and Duties of Media Service Providers and Recipients of Media Services represent the normative core of the EMFA. At this level, editorial autonomy of media service providers is, for the first time, explicitly protected under EU law, together with journalists' rights relating to the protection of sources and the prohibition of unlawful use of intrusive surveillance software. At the same time, a normative framework is established for strengthening public service media. The exceptions and limitations indicate an attempt to balance the protection of media freedom with legitimate public interests, but they also leave room for divergent interpretations in practice. Nevertheless, while the EMFA represents an important step in recognizing the risks of media concentration and platform dependence, it does not adequately address the implications that infrastructural and vertical platform power has for media pluralism and editorial independence (Seipp et al., 2024, p. 18).

The Framework for Regulatory Cooperation and a Well-Functioning Internal Market for Media Services regulates and strengthens cooperation between Member States through their regulatory

authorities, while also normatively defining the relationship between media services and online platforms. The setting up of the European Board for Media Services constitutes a significant step towards a more coordinated and unified approach to regulating the EU media space. However, the normative analysis shows that, although the EMFA strengthens procedural guarantees of independence for regulatory authorities, it largely relies on pre-existing national institutional arrangements, limiting its capacity to correct structural deficiencies in captured media systems (Trevisan, pp. 198–199).

The Final Provisions indicate that the EMFA is conceived as a regulatory framework whose actual reach will be demonstrated through practice. Monitoring and evaluation mechanisms suggest that the effects of the Regulation will depend primarily on its implementation at the level of the Member States, rather than solely on its normative content.

Taken as a whole, the EMFA represents an important normative step forward, but not a final solution to the problem of media freedom in the European Union. Its real impact will depend on consistent application, the institutional capacities of Member States, and the political will to effectively enforce the guarantees established by the Regulation. For this reason, the EMFA should be understood as the beginning of a new regulatory phase in European media law, rather than as the conclusion of that process.

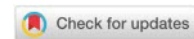
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THE DIALOGUE AS A METHOD IN THE THEORY OF UPBRINGING: AN AUTHORIAL PSYCHODRAMATIC MODEL FOR PSYCHOLOGICAL AND SOCIO-PEDAGOGICAL SUPPORT OF PEDAGOGY STUDENTS THROUGH SYMBOLIC TRANSFORMATION OF FEARS

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Abstract: This paper presents a pedagogical model that integrates the principles of psychodrama and expressive arts therapy within the classical framework of the pedagogical dialogue. The study investigates the potential of symbolic transformation as a pedagogical mechanism for reducing anxiety and enhancing emotional resilience among pedagogy students. Developed by Dr. Avi Abner and grounded in the theory of upbringing, the model unites cognitive, emotional, and social dimensions of learning through creative expression and reflective interaction. It introduces a holistic process in which dialogue becomes a transformative medium for self-awareness, emotional regulation, and personal growth. The research was conducted at Burgas State University "Prof. Dr. Assen Zlatarov" with students of pedagogy and social pedagogy in part-time study programmes, who participated in a structured pedagogical experiment. The findings demonstrated a clear reduction in students' anxiety levels and an increase in emotional stability and self-reflective competence. These results validate the pedagogical significance of dialogical and creative approaches in shaping future educators who can maintain psychological balance and empathy in professional contexts. The proposed model contributes to contemporary pedagogical theory by bridging the artistic, emotional, and cognitive dimensions of education. It redefines the pedagogical dialogue as both a diagnostic and transformative tool, enabling future teachers to internalize mechanisms of self-regulation and emotional resilience. The study affirms that the integration of psychodramatic and art-therapeutic principles into teacher education represents a valuable innovation in developing reflective, emotionally mature, and socially responsive professionals.

Keywords: *Theory of upbringing; expressive arts therapy; symbolic transformation; teacher education; socio-pedagogical support; catharsis; self-regulation; reflective practice; holistic education.*

Field: Pedagogy

1. INTRODUCTION

The formation of emotional resilience and self-regulatory competence has become an essential dimension of teacher education in the twenty-first century. As Christopher Day, Qing Gu argue, teachers' professional effectiveness is inseparable from their emotional and moral well-being, which must be developed through reflective and supportive pedagogical frameworks (Day, C., Gu, Q, 2010). Contemporary pedagogy no longer perceives the educational process solely as cognitive transmission, but rather as an integrative field encompassing intellectual, affective, and social development (Hargreaves, 1998), (Noddings, 1986). Within this expanded paradigm, the pedagogical dialogue- traditionally used as a means of moral and intellectual formation acquires renewed significance when coupled with creative and therapeutic practices that activate both the emotional and symbolic dimensions of learning. Teacher preparation, therefore, must address the psychological dimension of learning-to-teach, fostering the ability to recognize, manage, and transform emotional experiences constructively (Jennings, P. A., & Greenberg, M. T, 2009). Emotional self-regulation is no longer peripheral but rather a prerequisite for authentic pedagogical relationships built on empathy, trust, and care (Noddings, 1986). Within this humanistic framework, dialogue assumes a pivotal role, functioning not merely as a didactic technique but as a means of mutual discovery and meaning-making between teacher and learner (Freire, 2000). This understanding corresponds to the view of Mihaela Shanova, who traces the dialogue as a fundamental pedagogical method from Antiquity to the present day and demonstrates its enduring relevance as a form of meaningful and value oriented communication in education (Shanova, 2012). Theoretical and empirical contributions in expressive arts and psychodrama further expand this understanding by demonstrating that symbolic and creative processes can facilitate psychological transformation and emotional integration (Malchiodi, 2020). By engaging in expressive action, individuals externalize inner conflicts, convert them

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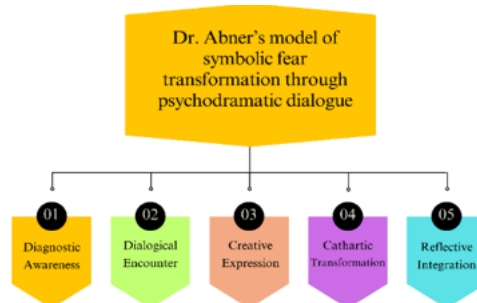


into symbolic representations, and achieve insight through reflective dialogue. In the context of teacher education, such processes nurture self-awareness, empathy, and resilience, which are indispensable for sustainable professional growth and classroom stability. The current study emerges within this intellectual and pedagogical landscape, proposing an integrative approach that aligns classical methods of the theory of upbringing with contemporary psychodramatic and art-therapeutic perspectives. It positions creative and dialogical experience as the foundation for developing emotionally balanced and socially responsive educators capable of navigating the complexities of twenty-first-century teaching practice.

2. METHODS

Contemporary tendencies in pedagogical theory and practice emphasize the necessity of integrating methods that unite the cognitive, emotional, and social dimensions of the student's personality. Of particular importance are those pedagogical approaches that allow experience to function as a process of creative and symbolic transformation. In this context, the dialogue, as a method in the theory of upbringing, may be enriched through the integration of psychodramatic and art-therapeutic techniques, with the purpose of achieving deeper personal and social support. Existing empirical studies in the field of expressive art therapies indicate that their transformative effect is realized through specific mechanisms of change such as embodiment, materialization, and symbolic work (De Witte, M., Orkibi, H., et al, 2021), (Grant, 2023). These mechanisms become particularly evident within the context of psychodrama, where action and symbol intertwine in an experiential process capable of transforming internal conflicts. In the pedagogical preparation of future teachers, such an approach has the potential to reduce anxiety, enhance emotional resilience, and foster the development of social competences necessary for effective group work. Recent meta-analyses confirm that creative arts-based practices of this kind are effective in reducing stress and anxiety among young people, while simultaneously strengthening their capacity for self-reflection and social integration (Frasco, E., Sherr, L., et al, 2025). This understanding is consistent with recent integrative perspectives in creative arts therapies, which demonstrate that structured creative modalities can be safely combined with trauma-informed approaches such as EMDR in order to support emotional regulation and the processing of complex experiences (Davis, 2022). This perspective is further reinforced by contemporary art therapy models that explain trauma repair through the interaction of expressive processes, somatic regulation, and narrative integration (Knash, 2024). This is particularly significant for pedagogy students, who, throughout their academic training, often encounter considerable emotional and academic stress. In this sense, the combination of the didactic conversation with art-therapeutic techniques and psychodramatic catharsis establishes the essential connection between diagnosis, experience, and transformation. The proposed authorial model is structured around several consecutive stages. First, through a diagnostic questionnaire, students' fears are identified and symbolically represented through the image of an animal. This initial phase corresponds to the principle of materialization, which, according to Peter Kellermann, is fundamental for creating a necessary distance between the individual and the traumatic content, allowing the experience to be observed, expressed, and ultimately transformed within a safe symbolic framework (Kellermann, 1992). The second stage involves a dialogical conversation within the group, during which sharing and reflection on the chosen symbols are encouraged. The third stage consists of creative expression through glass painting. The transparency and fragility of glass function as a metaphor for psychological vulnerability, while the artistic process activates the therapeutic mechanisms of symbolism and embodiment (Malchiodi, 2020). The fourth stage is a cathartic act of breaking the glass, through which fear is symbolically destroyed. The final, fifth stage consists of group reflection, during which students integrate their experiences and comprehend their own process of transformation.

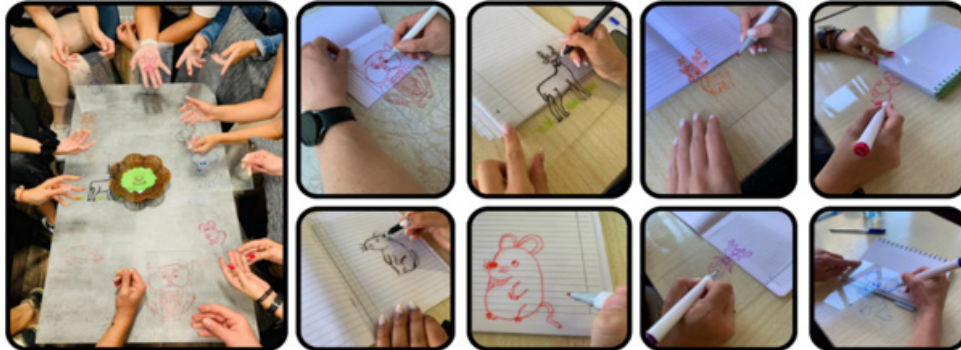
Figure 1. Conceptual model



Source: The model developed by Dr. Avi Abner. All rights reserved

The necessity of applying this method in pedagogical education arises from the fact that future teachers must develop resilience to stress, as well as the ability to work with their own fears and emotions. If these competences are not formed during the university years, there is a risk that their insecurity will be transferred into their professional practice. It is precisely here that the psychodramatic model, grounded in dialogue and symbolic experience, emerges as an effective instrument for psychological and socio-pedagogical support.

Fig. 2 Working process



Source: Visual materials are original. All right reserved

3. DISCUSSIONS

On a theoretical level, this authorial model integrates the fundamental principles of psychodrama—spontaneity, creativity, emotional awareness, and catharsis—within the classical structure of the pedagogical dialogue (López-González, M. A., Morales-Landazábal, P., & Topa, G, 2021). This interpretation is further supported by recent survey findings showing that strong social bonds function as a protective factor against fear of exclusion and its negative psychological consequences (Gumus, 2025). It enables profound work with personal fears and the development of resilient strategies for coping and self-regulation among future educators. From the perspective of socio-pedagogical support, this model is based on the creation of a safe and supportive environment, specifically within the Office for Psychological and Socio-Pedagogical Support, which is unique in the Republic of Bulgaria and located at Burgas State University “Prof. Dr. Assen Zlatarov,” Faculty of Social Sciences. It is precisely in the Office for Psycho-Social Support that students share similar experiences and assist one another in achieving mutual emotional stabilization. The symbolic action contributes to the development of interpersonal empathy and solidarity, both essential for successful pedagogical practice and for constructive interpersonal interaction within the professional environment. The authorial psychodramatic model, integrating the dialogue as a method in the theory of upbringing, developed by Dr. Avi Abner, provides psychological support and opportunities for socio-pedagogical development, preparing pedagogy students for successful professional realization. A particularly significant moment in the authorial model is the fourth stage, in which the symbolic destruction of fears is achieved through the breaking of glass. Here the classical psychodramatic concept of catharsis is realized, introduced by Jacob Levy Moreno as a fundamental therapeutic mechanism for the transformation of inner tension (Moreno, 2010). In the specific pedagogical context, this act combines both emotional release and a socio-pedagogical function (Orkibi, 2025); (Giacomucci, 2025). Through it, students confront their own vulnerability, symbolized by the transparency and fragility of glass, and are given the opportunity to break the internal barriers that hinder their professional and personal development. International studies on the therapeutic mechanisms of psychodrama confirm that symbolic action plays a crucial role in achieving inner transformation and lasting change in personal attitudes (López-González, M. A., Morales-Landazábal, P., & Topa, G, 2021); (Gaztambide, 2024). The breaking of glass, as the culmination of the process, acts as a catalyst for the experience, allowing students to move from a state of anxiety to one of release and confidence. This experience possesses a therapeutic value comparable to that described by Cathy Malchiodi in her studies on expressive arts and their role in coping with traumatic experiences (Malchiodi, 2020). The figure below visualizes precisely this cathartic moment, realized within the specialized Office for Psycho-Social Support for pedagogy students.

Figure 3. Cathartic transformation process



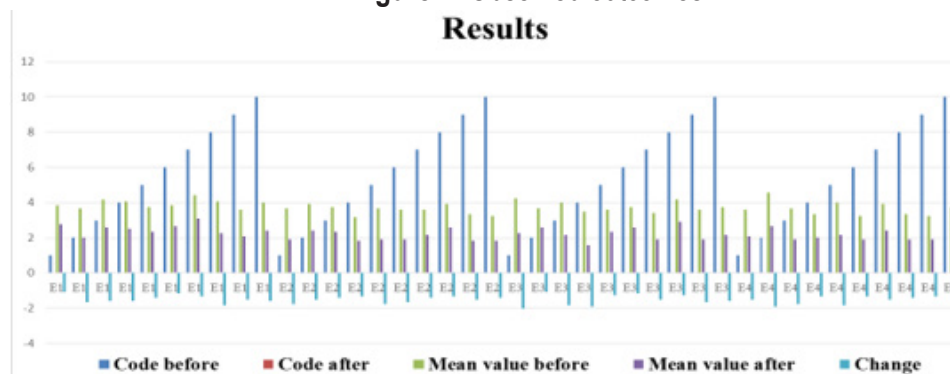
Source: Visual materials are original. All right reserved

After the cathartic phase, students proceed to the final stage of group reflection, during which the experience is comprehended and integrated into their professional identity. In this way, a sustainable foundation is created for their future pedagogical practice. If this stage is omitted, there is a risk that unconscious fears may be transferred into the school environment, hindering the formation of a genuine connection between teacher and student. Therefore, the method based on the combination of dialogue, psychodramatic catharsis, and group reflection holds particular significance for the preparation of future educators.

4. RESULTS

The study involved a total of 80 participants, divided into an experimental group ($n = 40$) and a control group ($n = 40$). The results demonstrate a clear difference between the two groups. As illustrated in Figure 4, students from the experimental group, organised into four subgroups (E1–E4), who participated in the dialogic-psychodramatic sessions showed a marked reduction in anxiety levels, with mean scores decreasing from 3.83 before the programme to 2.16 after its completion. This reduction was consistent across all experimental subgroups, with mean change values ranging from -1.48 to -1.52 , indicating a stable and uniform effect of the applied pedagogical model. In contrast, the control group exhibited only minimal variation between measurements. Group-level analysis further confirmed a statistically significant reduction in anxiety in the experimental group, accompanied by a large effect size ($d = -6.42$), whereas the control group showed only a small change ($d = -0.47$), despite reaching statistical significance ($p = .005$).

Figure 4. Observed outcomes



Source: Designed and developed by Dr. Avi Abner. All rights reserved.

5. CONCLUSION

The present study validates an authorial pedagogical technology that extends the classical didactic conversation by integrating symbolic expression and psychodramatic catharsis. In doing so, it establishes a sustainable framework for psychological and socio-pedagogical support for pedagogy students. The application of the model resulted in a distinct and statistically significant reduction in self-reported anxiety within the experimental group, confirming its effectiveness both theoretically and practically. The reliability of the instrument used remained high across both measurements, ensuring the validity and

credibility of the results. The observed effects correspond to Moreno's classical concepts of catharsis and to subsequent research in the field of expressive arts therapies which emphasize the importance of spontaneity, symbolic action, and group reflection as essential pathways for emotional transformation and internal regulation (Malchiodi, 2020), (De Witte, M., Orkibi, H., et al, 2021). In this sense, Dr. Avi Abner's model demonstrates high applicability in the preparation of future teachers, as it addresses the risk of transferring personal fears and insecurities into school practice through experiential yet methodically structured symbolic work and collective reflection. From a pedagogical standpoint, the model offers clear implications for university-level teacher education. It can be integrated into the academic disciplines Theory of upbringing and pedagogical diagnostics as a structured learning session conducted in two phases pre-assessment and post-assessment of anxiety. The session should include clearly defined safety guidelines, a guided group dialogue, creative expression, and a final reflective phase. Ultimately, the model demonstrates that the integration of dialogue, symbolic expression, and catharsis within a structured educational framework represents an effective tool for reducing anxiety and enhancing the professional readiness of future teachers. It not only alleviates momentary emotional tension but also fosters the development of sustainable competences for self-reflection, emotional maturity, and social interaction-key prerequisites for high-quality pedagogical practice. The theoretical coherence of the model with established psychodramatic and art-therapeutic frameworks, supported by empirical data, positions it as a promising innovation in university education in the fields of Theory of upbringing and social pedagogy, as well as a meaningful contribution to the contemporary paradigm of holistic education.

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GENDER DIFFERENCES IN TEST ANXIETY AMONG LATE ADOLESCENTS: LEVELS AND COPING STRATEGIES

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Abstract: Anxiety during adolescence represents a significant psychological challenge, particularly in the context of increased academic demands and formal assessment situations. Previous research suggests that gender may play an important role in both the intensity and manifestation of anxiety; however, additional empirical evidence is needed within the context of secondary education. The aim of this study was to examine whether, and to what extent, gender differences exist in levels of generalized anxiety and test anxiety among late adolescents, as well as to identify gender as a potential predictor of test anxiety. The study was conducted as a cross-sectional survey on a sample of 112 final-year secondary school students (aged 18–19), evenly distributed by gender (56 males and 56 females), from three cities in the Republic of North Macedonia. The instruments used included the GAD-7 scale for measuring generalized anxiety and an adapted version of the Test Anxiety Inventory (TAI), using Likert-type response formats. Data were analyzed using descriptive statistics, independent samples t-tests (with Welch's correction), and point-biserial correlation analysis. The results indicated that male students predominantly exhibited normal to mild levels of generalized anxiety ($M = 7.5$), with no cases of severe anxiety, whereas female students showed significantly higher levels, with over 60% falling within the moderate category ($M = 10.2$). The gender difference was statistically significant with a medium effect size. Even more pronounced differences were observed in test anxiety, where 71% of female students reported high levels of anxiety, compared to predominantly low levels among male students. Statistical analysis revealed an exceptionally strong difference ($t = -13.5$; Cohen's $d \approx 2.6$). Furthermore, the point-biserial correlation ($r = 0.79$) confirmed that gender accounts for more than 60% of the variance in test anxiety. In conclusion, the findings provide strong empirical support for the general hypothesis that female students in late adolescence exhibit higher levels of both generalized anxiety and test anxiety. These results highlight the need for systematic, gender-sensitive interventions in secondary education, including early identification, psychoeducational programs, and adapted assessment strategies aimed at protecting students' mental health. From a practical perspective, the findings underscore the need for a multilayered, gender-sensitive approach that integrates individual-level interventions (e.g., brief cognitive-behavioral techniques, relaxation and mindfulness), classroom practices, school-based mental health support, and family involvement. Implementing preventive and systemic strategies—such as formative assessment practices, teacher training, and early screening—may substantially reduce test anxiety and promote psychological well-being, particularly among female students in late adolescence.

Keywords: test anxiety, generalized anxiety, gender differences, late adolescence, secondary education

Field: Social Sciences

1. INTRODUCTION

Academic and generalized anxiety have emerged as prevalent psychological challenges among adolescents, particularly in the later stages of adolescence (Bao & Han, 2024; Sun et al., 2021). These anxiety symptoms not only affect emotional well-being but also impair concentration, motivation, and academic achievement (Polanczyk et al., 2015). Research indicates that female adolescents report higher levels of generalized anxiety and evaluation-related anxiety compared to male adolescents (Racine et al., 2021; Bao & Han, 2024). Biological, psychological, and social factors contribute to these differences, including heightened amygdala reactivity, perfectionism, and social expectations (van Oort et al., 2009).

Within the educational context, evaluation-related anxiety (test or exam anxiety) represents a key stressor that can negatively affect learning and overall well-being. Early identification and intervention are essential to prevent chronic emotional distress and impaired academic performance. The aim of this study is to examine gender differences in generalized anxiety and evaluation-related anxiety among late adolescents and to determine whether gender serves as a significant predictor of anxiety levels.

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2. MATERIALS AND METHODS

The study included 112 adolescents (aged 18–19 years) from the Republic of North Macedonia, evenly distributed by gender (56 boys and 56 girls). Participants were recruited from general secondary schools and vocational schools, with an average GPA of 3.5. The study employed a cross-sectional design, and data were collected through an online questionnaire.

Data collection was conducted in March and April 2024, with participants from Skopje, Ohrid, and Berovo. Participation was voluntary and anonymous, and informed consent was obtained prior to completing the questionnaire. The research instrument consisted of three parts: Demographic questionnaire – including age, gender, type of school (general or vocational), city of residence, and average GPA.; Generalized Anxiety Disorder Scale (GAD-7), adapted for adolescents – consisting of seven items assessing the frequency of generalized anxiety symptoms over the past two weeks, rated on a four-point Likert scale from 0 (“not at all”) to 3 (“nearly every day”). Higher scores indicate higher levels of generalized anxiety (Spitzer, Kroenke, Williams, & Löwe, 2006). Test Anxiety Inventory (TAI – adapted version) – used to assess anxiety related to exam situations. The adapted version includes items measuring emotional tension, worry, and physiological arousal during exams, rated on a Likert scale. Higher total scores indicate higher levels of test anxiety (Spielberger, 1980). To ensure geographical diversity, participants were recruited from three urban clusters (large, medium, and small cities). Data analysis was performed using Excel and SPSS 20. Descriptive statistics (means, standard deviations, and percentages) were used to present levels of anxiety. Gender differences in generalized anxiety and test anxiety were examined using independent samples t-tests (Welch t-test was applied when Levene’s test indicated unequal variances). The relationship between gender (coded as 0 = male, 1 = female) and test anxiety was examined using point-biserial correlation.

3. RESULTS

The results of descriptive and inferential analyses are presented in Tables 1–7. Generalized Anxiety (GAD-7) Boys reported lower mean scores on the GAD-7 compared to girls.

Table 1 *Descriptive Statistics for GAD-7 – Boys*

Parameter	N	Minimum	Maximum	Mean	SD
Score	56	0	14	7.54	3.68

Source: Authors’ research

Table 2 *Descriptive Statistics for GAD-7 – Girls*

Parameter	N	Minimum	Maximum	Mean	SD
Score	56	1	21	10.15	3.22

Source: Authors’ research

The Welch t-test indicated a statistically significant difference between boys and girls in generalized anxiety levels, $t(108.3) = -4.20$, $p < .001$. Girls ($M = 10.15$, $SD = 3.22$) scored significantly higher than boys ($M = 7.54$, $SD = 3.68$), with a large effect size (Cohen’s $d = 0.79$).

Table 3 *Independent Samples Test (Welch) – GAD-7*

Levene’s Test	F	Sig.	t	df	p	Mean Diff	SE Diff	95% CI Lower	95% CI Upper
	2.41	.124	-4.20	108.3	< .001	-2.61	0.62	-3.86	-1.36

Source: Authors’ research

Test Anxiety (TAI)

Male students reported mostly low to moderate levels of test anxiety.

Table 4 *Descriptive Statistics for TAI – Boys vs. Girls*

Gender	N	Minimum	Maximum	Mean	SD
Boys	56	8	28	16.0	4.0
Girls	56	10	40	30.0	5.0

Source: Authors’ research

Table 5 Distribution of Test Anxiety Levels – Boys

Anxiety Level	Score Range	n	%
Low	8–16	34	61.1
Moderate	17–28	22	38.9
High	29–40	0	0
Total		56	100

Source: Authors' research

Table 6 Distribution of Test Anxiety Levels – Girls

Anxiety Level	Score Range	n	%
Low	8–16	5	8.9
Moderate	17–28	11	19.6
High	29–40	40	71.4
Total		56	100

Source: Authors' research

Levene's test indicated unequal variances ($p = .024$); therefore, Welch t-test was applied. There was a highly significant difference between boys and girls in test anxiety, $t(93.6) = -13.50$, $p < .001$, with a very large effect size (Cohen's $d \approx 2.6$).

Table 7 Independent Samples Test (Welch) – TAI

Levene's Test	F	Sig.	t	df	p	Mean Diff	SE Diff	95% CI Lower	95% CI Upper
	5.34	.024	-13.50	93.6	< .001	-14.63	1.08	-16.79	-12.47

Source: Authors' research

Point-biserial correlation showed a strong positive association between gender and test anxiety ($r = 0.79$), indicating that gender accounted for approximately 62% of the variance in test anxiety scores.

Overall, the results support the study hypotheses: girls exhibited significantly higher levels of both generalized anxiety and test anxiety compared to boys. Gender emerged as a strong predictor of test anxiety in late adolescence.

4. DISCUSSION

The findings are consistent with a substantial body of previous research indicating that female adolescents are more susceptible to generalized and evaluation-related anxiety (Bao & Han, 2024; Sun et al., 2021). Test anxiety appears to be particularly pronounced and may develop early in the school years, persisting into late adolescence (van Oort et al., 2009). Biological factors (such as amygdala reactivity) and social expectations (including perfectionism and academic pressure) likely mediate this effect (Racine et al., 2021).

The results highlight the need for gender-sensitive interventions at multiple levels. At the individual level: cognitive-behavioral therapy (CBT), mindfulness, relaxation techniques, journaling, and time management. At the classroom level: clear assessment criteria, formative feedback, and brief relaxation exercises. At the school level: mental health programs, access to school psychologists, and teacher training. At the family level: parental guidance and modeling of healthy coping strategies. At the systemic level: flexible assessment formats and national awareness campaigns. These measures can reduce emotional burden and improve the learning environment, particularly for girls experiencing high academic stress.

5. CONCLUSIONS

The study confirms that gender is a significant predictor of anxiety among late adolescents, with females exhibiting higher levels of generalized and test-specific anxiety. Schools should implement preventive, gender-sensitive strategies integrated into everyday educational practice, rather than applying interventions only during high-stress periods such as final examinations. The findings indicate that girls in late adolescence are particularly vulnerable to generalized anxiety and evaluation-related anxiety, underscoring the need for a comprehensive support approach. At the individual level, the use of cognitive-behavioral techniques, mindfulness, relaxation, and journaling can help students recognize and regulate their thoughts and emotions. In the classroom, clear assessment criteria, formative feedback, and short relaxation exercises before tests create a supportive environment that reduces stress. At the school level, mental health programs, access to psychologists, and teacher training in anxiety recognition and management contribute to a more open and safe atmosphere. Families can provide support through guidance and modeling healthy coping strategies, while systemic measures such as flexible assessment formats and national mental health campaigns foster long-term support. Integrating these strategies allows for a reduction in emotional burden and the creation of a healthier, more relaxed, and more positive learning environment, particularly for girls facing high academic stress.

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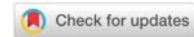
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PUBLIC FINANCE AND THE INTERNATIONAL ECONOMY IN SUPPORT OF THE SMART SPECIALISATION STRATEGY: FOCUS ON THE GREEN AND DIGITAL TRANSITION

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Abstract: This paper analyses the role of public finances and the international economy in supporting the implementation of the Smart Specialization Strategy of the Republic of North Macedonia for the period 2024–2027, with a particular focus on the green and digital transition. The main objective of the study is to examine how fiscal policy instruments, public investment, and international economic integration contribute to innovation-led and sustainable economic development. The methodology is based on qualitative policy analysis and comparative assessment, using official data from the Ministry of Education and Science, the Innovation Agency, and relevant European Union documents, complemented by academic literature in the fields of public finance and international economics. The results indicate that public finances play a key role in operationalizing the Smart Specialization Strategy through targeted budget allocations, innovation grants, and support for green and digital projects, while international economic integration enhances access to external funding, markets, and knowledge transfer. The findings further show that alignment with European Union policies significantly strengthens the effectiveness of national strategic interventions. The paper concludes that coherent coordination between fiscal policy, innovation support mechanisms, and international economic frameworks is essential for the successful implementation of the Smart Specialization Strategy. It is recommended that public financing for innovation be made more stable and predictable, that absorption of European Union funds be increased, and that international best practices be systematically integrated in order to accelerate the green and digital transition. Additional data used in the analysis include official budgetary information, innovation grant programs, and comparative indicators related to research, innovation, and sustainability in North Macedonia and the European Union.

Keywords: public finance; international economy; smart specialization; green transition; digital transition; innovation policy

Field: Social Sciences

1. INTRODUCTION

Public finances play a fundamental role in shaping economic development and supporting structural transformation, particularly in small open economies where fiscal capacity and policy coordination are critical for long term growth (Stiglitz, 2019; Musgrave & Musgrave, 1989). Through public expenditure, investment, and targeted financial instruments, governments influence innovation performance, sectoral competitiveness, and the allocation of resources toward priority development objectives.

In parallel, the international economic environment significantly affects national development strategies by shaping access to external markets, capital flows, and innovation networks (Krugman, Obstfeld, & Melitz, 2022). For countries integrated into the European economic space, alignment with European Union policy frameworks further determines domestic policy choices, particularly in the areas of digitalization, green transition, and innovation driven growth (European Commission, 2021).

In this context, the Republic of North Macedonia has increasingly harmonized its fiscal and economic policies with European Union priorities, especially following the adoption of the Smart Specialization Strategy 2024–2027. Smart specialization represents a strategic policy approach aimed at concentrating public resources on selected priority domains with high innovation potential, thereby enhancing competitiveness and sustainable growth (Foray, 2015; Ministry of Education and Science, 2023).

The successful implementation of the Smart Specialization Strategy largely depends on the availability and effective allocation of public financial resources. Budgetary support, innovation grants, and public investment programs determine the scope and intensity of support for research, digital transformation, and environmentally sustainable development (OECD, 2020). At the same time, international financial instruments and European Union programs complement national funding and expand opportunities for innovation and technology transfer (European Commission, 2021).

Recent institutional developments further illustrate this interaction between public finances and innovation policy. The establishment of the INOVA Agency for Innovation, together with the introduction

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of green grant schemes supporting sustainable and digital business models, reflects an increasing commitment to directing public and international resources toward innovation oriented growth (Biznis Vesti, 2026). Such initiatives align with European Union objectives for climate neutrality and digital competitiveness while strengthening domestic innovation ecosystems.

Given these developments, the objective of this paper is to analyze how public finances and the international economy support the implementation of the Smart Specialization Strategy of the Republic of North Macedonia, with particular emphasis on the green and digital transition. By examining public financial instruments, international funding mechanisms, and institutional coordination, the paper aims to contribute to a better understanding of the role of fiscal policy and international economic integration in fostering sustainable, innovation driven growth.

2. MATERIALS AND METHODS

This study applies a qualitative and comparative methodological approach to analyze the role of public finances and international economic integration in supporting the implementation of the Smart Specialization Strategy, with particular focus on the digital and green transition. The analysis is based on desk research and a systematic review of secondary data obtained from official and publicly available sources, including strategic documents published by the Ministry of Education and Science (2023), reports of the Innovation Fund of North Macedonia (2022), and relevant documents from European Union institutions (European Commission, 2021).

Budgetary data and information on innovation, digitalization, and green grant programs were examined to assess the allocation and effectiveness of public financial support. In addition, a comparative perspective was employed through the analysis of selected European Union practices related to financing smart specialization, green transition, and digital transformation (Foray, 2015). The methodological framework was further supported by academic literature in public finance and international economics, providing a conceptual basis for examining the interaction between public funding mechanisms and international economic integration.

3. RESULTS

The results of the analysis indicate that public financial instruments have played a significant role in supporting the implementation of the Smart Specialization Strategy in the Republic of North Macedonia. Budgetary allocations and grant schemes aimed at innovation, digitalization, and green development were identified as the main channels through which strategic priorities were operationalized (Ministry of Education and Science, 2023; Innovation Fund of North Macedonia, 2024).

Empirical evidence showed that public funding was predominantly directed toward small and medium-sized enterprises, start ups, and research oriented projects, with a growing focus on environmentally sustainable and digitally driven activities. In particular, national grant programs contributed to increased investment in green technologies, digital solutions, and innovation capacity within priority domains defined by the Smart Specialization Strategy (European Commission, 2023).

The analysis further revealed that international financial support significantly complemented domestic public financing. European Union programs and funds enabled additional investment in innovation, green transition, and digital transformation, thereby expanding the scope of national policy measures (European Commission, 2022). Access to these instruments enhanced the integration of domestic firms into regional and European value chains.

A notable recent development was the establishment of the Agency for Innovation, Technological Development and Entrepreneurship (INOVA), which introduced new grant schemes for green businesses supported jointly by the European Union and the Government of North Macedonia. Initial evidence indicated that these programs strengthened financial support for environmentally sustainable projects and reinforced the alignment between public finances and green transition objectives (INOVA, 2026).

4. DISCUSSIONS

The findings confirm that the alignment of public financial frameworks with the objectives of the Smart Specialization Strategy is essential for fostering innovation led and sustainable economic development. The prioritization of digitalization and green transition observed in North Macedonia reflects broader European Union policy trends, where smart specialization serves as a key mechanism for directing public resources toward high value and future oriented sectors (European Commission, 2023).

Although North Macedonia operates with limited fiscal capacity compared to European Union member states, the combination of national funding instruments and external financial support helped mitigate these constraints. The results suggest that international economic integration enhanced the effectiveness of domestic public spending by facilitating access to funding, technology transfer, and innovation networks (Krugman, Obstfeld, & Melitz, 2022).

The establishment of Agency for Innovation, Technological Development and Entrepreneurship (INOVA) represented an important institutional innovation within the national innovation system. By introducing targeted grant schemes for green businesses, the agency strengthened the operational link between public finances and green transition priorities, thereby supporting the practical implementation of the Smart Specialization Strategy (INOVA, 2026). This development underscored the importance of institutional coordination and specialized agencies in improving policy effectiveness.

Overall, the discussion highlights that coherent coordination between public financial planning, innovation support mechanisms, and European Union instruments is a critical determinant of successful smart specialization implementation. These findings are consistent with existing theoretical and empirical literature, which emphasizes the role of public finances and international economic integration in supporting long term competitiveness in small open economies (Musgrave & Musgrave, 2019; Stiglitz & Rosengard, 2020).

5. CONCLUSIONS

The analysis demonstrates that public finances and the international economy play a crucial and complementary role in supporting the Smart Specialization Strategy of the Republic of North Macedonia. Public financial instruments facilitate the implementation of strategic priorities, while international economic integration enhances access to funding, markets, and innovation networks.

The findings indicate that the success of the Smart Specialization Strategy depends on effective coordination between public financial frameworks, innovation support mechanisms, and European Union instruments. Stable and predictable public financing, improved absorption of European Union funds, and stronger institutional coordination are essential for accelerating the green and digital transition. In this context, the Smart Specialization Strategy represents a key mechanism for achieving sustainable, innovation-driven growth and strengthening long-term competitiveness.

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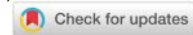
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THE ROLE OF ARTIFICIAL INTELLIGENCE IN CONTEMPORARY DIGITAL MARKETING STRATEGIES: A SYSTEMATIC REVIEW

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Abstract: The rapid development of digital technologies has significantly transformed contemporary marketing practices, placing artificial intelligence (AI) at the centre of strategic decision-making and customer engagement. This study aims to systematically review recent academic literature on the role of artificial intelligence in contemporary digital marketing strategies, with particular emphasis on personalisation, predictive analytics, marketing automation, and ethical implications. By synthesising empirical and theoretical evidence, the review seeks to provide an integrated understanding of how AI reshapes marketing processes and organisational performance. A systematic literature review methodology was employed, following established review protocols to ensure transparency and methodological rigour. Relevant studies published between 2022 and 2026 were identified through structured searches of the major academic database, Google Scholar. After applying predefined inclusion and exclusion criteria, sixteen peer-reviewed articles were selected for qualitative content analysis and thematic synthesis. Both quantitative and qualitative research designs were considered, encompassing survey-based studies, machine learning applications, case analyses, and systematic reviews. The findings indicate that artificial intelligence significantly enhances digital marketing effectiveness by improving customer segmentation, personalisation, forecasting accuracy, and resource optimisation. Machine learning techniques, particularly clustering and ensemble learning, enable more precise targeting and campaign optimisation, while AI-powered automation supports real-time decision-making and customer interaction. However, the review also identifies persistent challenges related to data quality, model transparency, system integration, and ethical concerns, particularly regarding privacy and algorithmic bias. Overall, the study highlights that while artificial intelligence offers substantial strategic advantages, its long-term value depends on responsible implementation, organisational readiness, and effective governance structures. The review contributes to existing literature by consolidating current evidence and identifying research gaps, particularly in qualitative inquiry and cross-cultural analysis. These findings provide practical and theoretical insights for researchers and practitioners seeking to leverage AI for sustainable and competitive digital marketing.

Keywords: artificial intelligence, digital marketing, data-driven marketing; marketing automation; consumer behaviour.

Field: Social Sciences

1. INTRODUCTION

The rapid growth of digital technologies has fundamentally reshaped contemporary marketing practices, enabling organisations to engage with consumers across multiple online platforms and to personalise communication in real time. Digital marketing has become a central component of corporate strategy, supported by increasing volumes of customer data and advanced analytical tools. Recent studies indicate that artificial intelligence (AI) and predictive analytics have played a decisive role in this transformation by automating decision-making processes and enhancing consumer behaviour forecasting (Al Rafi, 2023; Potwora et al., 2024; Obaid, 2025).

Artificial intelligence enables marketers to analyse complex datasets, identify behavioural patterns, and design targeted campaigns through machine learning and recommendation systems. These technologies support data-driven decision-making and improve forecasting accuracy, contributing to higher marketing efficiency and customer engagement (Al Rafi, 2023; Obaid, 2025; Pande et al., 2025). As a result, marketing strategies are increasingly based on predictive and automated systems rather than managerial intuition. One of the most significant applications of AI in digital marketing is personalisation, which has evolved into hyper-personalisation through real-time data processing and customer profiling. AI-powered CRM (Customer Relationship Management) systems enable the delivery of customised content, product recommendations, and communication across multiple channels, strengthening customer relationships and brand loyalty (Rane et al., 2023; Potwora et al., 2024; Sathish et al., 2026).

Personalisation has therefore become a key strategic tool for achieving competitive advantage in digital environments. Predictive analytics further supports strategic marketing by enabling accurate

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estimation of customer lifetime value, churn probability, and long-term profitability. These capabilities are particularly important for e-commerce and subscription-based platforms, where retention and customer engagement are critical success factors (Al Rafi, 2023; Pande et al., 2025; Umezurike et al., 2025).

Consequently, AI-driven forecasting has become an essential component of modern digital marketing strategies. Despite these advantages, several challenges limit the effective implementation of AI in marketing. These include data quality issues, limited model generalisability, difficulties in system integration, and ethical concerns related to privacy, transparency, and algorithmic bias (Obaid, 2025; Tashtemirovich et al., 2024; Potwora et al., 2024). Addressing these challenges is necessary to ensure responsible and sustainable AI adoption.

In response to these developments, this review aims to synthesise recent academic literature on the role of artificial intelligence in digital marketing strategies. By examining technological applications, performance outcomes, and ethical considerations, the study seeks to provide an integrated understanding of how AI shapes contemporary marketing practices and to identify directions for future research.

2. METHODS

This study adopted a systematic literature review methodology to examine the role of artificial intelligence in contemporary digital marketing strategies. The review process was designed to ensure transparency, reproducibility, and comprehensive coverage of relevant academic research. The methodological framework was informed by established review practices and recent studies employing systematic and integrative approaches in marketing and information systems research (Motlani et al., 2025; Nianko & Andrushkevych, 2025).

Data collection was conducted through structured searches in the major academic database, Google Scholar. Keywords and Boolean operators were used to identify relevant publications, such as “artificial intelligence”, “digital marketing”, “personalisation”, “predictive analytics”, “chatbots”, and “marketing automation”. The initial search yielded a broad set of publications, which were subsequently refined through predefined inclusion and exclusion criteria. Only peer-reviewed journal articles and conference papers published between 2022 and 2026 and written in English were considered. The screening process was performed in three stages.

First, duplicate records were removed. Second, titles and abstracts were examined to assess relevance to AI applications in digital marketing. Third, full-text analysis was conducted to confirm methodological rigour and thematic relevance. Studies focusing exclusively on technical system design without marketing implications were excluded. This multi-stage filtering process enhanced the reliability and validity of the final dataset. Following selection, the included studies were subjected to qualitative content analysis and thematic synthesis. Key methodological characteristics, research designs, data sources, analytical techniques, and main findings were systematically extracted. Both qualitative and quantitative studies were considered, including survey-based research, case studies, experimental designs, and machine learning-based analyses (Tauheed et al., 2024; Al Rafi, 2022).

To ensure analytical consistency, studies were categorised according to methodological approach, application domain, and type of AI technology employed. Comparative analysis was then used to identify dominant research trends, methodological gaps, and emerging directions. This integrative approach enabled a balanced evaluation of empirical evidence and theoretical contributions, supporting a comprehensive understanding of AI-driven digital marketing strategies.

To enhance the reliability of the review process, inter-study consistency was ensured through independent verification of extracted data and cross-checking of key methodological features. A coding framework was developed to categorise studies according to research design, data characteristics, AI application domains, and performance indicators. This framework enabled systematic comparison across studies and reduced the risk of subjective interpretation. In addition, methodological quality was assessed using predefined criteria, including clarity of research objectives, appropriateness of analytical techniques, and transparency of reporting. Studies that did not meet minimum quality standards were excluded from the final synthesis. This quality assessment process strengthened the robustness of the review and supported the validity of the derived conclusions (Table 1).

Table 1. Overview of methodologies in reviewed studies on AI in digital marketing

No.	Authors (Year)	Research Design	Data / Sample	Methods / Tools	Main Focus
1	Al Rafi (2022)	Quantitative / ML-based	50,000 customer records	PCA, K-Means, DBSCAN, GBM	Customer segmentation
2	Al Rafi (2023)	Quantitative / ML	Transactional datasets	Random Forest, GBM, AdaBoost	Predictive marketing
3	Ilić et al. (2025)	Mixed-methods (quantitative + qualitative)	Organisational data	Surveys, interviews	Chatbots & work
4	Krsmanović (2025)	Narrative literature review / conceptual analysis	Academic literature	Conceptual analysis, content review	AI as creative partner in digital marketing
5	Motlani et al. (2025)	Systematic review	Academic articles	SLR, thematic analysis	Personalisation
6	Murár & Piatrov (2024)	Narrative review with comparative elements	Industry reports	Comparative analysis	Chatbots
7	Nan et al. (2024)	Narrative literature review / trend analysis	Secondary sources	Trend analysis	Marketing analytics
8	Nianko & Andrushkevych (2025)	Systematic review	Academic publications	Content & comparative analysis	AI-driven digital marketing & sustainability
9	Obaid (2025)	Systematic review	Peer-reviewed journal articles (2024–2025)	PRISMA protocol, thematic synthesis	AI-driven digital marketing; predictive analytics; ethics & innovation
10	Pande et al. (2025)	Empirical / ML-based framework	Big data sources (e-commerce context)	Machine learning, clustering, predictive analytics	Recommendations & consumer behaviour
11	Potwora et al. (2024)	Systematic literature review	Academic literature	SLR, thematic analysis	Marketing automation
12	Rane et al. (2023)	Review + bibliometric analysis	Academic publications	Literature review, bibliometric analysis	CRM personalisation
13	Sathish et al. (2026)	Mixed-methods (case studies + review)	Secondary data, case evidence	Qualitative synthesis, comparative analysis	Sustainability & AI
14	Tashtemirovich et al. (2024)	Empirical modelling	Campaign datasets	Neutrosophic modelling	Marketing efficiency
15	Tauheed et al. (2024)	Quantitative survey	115 respondents	Correlation, regression analysis	AI impact on marketing performance
16	Umezurike et al. (2025)	Analytical literature-based modelling	Subscription platform studies	Regression models, ML techniques	CLV prediction

Abbreviations: AI – Artificial Intelligence; CLV – Customer Lifetime Value; CRM – Customer Relationship Management; DBSCAN – Density-Based Spatial Clustering of Applications with Noise; GBM – Gradient Boosting Machine; ML – Machine Learning; PCA – Principal Component Analysis; PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SLR – Systematic Literature Review.

Source: Authors' research

3. RESULTS OF THE REVIEW

The findings of the reviewed literature indicate that artificial intelligence plays a central role in enhancing the effectiveness, efficiency, and strategic orientation of contemporary digital marketing. Across empirical studies, AI-based tools consistently demonstrate strong positive effects on customer engagement, campaign performance, and personalisation outcomes. Machine learning techniques, particularly clustering, ensemble learning, and predictive modelling, are widely applied to analyse complex consumer data and support evidence-based decision-making. Several quantitative studies confirm that AI-driven segmentation

and predictive analytics significantly improve marketing performance. Al Rafi (2022) reports that machine learning-based customer segmentation increased click-through rates (CTR) by 34% and conversion rates by 27%, demonstrating the practical value of data-driven targeting strategies. Similarly, Al Rafi (2023) shows that ensemble learning models, particularly Optimized AdaBoost, Random Forest, and Gradient Boosting, enhance the accuracy of customer engagement and sales prediction, enabling more effective campaign optimisation. Survey-based research further supports these findings (Tauheed et al., 2024). Tauheed et al. (2024) identify a strong positive relationship between AI adoption and digital marketing effectiveness, with AI explaining more than 80% of variance in marketing performance indicators. Their results confirm that AI contributes to improved planning, targeting, and campaign evaluation. Advanced analytical approaches are also evident in recent studies. Tashtemirovich et al. (2024) apply neutrosophic modelling to assess marketing efficiency and find that AI integration increases campaign effectiveness by approximately 27% while reducing execution time by 33%. These results highlight the operational benefits of intelligent automation. Furthermore, Murár and Piatrov (2024) show that AI chatbots improve customer interaction and lead generation, although they note limitations related to scalability and data protection. Overall, empirical evidence indicates that AI enhances personalisation, forecasting accuracy, and resource optimisation. However, several studies also report persistent challenges, including data quality issues, limited external validity, and ethical concerns. These findings suggest that while AI offers substantial strategic advantages, its long-term effectiveness depends on responsible implementation and organisational readiness (Table 2).

Table 2. Key findings from selected empirical studies

No.	Authors (Year)	Methodology	Sample / Data	Key Findings
1	Al Rafi (2022)	ML-based quantitative analysis	50,000 customer records	CTR increased by 34%, conversion by 27% through AI segmentation
2	Al Rafi (2023)	Ensemble learning models	Transactional and campaign data	Improved prediction of engagement and sales
3	Murár & Piatrov (2024)	Qualitative analysis	Industry cases	Chatbots improved interaction and lead generation
4	Tashtemirovich et al. (2024)	Neutrosophic modelling	Campaign datasets	Effectiveness +27%, execution time – 33%
5	Tauheed et al. (2024)	Survey, regression analysis	115 marketers	AI explained 82.4% of marketing performance variance

Abbreviations: AI – Artificial Intelligence; CTR – Click-Through Rate; ML – Machine Learning.
Source: Authors' research

4. DISCUSSION

The findings of this review confirm that artificial intelligence has become a fundamental component of contemporary digital marketing strategies. Empirical evidence consistently demonstrates that AI-driven tools enhance campaign effectiveness, customer engagement, and decision-making accuracy. In particular, machine learning-based segmentation and predictive analytics enable organisations to move beyond traditional demographic targeting towards more dynamic and behaviour-based approaches. These developments support the transition from intuition-based marketing to data-driven strategic planning. The reviewed studies also highlight the growing importance of personalisation and automation in creating competitive advantage. AI-powered recommendation systems, chatbots, and marketing automation platforms facilitate real-time interactions and improve customer experience. However, the findings suggest that technological capabilities alone are insufficient to guarantee success. Organisational readiness, data management infrastructure, and employee competencies play a crucial role in determining the effectiveness of AI implementation. Despite the substantial benefits, several challenges remain.

Many studies report limitations related to data quality, model transparency, and external validity. In addition, ethical concerns regarding privacy, algorithmic bias, and consumer trust continue to restrict widespread adoption. These issues are particularly relevant in highly regulated markets, where compliance requirements may limit the use of advanced analytics. Furthermore, the dominance of quantitative and technology-oriented approaches in existing research indicates a lack of in-depth qualitative insights into managerial decision-making and consumer perceptions. Overall, the findings suggest that the strategic value of AI in digital marketing depends on its responsible and context-sensitive integration. Future research should therefore adopt interdisciplinary and mixed-method approaches to better understand the

long-term organisational and societal implications of AI-driven marketing.

In addition, the reviewed studies suggest that the competitive benefits of artificial intelligence are unevenly distributed across organisations and markets. Large firms with advanced technological infrastructure and access to extensive datasets are better positioned to exploit AI-driven marketing tools, while small and medium-sized enterprises often face financial and technical constraints. This digital divide may reinforce existing market inequalities and limit innovation in less developed regions. Moreover, the rapid pace of technological change poses challenges for regulatory frameworks, which frequently lag behind emerging AI applications. As a result, policymakers and industry stakeholders must collaborate to establish adaptive governance mechanisms that balance innovation with consumer protection and ethical responsibility.

5. CONCLUSION

This review provides a comprehensive overview of the role of artificial intelligence in contemporary digital marketing strategies. The analysed studies demonstrate that AI significantly enhances marketing performance through improved personalisation, predictive accuracy, and resource optimisation. Machine learning and automation tools enable organisations to better understand consumer behaviour and deliver more relevant and timely marketing interventions.

At the same time, the findings indicate that successful AI adoption requires more than technological investment. Effective data governance, ethical standards, and organisational capabilities are essential for maximising the benefits of intelligent systems. Without these supporting factors, the potential of AI-driven marketing may remain underutilised. The review also reveals several research gaps, particularly in relation to qualitative perspectives, cross-cultural comparisons, and long-term performance evaluation. Addressing these gaps would contribute to a more balanced and holistic understanding of AI's impact on marketing practice. In conclusion, artificial intelligence represents a powerful strategic resource for digital marketers, offering significant opportunities for innovation and competitiveness. However, its sustainable value depends on responsible implementation, continuous learning, and alignment with organisational and societal expectations. Furthermore, continuous investment in digital skills development and interdisciplinary collaboration will be essential for maximising the long-term value of artificial intelligence in marketing. Organisations must foster adaptive learning cultures that support innovation while ensuring ethical compliance and customer trust in increasingly data-driven business environments.

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ENHANCING KEY COMPETENCIES FOR THE EMPOWERMENT OF MEDIA LITERACY

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Abstract: Continuous development of knowledge, skills, and abilities that lead to the enhancement of media literacy results in an adequate perception of media discourse, the development of critical thinking, and significantly greater safety, especially in the virtual environment. This represents an indispensable resource that provides both individuals and society as a whole with the necessary knowledge and skills to identify, understand, and evaluate media content, thereby creating a platform for the participatory exercise of one of the fundamental human rights. In the contemporary era, educational institutions, from primary education to doctoral studies, should be recognized for their educational and practically applicable role in designing, creating, implementing, and evaluating media literacy educational programs. Such an approach, in subsequent iterations, implies their broader contextual and programmatic transformation to become more sensitive and flexible in response to the rapid changes in the media industry. Within this context, a primary study was conducted to examine how and to what extent students have developed key competencies during their higher education, how these competencies contribute to the development of media literacy, and how they can be improved and integrated into curricula. The research sample was purposively selected and consisted of students from two private universities in the Republic of Serbia (n=185). Data were collected from December 2025 to February 2026. The study established the importance of media literacy and critical thinking for accessing, analyzing, and evaluating media content in various contexts. It was demonstrated that media literacy is closely linked to the development of critical thinking, digital literacy, and ethical responsibility, and that the lack of development of key competencies can lead to uncritical acceptance of disseminated information and manipulation of public opinion.

Keywords: media literacy, education, key competencies, critical thinking, manipulation

Field: Social Sciences

1. INTRODUCTION

The media have long surpassed the threshold at which they primarily served as tools for information and entertainment. In the new millennium, traditional and especially digital media exert a powerful influence on shaping attitudes, values, behaviors, and identities, with young people being particularly sensitive to these effects. In such a dynamic and ever-changing media environment, among the most important competencies required for active social, critical, and responsible participation, manifested through the ability to access media discourse, analyze and evaluate it, and form independent opinions in various contexts, is media literacy. Media literacy positively correlates with the development of critical thinking, digital literacy, and communication skills, while the establishment of ethical responsibility is indispensable. The absence or abstraction of these competencies can lead to the uncritical acceptance of information, dissemination of misinformation, and manipulation of targeted audiences.

Media literacy should be oriented toward addressing the key challenges of contemporary society, including phenomena that affect personal autonomy and decision-making capacity, thereby fostering the development of critical awareness of new media-mediated realities. In this context, it is essential to move beyond approaches based solely on technical mastery of devices to prevent uncritical adoption and consumption of media content (Mesquita-Romero et al., 2022). A prerequisite for redefining the knowledge and skills students can acquire during formal education is the enhancement of teachers' awareness and a deeper understanding of contemporary media literacy competencies, as an integral part of the educational and pedagogical role of universities in promoting a safe, responsible, and inclusive relationship between students and the media (Lähdesmäki & Maunula, 2023).

Valuing the relevance of media literacy in contemporary society, it is essential to systematically investigate which key competencies contribute to its development and how they can be enhanced through educational processes. The research encompassed an analysis of the following key competencies, selected in accordance with the research objectives and theoretical framework: Capacity for original thinking and innovative approaches, Analytical and evaluative reasoning skills, Problem-oriented reasoning and solution development, Competence in informed and responsible decision-making, Adaptability to changing conditions and contexts, Collaborative work competence in group settings, Interpersonal communication

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effectiveness, Proficiency in spoken and written foreign-language communication, Fundamental digital and ICT literacy, Information handling and analytical processing skills, Methodological competence in research and inquiry, Adherence to ethical principles and professional integrity, Practical implementation of theoretical knowledge, Capacity for responsible leadership and coordination, Sensitivity to cultural diversity and inclusiveness, Proactive behavior and autonomous task management, Learning capacity and continuous development orientation, Planning and organizational competence, Reflective and self-evaluative capability, and Intrinsic motivation and work engagement.

2. LITERATURE REVIEW

Media competencies encompass not only practical skills but also various forms of literacy, including knowledge, the capacity to critically analyze media content, as well as the ability to employ media effectively for innovative and creative communication. (Tolić, 2009). Media education should include more than just learning how to use digital tools. It should also help students understand the context, purpose, and social effects of media. This way, students become thoughtful and responsible, able to create meaningful content and take part in democratic discussions (Buckingham, 2003).

Fake news, hidden advertising, hate speech, cyberbullying, and gender and racial stereotypes are some of the problems people and society face in the digital media age. Because of this, media literacy becomes an important skill that helps people understand the media world better and take part more actively in today's democratic society (Vučetić, 2020, pp. 6–7). The factors that substantially impact the development of particular competencies are dynamic and subject to variation, yet they typically reflect spatial and temporal constraints. Penjišević et al. (2025) demonstrated that individuals with higher levels of media literacy are better equipped for labor market entry, while also highlighting the family's significant positive influence on the development of 21st-century skills.

Pungente (1989) explains the key concepts and reasons for media education as follows: all media are deliberately created constructs, not just reflections of reality; they shape reality by influencing attitudes, behaviors, and ideas; media operate as a profit-driven industry where the audience is treated as a commodity; users actively interpret media content rather than passively receiving it; media have social and political impacts; and different media outlets report the same event in different ways.

Sančanin et al. (2024) emphasize that in a participatory environment characterized by a preference for speed and cost-efficiency over accuracy, the function of the media is increasingly shifting toward an educational role. In this context, educational institutions bear the responsibility of providing students with competencies that are relevant, broadly transferable, and competitive within the labor market. The authors highlight information management capabilities, particularly the skills related to collecting, processing, and analyzing data from diverse sources, as the most essential competency. Furthermore, the study indicates that students who developed their soft skills and media literacy throughout their academic progression exhibited a higher level of proficiency in critically assessing media content and effectively distinguishing reliable information from misleading or false material.

Emphasizing media literacy in relation to artificial intelligence (AI) constitutes a crucial civic competency, because preparing students to recognize and critically resist manipulative information strengthens the quality of education, supports lifelong learning, and protects democratic processes in environments mediated by algorithms. In this context, Ponce Rojo et al. (2025) regard media and information literacy as a principal means of promoting the ethical and responsible use of digital tools within educational settings. Their objective is to reduce students' vulnerability to harm by teaching them to distinguish reliable information from biased or false content.

In her 2025 study, Khudoyarova Dilnoza identifies significant gaps in current understanding regarding the ways educational institutions incorporate elements of spiritual education alongside contemporary pedagogical methods and technological advancements. The research examines the interactions among schools, families, and community organizations in promoting spiritual resilience and moral consciousness among youth as a response to modern challenges. The curricular innovations proposed in the study seek to enhance young people's competencies in identifying and resisting harmful ideological influences, as well as in combating disinformation, by integrating media literacy with national ideological and value-based content.

Several authors highlight that the current economic landscape, coupled with the shift toward the fifth and sixth developmental paradigms, will exceed the capacities of traditional educational models, thereby requiring significant transformations in educational approaches, methodologies, and goals. These transformations involve a departure from predominantly extensive teaching and learning practices toward strategies that emphasize the intensive cultivation of skills and professional competencies, with particular

focus on media literacy and media education (Lebid & Shevchenko, 2020).

3. DATA, METHODOLOGICAL APPROACH, AND KEY OBSERVATIONS

The primary survey was developed to investigate the manner and degree to which students perceive the development of key competencies throughout their studies, and how this development impacts critical thinking, with a particular emphasis on the dissemination of information through the media. In relation to this, the following research questions were posed:

Q1. Which key competencies, such as critical thinking, digital competencies, communication, and ethical skills, play the most significant role in enhancing media literacy?

Q2. What are the challenges and limitations in implementing educational strategies aimed at developing media literacy?

Data were collected through the use of Google Forms as the primary research instrument. The research sample was selected using a purposive sampling approach and included students enrolled at two private universities located in the Republic of Serbia. To ensure the content validity of the questionnaire, a pilot study was initially carried out with 25 respondents. Following this, the finalized survey was administered to a separate sample of 185 participants (n=185). Data collection occurred between December 2025 and February 2026.

The questionnaire was structured into two distinct sections. The initial section comprised general demographic and background questions, while the subsequent section required respondents to evaluate the development of key 21st-century competencies using a seven-point Likert scale, ranging from 1 (indicating insufficient development) to 7 (indicating highly developed competence). To address the research questions, descriptive statistics, measures of dispersion, and measures of skewness were calculated. Nonparametric techniques were employed for hypothesis testing. Data processing and analysis were carried out with the use of SPSS.

4. ANALYSIS OF EMPIRICAL FINDINGS AND DISCUSSION

In the study, 185 participants took part, of whom 48.1% were male and 51.9% female. The largest proportion of respondents, 38.6%, reported an academic performance classified as above average. For further details, see Table 1.

Table 1: Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	89	48.1	48.1	48.1
	Female	96	51.9	51.9	100.0
	Total	185	100.0	100.0	
Your average grade during your university studies	Excellent	28	15.1	21.2	21.2
	Above average	51	27.6	38.6	59.8
	Average	40	21.6	30.3	90.2
	Below average	13	7.0	9.8	100.0
	Total	132	71.4	100.0	
Missing	System	53	28.6		
Total		185	100.0		

Source: Calculated by the authors.

Respondents identified that the top-ranked eight competencies predominantly belong to the Cognitive and Metacognitive domain. Namely, Ability to solve problems, Ability to apply knowledge in practice, Ability to learn, Ability to organize and plan, and Initiative and self-management, as well as the Digital-Information domain, which includes Basic computer skills and the Ability to manage information through gathering and analyzing data from various sources. The only exception to this pattern is the competency Flexibility and adaptability, defined as the ability to adjust to new situations. All competencies exhibit relatively low variability (CV are below 27%).

According to the respondents, the most well-developed competency during their studies is Basic computer skills, which received an average score of 5.58, a median of 6, and a mode of 7. The

competency Ability to manage information, encompassing the gathering and analysis of information from various sources, was rated with an average score of 5.25, while both its median and mode were 6. These two competencies belong to the Digital-Information domain. It can be stated that the Digital-Information domain encompasses knowledge, skills, and attitudes that enable an individual to use digital technologies efficiently, critically, and responsibly. In today's society, characterized by constant information availability and the primary role of digital media, the development of competencies within the Digital-Information domain represents one of the key prerequisites for fostering media literacy and active participation of individuals in educational, professional, and social processes. The competency related to information management, encompassing the collection and analysis of information from multiple sources, which involves identifying significant sources, collecting, selecting, and processing information from various media and digital platforms, holds a central role within this group. It enables distinguishing reliable information from misinformation, manipulative content, and media bias. Importantly, competencies within the Digital-Information domain also include raising awareness of the ethical, legal, and security aspects of using digital media, such as privacy protection, responsible information sharing, and respect for copyright. In this way, competencies from this group contribute to the development of a responsible and critically oriented user of media content.

The second group of competencies, the Cognitive and Metacognitive domain, encompasses a set of competencies related to the mental processes required for acquiring, understanding, applying, and evaluating knowledge, as well as an individual's ability to regulate their thinking. This group of competencies forms the foundation for the development of critical thinking in contemporary society.

The competence that the respondents developed the most during their studies is the ability to solve problems, which received an average score of 5.46, with both the modal and median scores being 6. This variable exhibits strong negative skewness (Skewness = -1.101). The competency Ability to solve problems involves identifying problems, analyzing available information, selecting appropriate strategies, and evaluating the outcomes of decisions made. It is closely linked to the ability to apply knowledge in practice, as it requires the transfer of theoretical knowledge to concrete situations and real-world contexts.

The respondents rated the development of the competency Ability to apply knowledge in practice with an average score of 5.45, a mode and median of 6, and a skewness value of -1.059, indicating a pronounced negative skew in the distribution. For further details, see Table 2.

Table 2: Descriptive Statistics

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Std. Error
Basic computer skills	179	1	7	5.58	1.689	2.852	-1.033	0.182
Ability to solve problems	185	1	7	5.46	1.281	1.641	-1.101	0.179
Ability to apply knowledge in practice	183	1	7	5.45	1.496	2.238	-1.059	0.180
Ability to learn	184	1	7	5.39	1.390	1.933	-1.172	0.179
Capacity for flexibility and adaptation to new situations	178	1	7	5.38	1.434	2.057	-0.928	0.182
Ability to organize and plan	180	1	7	5.32	1.505	2.264	-0.892	0.181
Initiative and self-management	183	1	7	5.31	1.440	2.073	-0.974	0.180
Proficiency in sourcing and interpreting information from different channels	180	1	7	5.26	1.518	2.303	-0.810	0.181
Appreciation of diversity and multiculturalism	183	1	7	5.21	1.914	3.663	-0.836	0.180
Ability to criticize and self-criticize	180	1	7	5.18	1.577	2.486	-0.757	0.181
Cooperation - the ability to work in a team	181	1	7	5.15	1.934	3.739	-0.918	0.181
Ability to make decisions	180	1	7	5.13	1.451	2.105	-0.679	0.181
Critical thinking	185	2	7	5.13	1.300	1.690	-0.649	0.179
Research and inquiry - research skills	183	1	7	5.08	1.542	2.379	-0.665	0.180
The ability to effectively communicate both orally and in writing in a foreign language.	181	1	7	5.05	1.787	3.192	-0.761	0.181
Communicativeness	181	1	7	4.99	1.817	3.300	-0.624	0.181
Self-motivation to work	182	1	7	4.94	1.848	3.416	-0.733	0.180
Creativity/innovation	185	1	7	4.91	1.409	1.986	-0.554	0.179
Leadership ability - leadership and responsibility	183	1	7	4.85	1.634	2.669	-0.546	0.180
Ethical commitment and orientation	181	1	7	4.80	1.545	2.386	-0.714	0.181

Source: Calculated by the authors.

The Kruskal–Wallis test revealed a statistically significant difference in the assessment of the development of the following competencies: Fundamental computer literacy, Problem-solving skills, Ability to implement knowledge practically, and Skills in organizing and planning, in relation to students'

grade point averages during their studies. For all these variables, students with an Excellent overall GPA had the highest mean ranks.

Table 3. Test Statistics^{a,b}

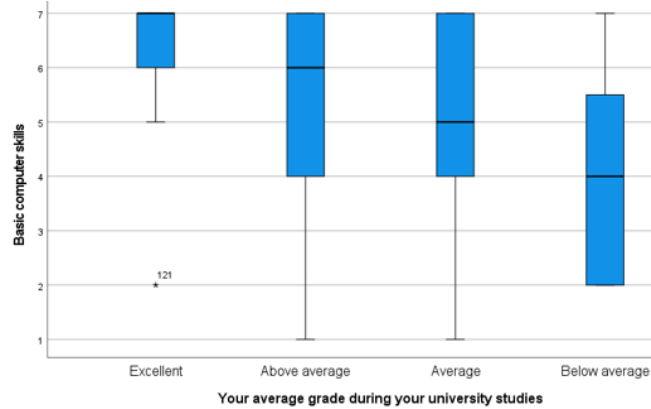
	Basic computer skills	Ability to solve problems	Ability to apply knowledge in practice	Ability to learn	Ability to organize and plan	Capacity to systematically collect, critically evaluate, and synthesize information from diverse sources
Kruskal-Wallis H	14.841	11.219	9.746	4.774	8.760	2.939
df	3	3	3	3	3	3
Asymp. Sig.	.002	.011	.021	.189	.033	.401

a. Kruskal Wallis Test

b. Grouping Variable: Your average grade during your university studies

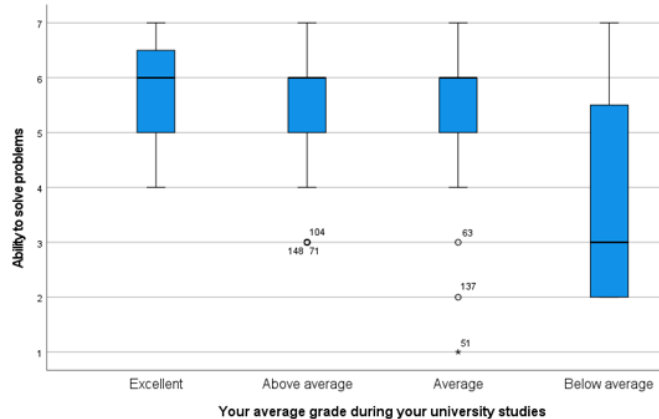
Source: Calculated by the authors.

Graph 1: Assessment of the Competency Development Level: Basic Computer Skills



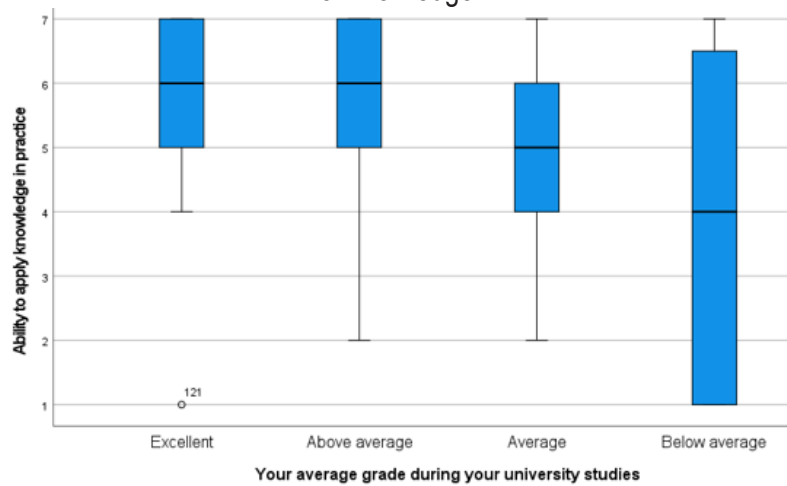
Source: Calculated by the authors.

Graph 2: Assessment of the Competency Development: Problem-Solving Ability



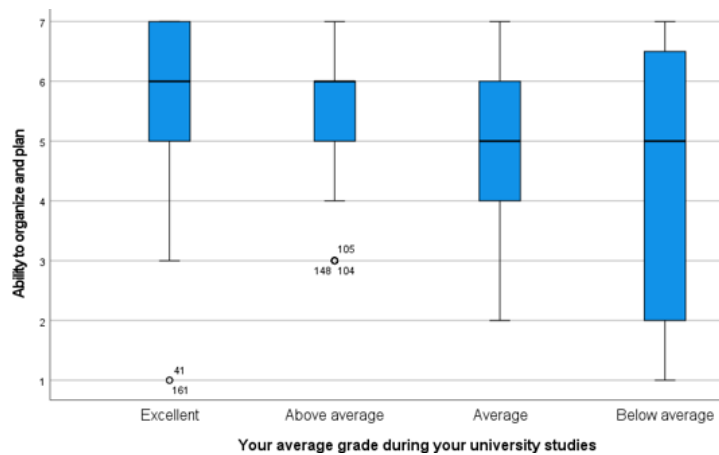
Source: Calculated by the authors.

Graph 3: Assessment of the Competency Development Level: Competence in practical application of knowledge



Source: Calculated by the authors.

Graph 4: Assessment of the level of competence development and the ability to organize and plan



Source: Calculated by the authors.

The capacity to systematically collect, critically evaluate, and synthesize information from diverse sources is essential for developing a comprehensive understanding and making informed decisions. This competence is complemented by the ability to identify, analyze, and effectively resolve complex challenges through strategic problem-solving methodologies. Furthermore, proficiency in translating theoretical knowledge into practical applications demonstrates an individual's capability to implement learned concepts within real-world contexts. Underpinning these skills is an aptitude for continuous intellectual growth, characterized by the effective acquisition, assimilation, and application of new knowledge and skills, which ensures ongoing adaptability and development in dynamic environments. There are significant direct linear relationships, as evidenced by correlation coefficients falling within the interval $0.5 < r < 0.7$. Additional information can be found in Table 3 below.

Table 3: Correlations

	1	2	3	4	5	6	7
Fundamental computer skills	-						
The ability to systematically gather and critically analyze information from diverse sources	.640**	-					
Capacity to identify, analyze, and resolve issues effectively	.515**	.468**	-				
Competence in implementing acquired knowledge within real-world contexts	.539**	.546**	.602**	-			
Capacity for continuous acquisition and assimilation of new knowledge	.453**	.369**	.550**	.651**	-		
Ability to organize and plan	.351**	.403**	.463**	.465**	.601**	-	
Initiative and self-management	.455**	.443**	.411**	.560**	.499**	.446**	-

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Calculated by the authors.

5. CONCLUSION

The results of the study suggest that competencies such as basic computer literacy, information management (including the collection and analysis of data from diverse sources), problem-solving skills, the practical application of knowledge, learning ability, organizational and planning skills, as well as initiative and self-management, are most effectively cultivated during university education. This confirms the crucial role of higher education institutions in the systematic formation of students' knowledge, skills, and capacities. The teaching and learning process is decisive for the development of cognitive, metacognitive, and digital-information competencies, which respondents identified as the most significant. The quality of higher education can be assessed through the extent to which institutions provide instructional methods oriented toward active learning, practical application of knowledge, the development of problem-solving abilities, and the fostering of student autonomy and initiative. The consistency in respondents' assessments of competency development further suggests that these competencies emerge from a coherent and structured educational framework rather than from individual or incidental factors. The results of the Kruskal–Wallis test indicate that students' average academic achievement during university studies represents a statistically significant differentiating factor for certain competencies. Overall, the findings confirm that the examined skills can be conceptualized as an interconnected set of general competencies, whose integrated development contributes to more effective academic and professional functioning. The digital-information competency cluster is particularly important in the contemporary media environment, as it provides the foundation for effective performance under conditions of media digitalization, accelerated content production, and continuous information flow. In turn, the cognitive and metacognitive competency clusters constitute the basis for the development of autonomous, critically oriented, and reflective individuals, which is essential for the advancement of media literacy and lifelong learning.

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ECOLOGICAL RESILIENCE AS A FRAMEWORK FOR LONG-TERM ENVIRONMENTAL PROTECTION AND SUSTAINABLE WELL-BEING: A REVIEW

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Abstract: Ecological resilience has emerged as a central framework in contemporary environmental governance and sustainable development, particularly under accelerating climate change and increasing anthropogenic pressures. This review examines resilience as an emergent and multi-dimensional property of ecosystems and social–ecological systems, enabling the absorption of disturbances, adaptive responses, and the preservation of core functions essential for long-term environmental protection and human well-being. Drawing upon interdisciplinary literature, the paper synthesises key resilience mechanisms, including resistance, adaptability, recovery capacity, functional and genetic diversity, and the role of critical thresholds and hysteresis in system transformation. Particular attention is given to the interconnections between resilience, biodiversity conservation, ecosystem services, and climate adaptation strategies, including ecosystem-based approaches, green infrastructure, and local ecological knowledge. The review further evaluates methodological challenges in resilience assessment and discusses contemporary analytical frameworks, such as the Vigor–Organization–Resilience model and indicators of exposure, sensitivity, and adaptive capacity. The findings underscore the necessity of integrated, multi-scalar governance strategies that align ecological integrity with sustainable development pathways. Ecological resilience is thus positioned as both a conceptual foundation and an operational principle for safeguarding environmental stability and intergenerational quality of life.

Keywords: *ecological resilience, social–ecological systems, climate change, ecosystem, adaptive management.*

Field: Social Sciences, and Humanities.

1. INTRODUCTION

Accelerated climate change, biodiversity loss, land degradation, and rapid urbanisation are reshaping ecological systems and redefining the conditions under which human societies pursue development. Increasing frequency and intensity of climate extremes, including droughts, floods, heatwaves, and storms, are placing unprecedented pressure on ecosystems and the services they provide (Thonicke et al., 2020). In this context, ecological resilience has emerged as a central framework for understanding how ecosystems and social–ecological systems absorb disturbances, reorganise, and sustain essential functions necessary for long-term environmental protection and human well-being.

Resilience thinking, originally conceptualised as the capacity of a system to withstand disturbance without shifting into an alternative stable state, has evolved into an interdisciplinary lens linking ecological processes, governance systems, and sustainable development (Folke, 2016). Rather than emphasising static equilibrium, resilience focuses on persistence, adaptability, and transformability in complex adaptive systems. This perspective is particularly relevant in the Anthropocene, where human and ecological processes are tightly coupled and embedded within the biosphere.

Climate change not only disrupts ecosystem structure and functioning but also challenges the delivery of ecosystem services critical for food security, water regulation, carbon sequestration, and climate regulation. For example, climate-smart agricultural practices have been shown to enhance farm productivity, strengthen resilience to climatic shocks, and contribute to greenhouse gas mitigation, thereby linking ecological resilience with socio-economic sustainability (Zheng et al., 2024). Similarly, urban ecosystem services (including temperature regulation, air purification, and stormwater management) are increasingly recognised as essential buffers against climate-related risks (Pandey & Ghosh, 2023).

Nature-based solutions and ecosystem-based adaptation strategies further demonstrate how resilience can be operationalised in practice. Ecosystem-based adaptation integrates biodiversity conservation, sustainable land management, and community participation to enhance adaptive capacity in vulnerable regions (Tiwari et al., 2022). In coastal and island contexts, strengthening both social and ecological resilience has proven critical for coping with sea-level rise, extreme weather events, and food insecurity (McLeod et al., 2019). These approaches underline that ecological resilience is not solely

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an ecological attribute but a multi-scalar property emerging from interactions between ecosystems, institutions, and communities. Against this backdrop, ecological resilience provides a unifying conceptual and operational framework for long-term environmental protection and sustainable quality of life. By integrating ecosystem integrity, adaptive management, and cross-scale governance, resilience-oriented strategies can reduce vulnerability, enhance ecosystem services, and align environmental protection with socio-economic development pathways. This review synthesises contemporary theoretical and applied perspectives on ecological resilience, examining its mechanisms, measurement approaches, and policy implications in the context of climate change and sustainable development.

The remainder of the paper proceeds by first outlining the methodological approach adopted in this review, including the criteria for literature selection, the stages of identification and screening, and the thematic framework used to analyse the selected studies. The subsequent part presents the main findings, synthesising theoretical, empirical, and policy-oriented perspectives on ecological resilience across multiple spatial and governance scales. Particular attention is given to resilience mechanisms, ecosystem-based adaptation practices, climate-smart strategies, and their contributions to environmental protection and sustainable development. This is followed by a discussion that critically examines the multi-dimensional and multi-scalar character of resilience, the synergies between ecosystem integrity and socio-economic wellbeing, and the methodological challenges associated with resilience assessment. The paper concludes by highlighting the strategic relevance of ecological resilience for long-term environmental governance and by identifying directions for future research and policy innovation.

2. METHODS

This paper adopts a structured narrative review approach to synthesise contemporary theoretical and applied perspectives on ecological resilience as a framework for long-term environmental protection and sustainable quality of life. The review integrates interdisciplinary literature from ecology, environmental management, climate adaptation, urban sustainability, and socio-ecological systems research. A systematic literature search was conducted using Google Scholar as the primary search engine. Only peer-reviewed journal articles published in English between 2016 and 2024 were considered, with particular emphasis on studies addressing resilience mechanisms, climate change impacts, ecosystem services, and governance frameworks. The selection process followed three stages: identification, screening, and inclusion. In the identification phase, potentially relevant articles were collected based on title and abstract relevance. During screening, duplicates were removed and studies not directly addressing ecological resilience or related adaptation frameworks were excluded. In the inclusion phase, full-text articles were assessed for conceptual clarity, methodological robustness, and relevance to the objectives of the review. Particular attention was given to studies proposing measurable resilience indicators, applied case studies, and policy-oriented frameworks. The selected literature was analysed thematically.

Studies were grouped into four analytical categories:

- (1) theoretical foundations of ecological resilience;
- (2) resilience mechanisms and indicators;
- (3) ecosystem-based adaptation and climate-smart practices; and
- (4) governance and multi-scalar management approaches.

This thematic synthesis enabled identification of conceptual convergences, methodological gaps, and emerging research trends. While the review does not employ meta-analytical statistical aggregation, it ensures analytical rigour through transparent selection criteria and cross-disciplinary integration, thereby providing a comprehensive overview of resilience-based environmental strategies in the context of climate change and sustainable development.

3. RESULTS

The synthesis of the seventeen reviewed studies reveals a strong interdisciplinary convergence around ecological resilience as a central framework for addressing climate change and long-term environmental sustainability. Across conceptual, empirical, and systematic review studies, resilience is consistently framed as a multi-dimensional property emerging from interactions between ecological processes, social systems, and governance structures. Conceptual contributions emphasise the dynamic nature of resilience, highlighting adaptability, transformability, and cross-scale interactions within social-ecological systems. Empirical studies demonstrate that resilience can be operationalised through measurable indicators, including ecosystem vitality, organization, recovery capacity, biodiversity integrity, and adaptive governance mechanisms. Spatial modelling approaches, such as landscape-based

ecosystem health assessments, confirm that resilience varies significantly across scales, with watershed or ecosystem-based units often providing the most coherent analytical framework.

Table 1. Methodological characteristics of the reviewed studies (n = 17)

Author(s), Year	Study Type	Conceptual / Analytical Framework	Spatial Scale	Data Sources	Methodological Approach	Resilience Dimension
Anderson & Gough (2021)	Conceptual / Framework-based	Climate variability impacts	Regional	Climate datasets	Statistical analysis	Socio-ecological
Angeler & Allen (2016)	Conceptual	Cross-scale resilience	Multi-scale	Literature	Conceptual modelling	Ecological
Clifford et al. (2020)	Qualitative empirical	Climate adaptation pathways	Regional	Interviews & focus groups	Scenario-based analysis	Socio-ecological
Folke (2016)	Conceptual	Social-ecological resilience	Global	Literature	Theoretical synthesis	Socio-ecological
Gann et al. (2019)	Policy framework	Ecological restoration standards	Global	Policy documents	Framework analysis	Socio-ecological
Green et al. (2016)	Empirical (case-based)	Ecosystem insurance value	Urban	Case studies	Comparative analysis	Socio-ecological (urban focus)
Huang et al. (2023)	Quantitative empirical	Vulnerability-resilience assessment	Regional	Indicator datasets	Fuzzy modelling	Socio-ecological
Kabeyi & Olanrewaju (2022)	Review	Sustainable energy transition	Global	Literature	Comparative synthesis	Multi-dimensional sustainability
Keesstra et al. (2016)	Forum paper / integrative review	Soil ecosystem services & SDGs	Global	Literature & policy reports	Integrative review	Socio-ecological
Kupika et al. (2019)	Empirical (mixed methods)	Local ecological knowledge	Local	Surveys & interviews	Mixed methods	Socio-ecological
Law et al. (2022)	Policy & modelling	Forest carbon reserves	National	Forest carbon datasets	Carbon & biodiversity analysis	Socio-ecological
Lei et al. (2023)	Quantitative spatial	Vigor-Organization-Resilience model	Watershed	GIS & landscape data	Spatial modelling	Ecological
McLeod et al. (2019)	Perspective / case-based	Ecosystem-based adaptation	Regional	Case examples	Policy & practice analysis	Socio-ecological
Pandey & Ghosh (2023)	Narrative review	Urban ecosystem services	Urban	Literature	Thematic synthesis	Socio-ecological
Thonicke et al. (2020)	Conceptual / analytical	Social-ecological resilience framework	Multi-scale	Interdisciplinary syntheses	Conceptual modelling	Socio-ecological
Tiwari et al. (2022)	Systematic review	Ecosystem-based adaptation	European coastal urban areas	PRISM A-reviewed studies	Evidence synthesis	Socio-ecological
Zheng et al. (2024)	Systematic review	Climate-smart agriculture	Global	PRISM A-reviewed studies	PRISMA synthesis	Socio-ecological

Source: Author's research

Note: SDGs – Sustainable Development Goals; GIS – Geographic Information Systems; PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

In addition, several studies underscore the importance of biodiversity and ecosystem integrity as foundational components of resilience. Higher levels of functional and genetic diversity are consistently associated with greater system stability, enhanced recovery potential, and reduced vulnerability to climate extremes. Research focusing on forest carbon reserves and soil ecosystem services further illustrates that ecosystem conservation not only strengthens resilience but also contributes to climate mitigation through improved carbon sequestration and ecosystem service provision.

Systematic reviews examining climate-smart agriculture and ecosystem-based adaptation highlight the integrative capacity of resilience-oriented practices to generate multiple co-benefits. These practices simultaneously enhance agricultural productivity, improve adaptive capacity to climatic variability, and reduce greenhouse gas emissions. Urban-focused research similarly demonstrates that green infrastructure, urban forests, and ecosystem services such as temperature regulation and stormwater management play a critical buffering role in reducing exposure and sensitivity to climate-related risks.

Moreover, qualitative and mixed-methods studies emphasise the role of local ecological knowledge, participatory governance, and community-based adaptation strategies in strengthening social and institutional dimensions of resilience. These findings collectively suggest that resilience is not confined to ecological robustness alone, but is co-produced through interactions between ecological systems, human agency, and governance arrangements. Overall, the evidence indicates that ecological resilience operates as both an analytical lens and a practical framework for linking ecosystem health, adaptive management, and sustainable development across diverse environmental contexts.

4. DISCUSSION

The findings of this review reinforce the understanding that ecological resilience constitutes a unifying framework capable of integrating environmental protection, climate adaptation, and sustainable development objectives. Across theoretical and empirical studies, resilience is consistently conceptualised as a dynamic property of social–ecological systems, characterised by adaptability, recovery capacity, and the ability to reorganise under disturbance. This confirms the transition from equilibrium-based ecological thinking toward a systems-oriented perspective that recognises uncertainty, thresholds, and non-linear change. A key insight emerging from the reviewed literature is the multi-scalar nature of resilience. Empirical analyses demonstrate that resilience varies significantly depending on spatial and institutional scale, with ecosystem-based or watershed-level assessments often providing more coherent evaluations than strictly administrative boundaries. This highlights the importance of aligning governance structures with ecological processes to ensure effective environmental management.

Furthermore, the evidence suggests that resilience-oriented practices generate multiple co-benefits. Climate-smart agriculture, ecosystem-based adaptation, urban green infrastructure, and forest conservation strategies not only enhance ecological stability but also strengthen food security, carbon sequestration, and socio-economic wellbeing. These synergies illustrate that resilience should not be interpreted solely as resistance to change, but rather as a proactive capacity to adapt and transform in response to evolving environmental conditions.

However, the review also reveals methodological fragmentation in resilience assessment. Diverse indicators, modelling techniques, and conceptual interpretations complicate cross-study comparability. This underscores the need for more standardised resilience metrics and integrated analytical frameworks capable of bridging ecological, social, and institutional dimensions. An additional critical insight concerns the interdependence between ecological resilience and governance quality. The reviewed studies suggest that ecological robustness alone is insufficient if not supported by adaptive institutions, participatory decision-making, and policy coherence across sectors. Governance systems that incorporate adaptive management principles, stakeholder engagement, and learning-oriented approaches are better positioned to respond to environmental shocks and long-term structural change. This reinforces the argument that resilience is co-produced through ecological processes and institutional arrangements.

Moreover, the increasing integration of ecosystem services into resilience frameworks signals a shift toward valuing nature not only for conservation purposes but also for its functional contributions to societal stability. Recognising ecosystem services as mediating mechanisms between ecological integrity and human wellbeing strengthens the policy relevance of resilience thinking. Nevertheless, trade-offs remain inevitable, particularly in rapidly urbanising or resource-intensive regions, where short-term economic priorities may undermine long-term ecological capacity.

Overall, ecological resilience emerges as both a conceptual and operational bridge between environmental integrity and sustainable quality of life. Future research should prioritise longitudinal studies, cross-scale governance analysis, and the integration of local knowledge systems to strengthen

the practical implementation of resilience-based environmental strategies.

5. CONCLUSION

This review demonstrates that ecological resilience provides a robust and integrative framework for advancing long-term environmental protection and sustainable quality of life in the context of accelerating climate change. By moving beyond static notions of stability, resilience thinking emphasises adaptability, transformability, and cross-scale interactions within complex social–ecological systems. Such a perspective is essential for navigating increasing environmental uncertainty and systemic risks. The analysed literature confirms that resilience-oriented approaches—ranging from ecosystem-based adaptation and climate-smart agriculture to urban green infrastructure and forest conservation—generate multiple ecological and socio-economic co-benefits. These practices simultaneously enhance ecosystem integrity, reduce vulnerability to climate extremes, strengthen carbon sequestration capacity, and support human wellbeing. The evidence therefore suggests that resilience is not merely a theoretical construct, but an operational principle guiding sustainable environmental governance. At the same time, the diversity of methodological approaches highlights the need for more harmonised resilience indicators and multi-scalar assessment frameworks. Integrating ecological metrics with social, institutional, and governance dimensions remains a critical research priority. Ultimately, safeguarding ecosystem integrity and strengthening adaptive capacity are indispensable for aligning environmental protection with sustainable development pathways. Ecological resilience thus emerges as a strategic foundation for ensuring environmental stability and intergenerational wellbeing in an era of profound global change.

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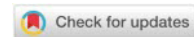
LANGUAGE PROFICIENCY AS THE KEY TO UNLOCKING GLOBAL BUSINESS SUCCESS

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Abstract: In international trade, language proficiency has increasingly been recognised as an important asset that facilitates global business success. This article analyses the significance of linguistic competence across multiple dimensions of international business, including communication, negotiation, and the establishment of sustainable, trust-based relationships. In competitive, culturally diverse markets, fluency in foreign languages enables firms to reduce misunderstandings, increase clarity in complex interactions, and strengthen cooperation with international partners. The article focuses on the effect of language proficiency on international negotiations. Research demonstrates that negotiators with a strong command of their counterparts' language are more likely to achieve advantageous outcomes, such as improved contractual terms, expedited agreements, and reduced conflict. Language fluency enhances the interpretation of subtle meanings, cultural nuances, and nonverbal signals, thereby increasing credibility and mutual understanding. These theoretical perspectives are supported by case studies that illustrate how linguistic competence contributes to advantageous deals, smoother negotiations, and robust long-term partnerships. The paper also presents findings from an empirical study involving 63 employees from 12 Serbian export-oriented companies across multiple sectors. The research examines the frequency and context of foreign-language use, the availability of corporate language training, and employees' perceptions of how language skills affect international business performance. Findings show that foreign language proficiency, particularly in English, is critical for international communication, negotiation, and customer relationship management, while systematic investment in language training remains inconsistent. The study emphasises the strategic value of language proficiency in driving export success and international competitiveness, offering practical implications for managers, educators, and policymakers. By encouraging trust and cultural understanding, language proficiency supports business relationships that extend beyond transactional exchanges and underpin enduring international partnerships. Organizations that invest in employees' linguistic competence gain a competitive advantage by accessing new markets and leveraging emerging business opportunities.

Keywords: *Language proficiency, language barriers, global business success, business communication, negotiating skills.*

Field: Social Sciences

1. INTRODUCTION

In a globalised, interconnected business environment, language proficiency has evolved from a supplementary skill to a core strategic capability for companies engaged in international trade. As firms expand beyond national borders and operate in culturally and linguistically diverse markets, effective communication becomes a critical determinant of competitiveness, negotiation outcomes, and long-term business sustainability. Therefore, fluency in foreign languages is essential for navigating the difficulties of global business interactions.

Language proficiency is fundamental for facilitating clear and productive communication with international partners, reducing misunderstandings, and fostering mutual trust. Beyond its functional value, language competence enables a greater understanding of cultural norms, values, and business practices, which is particularly significant in cross-border negotiations and relationship development. International studies consistently show that firms and individuals with strong language skills obtain superior negotiation outcomes, higher customer satisfaction, and stronger international partnerships. Negotiators who communicate in their counterparts' native language are more likely to establish rapport, interpret subtle cues, and respond effectively to complex negotiation dynamics.

While extensive international literature examines the role of language in global business, most research focuses on large economies and multinational corporations. Transition economies, such as Serbia, have received comparatively less scholarly attention, despite recent growth in export-oriented business activity. As Serbian companies increase their participation in international markets,

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understanding the perception, utilization, and strategic management of language proficiency becomes increasingly relevant. The export orientation of Serbian firms raises critical questions about the role of linguistic competence in international business success and the extent to which firms systematically invest in language development as a strategic resource.

The primary objective of this paper is to examine language proficiency as a key driver of global business success, with particular emphasis on its impact on communication effectiveness, negotiation performance, and the development of sustainable business relationships. By integrating a thorough theoretical overview, illustrative case studies, and empirical evidence from Serbian export-oriented companies, the study demonstrates the strategic value of language skills in international trade. The research seeks to contribute to the literature and provide actionable insights for managers, educators, and policymakers aiming to enhance international competitiveness and export performance.

2. MATERIALS AND METHODS

Contemporary organisations face increasing operational and employment-related risks due to globalisation, technological change, and market instability. These conditions require managers to possess strong strategic and interpersonal competencies, including advanced communication skills, which are essential for managing uncertainty and improving organisational performance (Bešić et al., 2023). This study adopts a mixed-methods research design that integrates qualitative and quantitative approaches to examine the strategic role of language proficiency in global business success. The research approach is grounded in established practices in international business, negotiation studies, and language management, which emphasise integrating theoretical perspectives with empirical evidence (Tenzer et al., 2017; Harzing & Tenzer, 2024).

The research is primarily based on secondary data sources, including peer-reviewed academic literature, international reports, and empirical studies on language proficiency, business communication, negotiation effectiveness, and cross-cultural management. Key theoretical foundations were drawn from studies examining the role of language in international negotiations and organizational performance (Elfenbein et al., 2008; Pérez-Yus et al., 2020), as well as research addressing language barriers and strategic language management in multinational and export-oriented firms (Tenzer et al., 2017; Harzing & Tenzer, 2024).

In addition, illustrative case studies of international companies (e.g., Starbucks, HSBC, Airbnb, IKEA, Google, Netflix) were analysed using publicly available corporate reports and previously published academic and professional analyses. These cases were selected for their relevance in showing both the positive and negative business outcomes associated with language proficiency and language-related mismanagement.

To complement the theoretical and case-based analysis, this paper incorporates empirical data collected through a standardised questionnaire administered to employees in Serbian export-oriented companies. The empirical component follows a methodology commonly used in socio-economic and business research, based on the analysis of secondary and survey data (Janković et al., 2025). It is adapted here to the context of language proficiency and international business operations.

The empirical study was conducted on a sample of 63 employees from 12 export-oriented companies in Serbia, selected across sectors including manufacturing, information technology, logistics, and agribusiness. Data were collected using an online questionnaire comprising closed-ended questions (multiple-choice and Likert-scale items) and a limited number of open-ended questions designed to capture qualitative responses. The questionnaire examined the frequency and aspects of foreign-language use, the availability of corporate language training, and respondents' perceptions of how language skills affect negotiation outcomes, customer satisfaction, and overall business performance.

The data analysis implemented descriptive statistical methods to identify dominant patterns and trends in language use and training practices, following approaches commonly used in applied economic and business research (OECD, 2020; Janković et al., 2025). The results were presented as percentage distributions and graphs to facilitate interpretation. In addition, a comparative analytical approach was applied to contrast theoretical findings alongside empirical results and case study evidence.

Given that the research relies on secondary sources and self-reported survey data, certain limitations have to be acknowledged. These include the relatively small sample size, the regional focus on Serbian export-oriented companies, and the subjective aspect of respondents' perceptions. Nevertheless, triangulating theoretical literature, case studies, and empirical findings increases the reliability and validity of the results. It enables meaningful conclusions about the essential value of language proficiency in global business contexts.

3. RESULTS

The empirical results of this study clearly indicate that foreign language proficiency plays a central role in the international business activities of Serbian export-oriented companies. The findings show that the use of foreign languages is deeply embedded in daily professional tasks, particularly in communication with international clients, partners, and suppliers. A significant proportion of respondents (76%) reported using at least one foreign language daily, pointing to the extent to which export operations rely on effective multilingual communication. English emerged as the predominant working language, used by the vast majority of respondents (91%). In contrast, other languages such as German, Russian, and French were also present, indicating the structure of Serbia's foreign trade and its key export markets.

The results further show that foreign language use is most intensive in high-stakes business situations, including international negotiations, contractual communication, and customer relations. Respondents emphasised that the ability to communicate fluently in a foreign language facilitated clearer understanding, reduced misinterpretations, and improved overall efficiency in cross-border interactions. These results show that language proficiency is not restricted to a single function within the company, but rather represents a transversal competence essential across multiple stages of the international business process.

Regarding organisational support, the findings show that although most companies recognise the importance of language skills, systematic investment in language development remains limited. Although 65% of respondents stated that their company offers language training, only 38% had participated in it in the previous year. This difference points to a gap between the acknowledged strategic importance of language proficiency and its practical integration into human resource development policies.

The perceived impact of language proficiency on business outcomes was strongly positive. More than 82% of respondents agreed that language skills had a direct and favourable influence on international negotiation outcomes. Participants reported that communicating in a partner's native language contributed to faster agreement, greater trust, and more stable long-term business relationships. Open-ended responses further confirmed that language proficiency often played a decisive role in successfully closing deals and resolving misunderstandings. Overall, the results show that language proficiency functions as an important asset that enhances negotiation effectiveness, strengthens business relationships, and supports the international competitiveness of export-oriented companies.

Table 1. Summary of Empirical Findings on Language Proficiency

Indicator	Result
Daily use of at least one foreign language	76% of respondents
Dominant working language	English (91%)
Other frequently used languages	German (18%), Russian (14%), French (11%)
Companies offering language training	65%
Employees who attended language training in the last 12 months	38%
Respondents perceive a positive impact of language skills on negotiations	82%
Main perceived benefits	Improved trust, faster agreement, reduced misunderstandings

Source: Authors' survey (2025)

The key empirical findings are summarised in Table 1, which provides an overview of the frequency of foreign language use, availability of language training, and the perceived effect of language proficiency on international business outcomes.

4. DISCUSSION

The results presented in the previous section confirm and further substantiate the growing body of international research stressing the strategic importance of language proficiency in global business. The high frequency of foreign language use reported by employees in Serbian export-oriented companies indicates that multilingual communication is not an occasional requirement but a structural component of daily international business operations. This finding corresponds to earlier studies that identify language

proficiency as a key enabler of effective coordination, negotiation, and relationship management in cross-border business contexts (Tenzer et al., 2017; Harzing & Tenzer, 2024).

The dominance of English as the primary working language indicates its role as the lingua franca of international business, a trend consistently observed in global entrepreneurship and export-oriented activities (Siddiqui et al., 2023). At the same time, the presence of other foreign languages such as German, Russian, and French suggests that companies operating in international markets increasingly require multilingual capabilities tailored to specific trading partners and regional markets. This supports the argument that reliance on a single global language may be insufficient to fully realise the potential of international business, particularly in negotiation-intensive, relationship-driven environments.

One of the most important findings of this study concerns the perceived impact of language proficiency on negotiation outcomes. The strong consensus among respondents that language skills contribute to more successful negotiations corroborates earlier empirical evidence that negotiators who communicate in their counterparts' language achieve more favourable outcomes and build stronger interpersonal trust (Elfenbein et al., 2008; Pérez-Yus et al., 2020). Language proficiency enables negotiators to interpret contextual meanings, cultural features, and implicit signals more effectively, consequently reducing uncertainty and enhancing mutual understanding (Choudhury, 2023). This reinforces the view that language competence functions not merely as a technical skill but as an integral element of negotiation strategy (Ferraris et al., 2022; Tibrewal et al., 2024). Despite the recognised importance of language skills, the findings show a notable gap between awareness and organisational practice. Although most companies offer some form of language training, participation rates remain relatively low, indicating that language development is often treated as optional or as an individual responsibility rather than as a systematically managed strategic resource. This observation is consistent with previous research indicating that many firms underestimate the long-term benefits of structured language management and fail to integrate linguistic competence into human resource and export strategies fully (Aston Business School & ATC, 2021; Harzing & Tenzer, 2024).

The results also point out the role of language proficiency in strengthening long-term business relationships. Respondents emphasised that communicating in a partner's native language fosters trust, accelerates decision-making, and facilitates conflict resolution. These findings echo the broader literature on cross-cultural business communication, which emphasises that trust and relationships are critical foundations for sustainable international partnerships (Tenzer et al., 2017). In this sense, language proficiency goes beyond transactional efficiency and contributes to the creation of durable relational capital.

From a broader perspective, the findings are particularly relevant for transition economies such as Serbia, where export growth increasingly depends on small and medium-sized enterprises. In such situations, language proficiency can serve as a cost-effective competitive advantage, enabling firms to overcome entry barriers, differentiate themselves in foreign markets, and enhance export performance. The results suggest that greater institutional and organisational support for language training could significantly improve international competitiveness and long-term business success.

5. CONCLUSION

This paper has examined the role of language proficiency as a key determinant of success in international business, with particular emphasis on its impact on communication effectiveness, negotiation outcomes, and the development of long-term business relationships. The findings confirm that foreign language skills represent far more than a supportive operational competence; they function as a strategic asset that enhances international competitiveness and export performance.

The empirical results from export-oriented companies in Serbia show that foreign languages, especially English, are widely used in daily business activities and play a critical role in international negotiations and partner communication. A substantial majority of respondents perceived language proficiency as a decisive factor in building trust, facilitating faster agreement, and diminishing misunderstandings in cross-border interactions. The results are consistent with existing international research that emphasises the importance of linguistic competence in negotiation strategy, cross-cultural understanding, and relationship-based business models.

Despite the recognised importance of language skills, the study also reveals a gap between awareness and systematic organisational investment in language development. While many companies provide some form of language training, participation rates remain limited, suggesting that language proficiency is not yet fully integrated into strategic human resource management and export planning. This indicates missed opportunities to strengthen international performance through relatively low-cost,

high-impact investments in linguistic and intercultural competencies.

The results of this study are particularly relevant for transition economies such as Serbia, where export growth increasingly depends on firms' ability to compete in linguistically and culturally diverse markets. Strengthening employees' language proficiency can help overcome market-entry barriers, improve negotiation efficiency, and foster sustainable international partnerships.

In conclusion, the paper argues that language proficiency should be recognised and managed as a strategic resource in global business. Systematic investment in language training and cross-cultural education can significantly improve negotiation effectiveness, relationship-building, and long-term competitiveness. Future research could extend this study by using larger samples, longitudinal designs, or qualitative methods to explore further the dynamic role of language proficiency in international business success.

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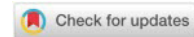
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TERMINOLOGICAL INNOVATION IN POST-VESALIAN ANATOMY: GABRIELE FALLOPPIO'S OBSERVATIONES ANATOMICAЕ (1561)

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Abstract: Gabriele Falloppio (1523–1562), a renowned anatomist of the post-Vesalius generation, played a key role in the formation and development of Latin anatomical terminology in the mid-16th century. This study focuses on G. Falloppio's contribution to terminology, based mainly on his major work *Observationes anatomicae* (1561), which is a kind of continuation of the process of standardization of terminology begun with Vesalius' *Fabrica* (1543). Through linguistic analysis of the original Latin text and a comparative methodological approach, the study describes specific terminological contributions in three main areas: the reproductive system (the uterine tube, *tuba uterina*), the anatomy of the ear (including the malleus and incus), and myology (extraocular muscles). The results clearly show that Falloppio not only corrected statements in Vesalius' descriptions, but also consistently supplemented and refined Vesalius' nomenclature, thus contributing to the stabilization of anatomical terminology in areas where there were gaps or inaccuracies in earlier descriptions. The study identifies three models of terminological contribution: (1) the introduction of new terms for previously undescribed structures (the uterine tube), (2) the conversion of Vesalius' descriptive metaphors into stable nomenclature (malleus, incus), and (3) the correction of anatomical inaccuracies through more precise classification (extraocular muscles). By standardizing descriptive metaphors into strict terms, Falloppio sought to show how precise nomenclature could function as a conceptual tool for clearer anatomical knowledge. His contribution is an example of the scientific thinking characteristic of that time: a critical but respectful building on earlier authorities, which marked a new stage in the development and refinement of anatomical Latin terminology after Vesalius' revolution.

Keywords: *Latin anatomical terminology; post-Vesalian anatomy; reproductive system, otology, myology.*

Field: Humanities

1. INTRODUCTION

In 1543, Andreas Vesalius' *De humani corporis fabrica* marked a turning point not only in anatomical science but also in medical terminology (O'Malley, 1964). Vesalius created the first systematic Latin anatomical nomenclature based on direct observation of the human body rather than on the authority of ancient texts (Siraisi, 1990). Vesalius' contribution to anatomy is enormous, bringing the epistemological approach to medical knowledge to the fore and thus elevating empirical observation above the authority of classical sources (Zampieri et al., 2020). Despite its merits, Vesalius' fundamental work also had its omissions, inaccuracies, and insufficiently described structures—a fact that he himself noted in the second edition of *Fabrica* (1555), in which he introduced numerous corrections and additions. Gabriele Falloppio (1523–1562), born in Modena and educated in Ferrara, became one of the most important critics and continuators of the Vesalian tradition (Premuda, 1983, pp. 1–14; Stolberg, 2022, pp. 27–29). Although Falloppio was never a personal student of Vesalius—the two never met—he studied Vesalius' work primarily through *De humani corporis fabrica* (Belloni Speciale, 1994). In this way, he established himself as the most significant intellectual heir to Vesalius' method of empirical observation. In 1548, at only twenty-five years of age, he was appointed professor of anatomy at the University of Pisa; in 1551 he assumed the chair of anatomy, surgery, and botany at the University of Padua—the very chair previously held by Vesalius and, more immediately, by Realdo Colombo (Belloni Speciale, 1994; Stolberg, 2022, p. 29; Ali, 2025). This symbolic succession shaped Falloppio's intellectual mission: not to dismantle the work of his intellectual predecessor, but to refine and perfect it. The principal work of Falloppio, *Observationes anatomicae ad Petrum Mannam medicum Cremonensem*, published in Venice in 1561 by the printer Marcus Antonius Ulmus, constitutes a systematic dialogue with Vesalius' *Fabrica*. The title—*Anatomical Observations*—eloquently underscores the author's empirical method. The book is structured as a series of comments and corrections to the Vesalian text, organized according to anatomical systems. Falloppio does not engage in aggressive polemic; rather, with respect yet firm conviction, he identifies weaknesses in Vesalius' descriptions, while simultaneously introducing new terminology for structures that Vesalius either failed to describe or described inaccurately. The nature of this relationship merits clarification: the preface to *Observationes* (pages 11–22) contains no autobiographical reference to personal encounters with Vesalius or to institutional training under him. When Falloppio first mentions Vesalius in the opening

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section of the text (page 25), he employs the verb *legerem* ("I was reading"), referring to the *Fabrica* as a text he studied, rather than to Vesalius as a personal instructor. On page 386, Falloppio uses the term *præceptor meus* ("my teacher"), yet immediately follows this with frank criticism, stating that Vesalius was *deceptus... à bouinis* ("deceived by bovine parts") in certain anatomical descriptions—a level of critical independence incompatible with traditional teacher-student hierarchy. Contemporary biographical scholarship confirms this interpretation: as Wikipedia (2025) states, Falloppio "was never a personal student of Andreas Vesalius as is often falsely maintained." The relationship between Falloppio and Vesalius is thus intellectual, grounded in the study and critical analysis of Vesalian work, rather than institutional or personal. The significance of *Observationes anatomicae* extends well beyond mere correction. Falloppio does not simply amend errors; he systematically expands the Vesalian terminological framework in critical domains such as the reproductive system, otology, and myology (Ciszek & Skrzat, 2019). The terms he introduced—most notably *tuba uterina* (the Fallopian or uterine tube)—became integral components of Latin anatomical nomenclature and have survived to the present day within modern *Terminologia Anatomica*. The present study aims to analyse the specific terminological contributions of Gabriele Falloppio as documented in the original Latin text of *Observationes anatomicae* (1561), within the context of Vesalian terminological standardisation. Through linguistic analysis of the primary source and a comparative methodological approach, the study identifies the new, revised, and refined terms that Falloppio introduced or consolidated. The findings illustrate a characteristic model of scientific continuity in the early modern period: the manner in which an intellectual successor builds upon the work of an intellectual predecessor, preserving respect for authority while remaining uncompromisingly committed to empirical truth.

2. MATERIALS AND METHODS

2.1. Materials (Primary Sources)

The present study is based on the analysis of the following primary historical texts:

Falloppio, G. (1561). *Observationes anatomicae ad Petrum Mannam medicum Cremonensem. Venetiis: Apud Marcum Antonium Vlmum*. Access: National Library of Medicine (NLM), Digital Collections. [Available at: <https://collections.nlm.nih.gov/ext/dw/2235026R/PDF/2235026R.pdf>]

Vesalius, A. (1543). *De humani corporis fabrica libri septem*. Basileae: Ex officina Ioannis Oporini. (Used as the reference base for comparative analysis.)

The analysis was conducted on the original Latin texts of these editions, without recourse to translations or adaptations.

2.2. Methods

The study employs a linguistic-comparative approach comprising the following steps:

Step 1: Identification of terminological contributions

- Systematic reading of *Observationes anatomicae* (Falloppio, 1561)
- Extraction of all anatomical terms that are:

o new (absent from Vesalius)

o corrective (modifications of Vesalian descriptions)

o refinements (additions that increase the precision of Vesalian nomenclature)

Step 2: Classification

The identified terms were classified by anatomical domain:

1. Reproductive system

2. Otology

3. Myology

Step 3: Comparative analysis

- Localization of the corresponding passages in *De humani corporis fabrica* (Vesalius, 1543)
- Comparison of terminology, anatomical description, and descriptive accuracy
- Documentation of divergences

Step 4: Linguistic analysis

- Etymological analysis of newly introduced terms
- Analysis of Latin morphosyntactic structure
- Assessment of semantic precision

Selection criteria for the analysed terms

- Historical significance (terms that entered standard anatomical nomenclature)
- Degree of innovativeness with respect to the Vesalian tradition
- Anatomical accuracy of the description

This methodology enables other researchers to replicate the analysis using the same primary sources and to validate the results. Philological analysis of Renaissance medical texts requires careful juxtaposition of primary Latin sources with the historical and scientific context of the period (Garrison & Hast, 2018).

3. RESULTS

The systematic analysis of *Observationes anatomicae* (1561) identified a substantial number of terminological contributions by Gabriele Falloppio that supplement, correct, or refine Vesalian nomenclature. The results are organised according to three principal anatomical domains.

3.1. Reproductive system: uteri tuba and related terminology

The most renowned and enduring contribution of Falloppio is the introduction of the term designating the structure that today bears his name—uteri tuba (uterine tube, Fallopian tube).

Latin quotation from Falloppio (1561, p. 417 [197]):

“...tamen si diligenter aperiantur, ac dilatentur tubæ cuiusdam aeneæ extremum orificium exprimunt. Quare cum huius classici organi demptis capreolis, vel etiam iisdem additis, meatus seminarius a principio usque ad extremum speciem gerat, ideo a me uteri tuba vocatus est. Ita se hæc habent in omnibus, non solum humanis, sed etiam ovinis ac vaccinis.”

Translation (English):

“But if they are carefully opened and widened, they resemble the terminal opening of a bronze tube. Therefore, since in this tubular organ, if the spiral windings (capreoli) are removed—or even if they are taken together with it—the seminal duct from its beginning to its very end retains the same appearance, it has therefore been called by me the uterine tube (uteri tuba). Such is the case in all [animals]—not only in humans, but also in sheep and cows.”

Terminological innovation

- uteri tuba (uterine tube): a metaphorical designation based on morphological form
- Explicit comparison with a wind or brass instrument (classicum organum—a trumpet or tube)
- The first precise anatomical description of the structure connecting the ovary to the uterus
- Correction of Vesalius's incomplete and partially inaccurate account of the female reproductive system

Significance

This term entered standard anatomical nomenclature and has survived to the present day as tuba uterina (*Terminologia Anatomica*, 1998), as well as in the eponym tuba Fallopii. Falloppio's formulation thus represents a decisive moment in the stabilization of anatomical terminology relating to the female reproductive system.

3.2. Otology: Consolidation of the terminology for the auditory ossicles

Falloppio made a significant contribution to the anatomy of the ear by consolidating and further elaborating Vesalius's descriptions.

Latin quotation from Falloppio (1561, p. 73 [25]):

“...quorum historiam postea divinus Vesalius expoliuit, atque alterum quod prius est malleolum, alterum vero incudem a similitudine appellauit, simulque optime descripsit.”

Translation (English):

“...whose history the divine Andreas Vesalius later refined; and one of them, which is the first, is called the malleus (malleolum), and the other the incus (incudem)—by resemblance (a similitudine)—and at the same time he described them excellently.”

Terminological contribution

Vesalius designates the ossicles through metaphorical analogy (a similitudine), and Falloppio confirms these metaphorical designations as established terminology—malleolus and incus. In addition, Falloppio introduces more detailed anatomical terms—such as gemina crura incidis (“the paired crura of the incus”), myringa (the tympanic membrane), and fenestrae geminae (“the paired windows” of the tympanic cavity)—and he describes the functional linkage among the ossicles within the auditory mechanism.

3.3. Myology: Correction of Vesalius's enumeration of the ocular muscles

Falloppio offers a major correction to Vesalius's account of ocular musculature, criticising not only Vesalius but also earlier anatomists for an inaccurate enumeration of the eye muscles.

Latin quotation from Falloppio (1561, pp. 159–160 [I4–I5]):

“Omnes, qui de musculis oculorum hucusque scripsere, aut publice profitentes (quod ego sciam) loquuti sunt in publicis dissectionibus, male plane illos enumerarunt. Nam ut a divino Vesalio incipiam;

ipse nobis septem musculos enumeravit... Musculus igitur, qui hanc trahit, a Vesalio praetermissus in bobus, qui ipsi donati sunt, octavus erit, vel saltem pars illius, qui oculum ad exteriorem angulum trahit.”

Translation (English):

“All those who have so far written about the muscles of the eye, or who teach publicly (so far as I know) and speak during public dissections, have listed them entirely incorrectly (male planè illos enumerarunt). For, to begin with the divine Andreas Vesalius (a divino Vesalio incipiam), he has enumerated seven muscles for us... Yet the muscle that draws this [membrane] is omitted by Andreas Vesalius (a Vesalio praetermissus) in the oxen that were provided to him, and it will be an eighth muscle, or at least a part of that [muscle] which pulls the eye toward the outer corner.”

Terminological correction

Vesalius enumerates seven ocular muscles (septem musculos), on the basis of observations in cattle. Falloppio corrects this by asserting the presence of an eighth muscle (octavus), arguing that Vesalius had omitted (praetermissus) the muscle associated with the movement of the nictitating membrane in animals. Although Falloppio refers to Vesalius as “divine” (divinus Vesalius), he nevertheless states unambiguously that earlier anatomists—including Vesalius—erred in their enumeration of the ocular muscles. This correction exemplifies Falloppio’s empirically grounded critical method: respect for Vesalius’s authority does not override anatomical observation when the latter indicates otherwise.

4. DISCUSSION

The analysis of *Observationes anatomicae* (1561) reveals a characteristic model of scientific continuity in the Renaissance: a critical yet respectful elaboration upon the authority of an intellectual predecessor. Gabriele Falloppio does not reject Vesalius’s contributions; rather, he refines and strengthens them through meticulous empirical observation and terminological precision.

4.1. Patterns of terminological innovation

Falloppio’s terminological contributions follow three principal patterns:

A) Introduction of new terms for structures not described by Vesalius

The most prominent example is *uteri tuba* (uterine tube), a designation based on metaphorical comparison with a wind or brass instrument. This term has survived into modern anatomical nomenclature as *tuba uterina* (*Terminologia Anatomica*, 1998) and through the eponym *tuba Fallopii*.

B) Consolidation of Vesalian metaphorical descriptions into established nomenclature

Vesalius described the auditory ossicles a *similitudine* (by analogy), whereas Falloppio transformed these analogical descriptions into standardised anatomical terms: *malleolus* and *incus*. This process of terminological stabilisation was crucial for the emergence of a universal anatomical nomenclature.

C) Correction of Vesalian inaccuracies

In the case of the ocular muscles, Falloppio explicitly states that Vesalius and all preceding anatomists erred (*male planè illos enumerarunt*), even while maintaining a respectful tone (*divinus Vesalius*). This combination of deference and critical rigor characterises the most accomplished representatives of Renaissance anatomical scholarship.

4.2. Terminological innovation as an instrument for anatomical progress

Falloppio’s approach to nomenclature demonstrates that precise terminology functions not merely as a descriptive tool but as a conceptual instrument for deeper anatomical understanding. The metaphorical precision of terms such as *uteri tuba*, *malleolus*, and *incus* reflects a recognition that anatomical structures can be most effectively communicated through analogies grounded in familiar objects and functions.

This transformation of Vesalian descriptive metaphors into standardized technical terms represents a crucial methodological advancement. Where Vesalius describes structures through analogical language, Falloppio consolidates these descriptions into fixed nomenclature, thereby facilitating subsequent anatomical discourse and instruction. The process exemplifies how terminological precision stimulates more accurate empirical observation: a well-defined term directs the anatomist’s attention to specific morphological features and functional relationships.

The survival of Falloppio’s terminology in modern *Terminologia Anatomica* is not merely historical accident but reflects the enduring value of nomenclature that combines anatomical accuracy, morphological precision, and conceptual clarity. Eponymization—as in *tuba Fallopii*—presents both advantages and limitations: while eponyms serve as historical markers of scientific achievement, they sacrifice the descriptive transparency of Latin morphological terms such as *tuba uterina*.

4.3. Scope and limitations of the study

The present study focuses on Latin terminological innovation in three principal anatomical domains: the reproductive system, otology, and myology. It does not undertake a detailed examination of Falloppio’s

anatomical illustrations or physiological interpretations. The analysis is limited to Latin terminology and does not systematically address Greek etymological roots, except where such consideration is necessary for understanding a specific terminological innovation.

Other domains in which Falloppio made important contributions—such as facial musculature and vascular structures—lie beyond the scope of the present article and may serve as subjects for future research. Notably, the present study excludes cerebral anatomy, as systematic verification of cited passages in the original Latin text of *Observationes anatomicae* revealed no confirmed primary source citations for claimed contributions to cranial nerve nomenclature. This methodological decision reflects a commitment to empirical rigor: only terminological innovations verifiable through direct citation of the Latin text are included in the analysis. The present study establishes a methodological framework and focuses deliberately on the most significant and verifiable terminological contributions.

4.4. Significance for the history of medical terminology

Falloppio represents a critical stage in the evolution of Latin anatomical terminology: the phase of consolidation and refinement that followed the Vesalian revolution. If Vesalius dismantled the Galenic tradition and laid new foundations, Falloppio stabilised those foundations by transforming metaphors into technical terms, correcting errors, and supplying missing anatomical detail.

This model of gradual refinement continued with Caspar Bauhin (1605), who made the first systematic attempt at unifying anatomical nomenclature (Cunningham, 1997), and reached its culmination in the *Basle Nomina Anatomica* (1895) and the modern *Terminologia Anatomica* (1998). The process of terminological standardisation remains relevant today, and the historical experience of Renaissance anatomists offers valuable insights into the evolution of medical nomenclature (Kachlik et al., 2021; FIPAT, 2022). The survival of Falloppio's contributions in contemporary medical terminology is not accidental: they are distinguished by anatomical accuracy, terminological clarity, and firm empirical grounding.

5. CONCLUSION

The present study demonstrates that Gabriele Falloppio played a pivotal role in the development of Latin anatomical terminology in the mid-sixteenth century by extending, correcting, and stabilising the terminological foundations laid by Andreas Vesalius. Analysis of *Observationes anatomicae* (1561) reveals three principal patterns of terminological innovation: the introduction of new terms for previously undescribed structures (*uteri tuba*), the consolidation of Vesalian metaphorical descriptions into established nomenclature (*malleolus*, *incus*), and the correction of Vesalian inaccuracies in anatomical descriptions (ocular musculature).

Falloppio's contribution goes beyond the mere introduction of new terms; it demonstrates how precise terminology functions as a conceptual instrument for a deeper understanding of anatomical structures. Metaphorical nomenclature (*tuba*, *malleolus*, *incus*) not only facilitates memorisation but also structures anatomical reasoning and enhances international scientific communication.

Falloppio thus represents a critical phase in the evolution of Latin anatomical terminology—the stage of consolidation and refinement following the Vesalian revolution. If Vesalius dismantled the Galenic tradition and laid new foundations, Falloppio stabilised those foundations by transforming Vesalian metaphorical descriptions into standard terminology. This model of critical yet respectful elaboration upon the authority of an intellectual predecessor characterises the most accomplished representatives of Renaissance anatomical scholarship and prepared the ground for later attempts at unifying anatomical nomenclature.

The character of the relationship between Falloppio and Vesalius merits emphasis: although widely described in popular literature as a “personal student” of Vesalius, systematic analysis of *Observationes anatomicae* reveals no autobiographical evidence of institutional training or personal encounters. Authoritative biographical studies confirm this interpretation: Belloni Speciale (1994) and Stolberg (2022) document that Falloppio studied medicine in Ferrara under Antonio Musa Brasavola, with no evidence of personal instruction from Vesalius. The preface (pages 11–22) contains no reference to personal instruction; the opening section (page 25) employs the verb *legerem* (“I was reading”), indicating study of Vesalius's text rather than personal tutelage; and the critical tone throughout the work—including frank identification of Vesalian errors (*deceptus... à bouinis*, page 386)—demonstrates intellectual autonomy incompatible with traditional teacher-student hierarchy. The relationship is thus intellectual rather than institutional: Falloppio was a critical continuator of the Vesalian method, not a personal disciple.

The survival of Falloppio's terminological innovations in modern medical terminology (*tuba uterina* / *tuba Fallopii*, *malleolus*, *incus*, *myringa*) is not accidental; these terms are distinguished by anatomical accuracy, terminological clarity, and empirical grounding (FIPAT, 2019). As the first in a planned series

of studies, the present article establishes a methodological framework for analysing post-Vesalian terminological evolution and demonstrates the importance of working with primary Latin sources for understanding the historical development of medical nomenclature (Stranding & Borley, 2023).

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IDENTIFICATION OF LEARNING MOTIVES IN PRESCHOOL CHILDREN

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Abstract: The formation of learning motives in preschool age is a key factor for children's successful adaptation to school education. Learning motivation during this developmental period has a significant impact on the development of cognitive activity, self-regulation, and attitudes toward learning activities. The present study is aimed at analyzing the leading learning motives among preschool children and examining their specific characteristics with respect to gender differences.

The study was conducted with a sample of 30 children aged 5–6 years, using M. Ginzburg's methodology for diagnosing learning motivation. This diagnostic tool makes it possible to identify various types of learning motives—cognitive, social, positional, play-related, and external—as well as the degree of intrinsic and extrinsic motivation. The results indicate that the leading learning motive among the examined group of children is the cognitive motive (36.7%), which can be regarded as a significant and positive indicator of adequate school readiness. A predominance of mixed motivation (40%) was also identified, creating favorable conditions for the development of an active learning position, self-regulation, and a stable positive attitude toward learning activities. Gender-based analysis reveals that girls are characterized by more strongly expressed intrinsic and socially oriented learning motives, whereas boys more clearly exhibit positional, play-related, and external motives.

The obtained results confirm the importance of cognitive motivation as a foundation for successful school readiness in preschool age. The predominance of intrinsic and mixed motivation may be considered a positive indicator of children's future learning engagement. The observed differences between girls and boys in the structure of learning motives highlight the need for differentiated pedagogical approaches that take into account developmental characteristics and preferred forms of activity.

Keywords: preschool children, learning, motives, development.

Field: Humanities.

1. INTRODUCTION

Learning motivation in the preschool years represents a key component of child development, determining the extent and nature of a child's active engagement in the educational process. This developmental period is critical, as it is during this time that stable interests, cognitive curiosity, and attitudes toward learning begin to form, which have long-term implications for children's success in the early stages of formal education (Ollonen et al., 2025).

According to Leontiev's (1977) conceptualization, a motive is a psychological phenomenon that endows activity with personal meaning. In the context of early childhood, learning activities acquire meaning when they are emotionally engaging, socially significant, and practically oriented, corresponding to the child's needs and experiences.

Learning motivation is understood as a complex psycho-pedagogical construct encompassing both intrinsic motives (curiosity, interest, enjoyment of activity) and extrinsic motives (rewards, praise, social approval). These motives facilitate the child's engagement with learning tasks and active participation in the educational process (Veleva, 2024; Ratinho et al., 2025). In the preschool years, however, extrinsic motives have a limited regulatory function and do not lead to enduring learning motivation unless they are complemented by the development of intrinsic motives (Deci & Ryan, 2000).

Within the framework of Self-Determination Theory (SDT), Deci and Ryan (2000) posit that the most sustainable form of motivation emerges when three basic psychological needs are satisfied: autonomy (opportunities for choice and control over activities), competence (a sense of effectiveness and capability in task performance), and relatedness (a sense of support and belonging with significant adults and peers). This theoretical approach is particularly relevant for designing learning situations in preschool education that deliberately support the development of children's intrinsic motivation (Wang et al., 2025).

In the preschool years, play is the leading activity, functioning as a natural and effective context for learning. Through play, children encounter diverse situations that stimulate cognitive activity, experimentation, hypothesis testing, and repetition—processes that form the foundation of learning motivation (Tsokova, 2025).

Empirical studies of motivational tendencies in preschool children indicate that learning motivation is associated not only with successful task performance but also with individual characteristics such as executive function development and gender (Veraksa et al., 2022). Further research shows that active

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teaching methods, including play-based and project-based learning, significantly enhance children's intrinsic motivation by providing opportunities for active, creative, and meaningful engagement in the learning process (Viñuela et al., 2023).

The educator plays a key role in stimulating and maintaining learning motivation by creating a supportive, emotionally positive, and developmentally enriching educational environment. Implementing play-based approaches, problem-solving situations, and encouraging children's autonomy and initiative contributes to the development of intrinsic motivation and a sustainable attitude toward learning (Wentzel, 2012).

The aim of the present empirical study is to examine the structure and dominant learning motives of preschool children and to analyze the degree of expression of cognitive and social motives for learning.

The object of the study is learning motivation in preschool-aged children.

The subject of the study is the structure, content, and relationship between cognitive, social, intrinsic, and extrinsic learning motives in children aged 5–6 years.

To achieve this aim, the following research tasks were formulated:

1. To identify the leading learning motives in preschool children.
2. To determine the ratio between intrinsic and extrinsic learning motives.
3. To establish the presence of differences in learning motivation between girls and boys in the preschool age group.
4. To quantitatively analyze the results obtained from the applied research methodology.
5. To draw conclusions regarding children's motivational readiness for school entry.

The study was conducted with 30 children aged 5–6 years attending kindergarten. The sample included an equal number of girls and boys—15 children of each gender—representing 50% of the total number of participants in each subgroup. The educational environment of the study was the kindergarten, which provides structured conditions and a stimulating setting for the social, cognitive, and emotional development of children in this age group.

2. MATERIALS AND METHODS

The study employed the methodology developed by M. R. Ginzburg (1988), which is designed to diagnose children's motivational readiness for school education. The method uses a set of pictures depicting:

- learning situations (children in a classroom, a teacher, learning materials);
- play situations;
- social interactions (communication with peers, receiving approval);
- external attributes of school (a schoolbag, notebooks, grades, etc.).

The pictures represent six possible motives for attending school. The cognitive motive reflects intrinsic motivation and the desire to acquire knowledge, whereas the social and evaluative motives emphasize the role of external approval and feedback from significant adults. The positional motive is related to the social role of the student, which is particularly characteristic of early school age. The play motive reflects age-specific characteristics of children and the potential conflict between play and learning, while the external motive highlights the influence of coercion and pressure on learning activities.

The study was conducted individually in a calm environment, minimizing the influence of external factors and creating conditions for more authentic responses. The pictures were presented to the child sequentially. The psychologist/educator asked questions such as:

- "Which of them do you think is right? Why?";
- "Which of them would you like to play with? Why?";
- "Which of them would you like to study with? Why?";

The child selected pictures and justified their choices. Not only the selections themselves but also the explanations, emotional reactions, and spontaneous comments were taken into account.

The data were processed using frequency analysis, percentage distribution, and calculation of mean values. These methods are appropriate for quantitative analysis and allow for objective interpretation of the results. They provide a basis for drawing general conclusions regarding the dominant motivational tendencies within the studied group.

3. RESULTS

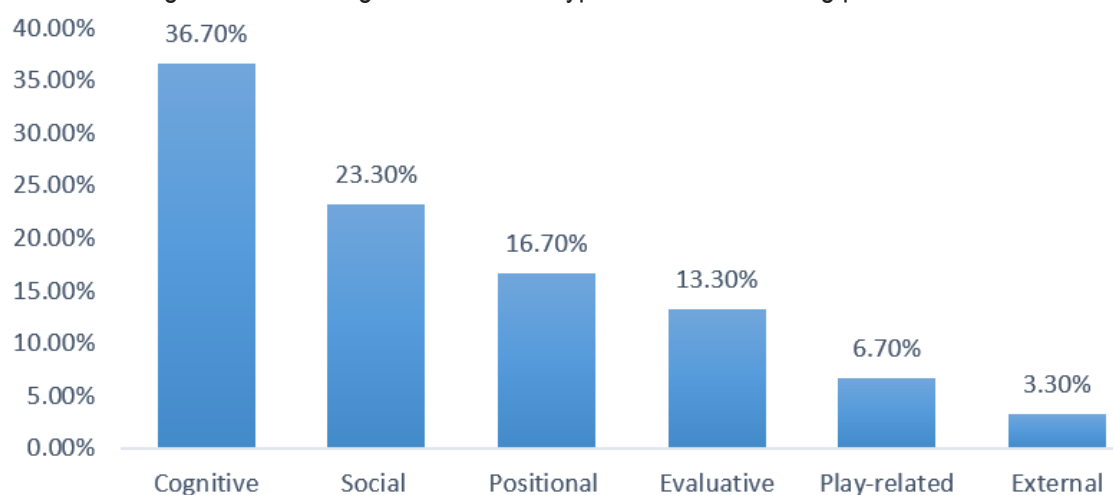
Table 1 presents the distribution of learning motives according to the number of children, while Figure 1 illustrates their percentage distribution.

Table 1. Distribution of learning motives among the children in the sample.

Type of Motive	Number of Children
Cognitive	11
Social	7
Positional	5
Evaluative	4
Play-related	2
External	1

Source: Author's own survey data (2026)

Figure 1. Percentage distribution of types of motives among preschool children.



Source: Author's own survey data (2026)

The analysis of motivational factors among children reveals a clearly expressed diversity in the reasons for participation in learning activities, highlighting the presence of both intrinsic and extrinsic motives.

The cognitive motive is the most prevalent among the children, observed in 11 participants, representing 36.7% of the studied group. This relatively high percentage indicates that a substantial proportion of the children demonstrate intrinsic motivation for learning, driven by natural curiosity and a desire for understanding rather than by external incentives such as grades or rewards.

The second most frequent is the social motive, identified in 7 children (23.3%). This motive is characterized by an orientation toward interaction with others—namely, a desire for cooperation, approval, and recognition from peers and teachers. The presence of this motive underscores the significance of the social environment in the learning process and highlights the role of group activities in the development of social and communicative skills.

The positional motive was registered in 5 children (16.7%) and reflects students' aspiration to maintain or enhance their status within the group. This type of motivation is associated with competition and a desire for recognition, often grounded in external evaluation by significant others. Although it may stimulate activity and achievement, the positional motive tends to be less stable over time, as it depends on external factors.

The evaluative motive, observed in 4 children (13.3%), is related to an orientation toward receiving grades and formal acknowledgment of effort. In this case, learning activity is primarily perceived as a means of attaining a specific outcome rather than as a value in itself. This indicates the predominance of extrinsic motivation, where cognitive interest is secondary to the importance of assessment.

The play motive is the least represented among the primary motives, identified in 2 children (6.7%). Despite its low frequency, it holds considerable importance, particularly in the context of early education.

Learning through play fosters the development of creativity, imagination, and intrinsic motivation, while cultivating a positive emotional attitude toward the learning process.

The least common is the external motive, reported in only 1 child (3.3%). This motive is associated with external pressure or incentives, such as rewards, punishments, or pressure from parents and teachers. Its low prevalence may be interpreted as a positive indicator, as it suggests that more autonomous and socially oriented motives for learning predominate within the studied group.

The empirical data presented in Table 2 reflect the distribution of children according to the dominant type of motivation for participation in the activity.

Table 2. Classification of Motives.

Type of Motivation	Number of Children	%
Intrinsic Motivation (Cognitive)	11	36,7%
Mixed Motivation	12	40,0%
Extrinsic Motivation	7	23,3%

Source: Author's own survey data (2026)

The analysis indicates that the largest relative proportion is represented by children with mixed motives—12 children, accounting for 40.0% of the studied sample. This suggests the simultaneous presence of both intrinsic and extrinsic motivational factors that interact and complement one another in the learning process.

In second place are the children in whom intrinsic (cognitive) motives predominate—11 children, or 36.7%. This result points to a relatively high level of cognitive engagement and interest in the content of the activity itself, which constitutes a prerequisite for sustainable and in-depth learning.

The smallest proportion is observed among children with predominantly extrinsic motives—7 children, or 23.3%. This implies that, for a smaller segment of the participants, motivation is primarily determined by external incentives such as rewards, approval, or sanctions.

Table 3 presents the mean values of the different types of motives among the girls and boys in the sample.

Table 3. Mean Values of the Types of Motives among Girls and Boys in the Sample.

Type of Motive	Mean value	
	Girls	Boys
Cognitive	4,5	4,0
Social	4,3	3,8
Positional	3,5	3,8
Evaluative	4,1	3,9
Play-related	4,1	4,4
External	3,5	3,8

Source: Author's own survey data (2026)

The analysis of different types of academic motivation reveals clearly defined differences between girls and boys, outlining specific motivational profiles associated with both intrinsic and extrinsic factors.

Regarding the cognitive motive, a higher mean value is observed among girls (4.5) compared to boys (4.0). This 0.5-point difference indicates a more pronounced intrinsic motivation for learning among girls, oriented toward knowledge acquisition and understanding of the academic content. The data suggest a stronger focus on the learning process itself rather than solely on its outcomes.

A similar pattern is evident in the social motive, where girls again demonstrate higher motivation (4.3) compared to boys (3.8). The 0.5-point difference indicates that social relationships within the school environment—including approval from teachers and peers—play a significant role in girls' academic engagement.

An inverse relationship is observed in the positional motive, where boys (3.8) surpass girls (3.5). Although moderate, the 0.3-point difference suggests that the pursuit of social prestige, peer comparison,

and attaining a higher position within the school hierarchy is more characteristic of boys.

With respect to the achievement motive, gender differences are relatively small. Girls show a slightly higher value (4.1) compared to boys (3.9), indicating that high grades serve as an important incentive for both genders, albeit with slightly greater significance for girls.

Analysis of the game-based motive reveals a stronger orientation among boys (4.4) toward playful, dynamic, and interactive forms of learning compared to girls (4.1). This suggests that active teaching methods and elements of competition and play have a more pronounced motivating effect on boys.

Finally, regarding the external motive, a higher mean value is observed among boys (3.8) compared to girls (3.5). This 0.3-point difference indicates that boys respond more strongly to external stimuli such as rewards, sanctions, or pressure from significant adults, whereas girls' motivation appears to be more intrinsically driven.

4. DISCUSSIONS

The results of the conducted study indicate that the primary learning motive among the examined group of children is the cognitive motive, which can be considered a significant and positive indicator of adequate school readiness. The predominance of this type of motivation suggests the presence of an intrinsic need for acquiring new knowledge, an interest in the learning content, and an active engagement in the learning process. In addition, a considerable portion of the children exhibit a mixed type of motivation, in which cognitive motives are combined with social and evaluative motives. This combination of motivational factors reflects the complex nature of learning motivation in preschool age and indicates that the pursuit of knowledge is often supported by the desire for social approval and positive feedback from significant adults.

The relatively low proportion of children with a dominant extrinsic learning motive can be interpreted as an indicator of a favorable motivational environment in the kindergarten, where emphasis is placed on intrinsic interest rather than on external incentives or coercion. The prevalence of internally oriented and mixed motivation creates conditions for the development of an active learning stance, self-regulation, and a sustained positive attitude toward learning activities, which are essential for subsequent school education.

Analysis of the results by gender reveals the presence of certain differences in the motivational structure. Girls are characterized by more strongly expressed internal and socially oriented learning motives, which suggests a higher orientation toward cognitive content and social interaction in the learning process. Boys, on the other hand, show a clearer prevalence of positional, play-based, and extrinsic motives, which may be related to the specifics of their development and preferred forms of activity. The identified differences should be taken into account when planning and organizing the learning process, with the aim of applying more effective, flexible, and differentiated pedagogical strategies that align with the individual and gender-specific characteristics of the children.

5. CONCLUSIONS

Preschool-aged children predominantly exhibit a positive attitude toward learning, with intrinsic and socially significant motives playing a leading role. This creates favorable conditions for the formation and sustainable development of academic motivation during early school years. M. R. Ginzburg's methodology has been established as a reliable and validated instrument for diagnosing learning motivation in children. In girls, motivation is effectively fostered through the acquisition of engaging knowledge, participation in social activities, as well as the use of group work and discussion-based formats. In boys, more pronounced effects are observed through competitive and play-based elements, clearly defined goals, reward systems, and an emphasis on extrinsic motivation. In this context, the development and implementation of differentiated teaching strategies tailored to the motivational characteristics of students according to gender becomes imperative.

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MILITARY LOGISTICS, FISCAL CAPACITY AND INSTITUTIONAL EFFICIENCY: A COMPARATIVE ANALYSIS OF IMPERIAL DEFENCE BURDENS IN MACEDONIA (MACEDONIAN, ROMAN, BYZANTINE AND OTTOMAN EMPIRES)

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Abstract: This study examines the relationship between military logistics, fiscal capacity, and imperial defence burdens through a comparative analysis of four major empires that governed the territory of Macedonia: the Macedonian Empire under Philip II and Alexander III, the Roman Empire, the Byzantine Empire, and the Ottoman Empire. The research challenges the conventional assumption that a higher percentage of economic output allocated to military purposes necessarily corresponds to greater military power or long-term state stability. The central hypothesis advanced in this paper is that imperial military strength and political durability were not primarily determined by the proportion of GDP devoted to defence, but rather by the degree of institutional coordination, fiscal mobilization capacity, and logistical efficiency embedded within the governing structure of each empire.

Given the absence of continuous and directly measurable GDP data for ancient and medieval societies, the study adopts a methodologically cautious framework that distinguishes between reconstructed economic output, documented state revenues, and military expenditure as a share of public budgets. The research relies on comparative historical analysis, secondary quantitative reconstructions from economic historians, fiscal documentation where available, and institutional-military literature. Particular attention is given to differentiating between military expenditure as a share of total state revenue and its estimated share of reconstructed GDP, thereby avoiding false statistical precision in premodern contexts.

The analysis demonstrates that although the military sector constituted the dominant component of public expenditure in all four empires, their logistical architectures and fiscal integration mechanisms differed substantially. Macedonian military expansion relied on high mobility, minimal logistical encumbrance, and resource extraction through conquest. Roman defence was sustained through institutionalized provisioning systems (*annona militaris*), standardized infrastructure, and integrated fiscal administration. Byzantine military organization combined decentralized thematic land grants with centralized reserves and advanced communication networks. The Ottoman system initially achieved cost-efficient military mobilization through the *timar* structure before gradually shifting toward centralized and fiscally heavier models of modernization.

The findings indicate that imperial sustainability correlated more strongly with institutional-logistical coherence and adaptive fiscal structures than with the absolute magnitude of military expenditure. Empires in which military systems exceeded the adaptive capacity of fiscal and administrative institutions experienced structural vulnerability, regardless of the percentage of economic output allocated to defence. The study contributes to fiscal-military state theory and imperial political economy by proposing an Institutional-Logistical Efficiency perspective for evaluating premodern defence burdens within a historically grounded analytical framework.

Keywords: *military logistics, fiscal capacity, state capacity, defence expenditure, institutional efficiency, imperial political economy, Macedonia, Macedonian Empire, Roman Empire, Byzantine Empire, Ottoman Empire*

Field: Social Sciences.

1. INTRODUCTION

The relationship between military expenditure and long-term state stability represents a central issue in the political economy of empires. Traditional interpretations frequently assume that a higher share of national output allocated to defence directly strengthens military power and secures political durability. Such an approach, however, tends to reduce complex state dynamics to a single fiscal indicator and neglects the institutional and logistical dimensions that sustain military systems over time.

The territory of Macedonia provides a rare historical setting for comparative analysis. Over a long temporal span, it was governed successively by four major imperial systems: the Macedonian Empire, the Roman Empire, the Byzantine Empire, and the Ottoman Empire. Each of these polities developed a distinct model of fiscal extraction, administrative organization, and military logistics. The comparative

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continuity of territorial space allows for structural comparison across different institutional configurations. The central hypothesis of this study is the following: Imperial military power and state stability are not directly correlated with the percentage of GDP allocated to defence, but with the degree of institutional coordination and logistical efficiency within the state apparatus.

Given that GDP is a modern analytical construct, its application to ancient and medieval societies requires methodological caution. For premodern polities, economic aggregates are reconstructed through demographic estimates, fiscal records, wage proxies, and secondary quantitative models (Broadberry et al., 2015; Scheidel, 2019). Accordingly, this research does not rely on artificial statistical precision. Instead, it differentiates between reconstructed economic output, state fiscal capacity, and military expenditure as a share of public revenue.

The objective of the paper is to examine how military logistics interacted with fiscal capacity in the four imperial systems that governed Macedonia and to assess whether variations in defence burden were decisive for imperial resilience. By focusing on institutional coordination, administrative integration, and logistical architecture, the study seeks to contribute to the broader debate on fiscal-military states and the structural foundations of durable political power.

2. MATERIALS AND METHODS

This study applies a comparative historical methodology grounded in economic history, fiscal sociology, and military-logistical analysis. Given the absence of direct national accounts for ancient and medieval polities, the research relies exclusively on secondary quantitative reconstructions, fiscal documentation, and peer-reviewed historical scholarship.

Reconstructed economic output is derived from established databases and scholarly models, including the Maddison Project Database (2020), Milanovic (2023), and recent revisions in long-run economic measurement (Broadberry et al., 2015; Scheidel, 2019). These reconstructions are based on demographic estimates, income per capita proxies, wage data, agricultural productivity models, and documented fiscal capacity. For the Ottoman period, additional quantitative insight is drawn from Karaman and Pamuk (2022), who provide updated fiscal-military state estimates within a comparative European framework.

Fiscal capacity and imperial revenue structures are examined through classical and contemporary fiscal studies, including Duncan-Jones (1994) for Roman public finance, Pamuk (2000) for Ottoman monetary and fiscal systems, and Treadgold (1997) and Haldon (1999) for Byzantine administrative-military structures. Military-logistical organization is analyzed through Engels (1978) on Macedonian campaigning systems, Murphey (1999) on Ottoman warfare and logistics, and recent contributions in strategic studies and defence management literature, including *Strategic Analysis: A Monthly Journal of the IDSA* and contemporary frameworks such as the Defense Logistics Management Standards (DLMS), which provide conceptual benchmarks for understanding supply-chain integration and institutional coordination in military systems.

The study further integrates recent scholarship on state capacity, war finance, and fiscal-military theory (Besley & Persson, 2022; Dincecco, 2023; Scheve & Stasavage, 2016; Karaman & Pamuk, 2022), situating imperial defence burdens within broader debates on taxation, administrative centralization, and institutional adaptability.

Analytically, the research differentiates three distinct but interrelated levels:

1. Reconstructed aggregate economic output (GDP or income estimates expressed as historical intervals);
2. State fiscal revenue as a share of reconstructed economic output;
3. Military expenditure as a share of total state revenue.

Where numerical values are referenced, they are treated as interval estimates derived from peer-reviewed reconstructions rather than as precise statistical measurements. Percentages of GDP for premodern empires are therefore interpreted as modeled approximations and are explicitly presented within scholarly ranges.

In addition, the paper introduces an original analytical framework termed the Institutional-Logistical Efficiency Model (ILEM). This model evaluates imperial defence sustainability not primarily through the magnitude of defence expenditure, but through institutional coordination, administrative integration, fiscal adaptability, transport infrastructure, and logistical standardization. The ILEM framework is used as a qualitative-comparative instrument to assess structural resilience across the four imperial systems under examination.

This methodological design ensures analytical rigor, reproducibility of sources, and conceptual

clarity while avoiding false statistical precision in the treatment of premodern economic aggregates.

3. RESULTS AND DISCUSSION

The comparative analysis across the four imperial systems governing Macedonia demonstrates that military expenditure consistently constituted the dominant component of public finance. However, the decisive variable was not the absolute share of economic output devoted to defence, but the degree of institutional coordination and logistical integration that structured military mobilization.

Macedonian Empire

The Macedonian state of the fourth century BCE functioned as a highly militarized expansionist monarchy. Reliable macroeconomic aggregates do not exist for this period; therefore, any calculation of defence expenditure as a percentage of GDP would be methodologically indefensible. Available evidence indicates that royal revenues derived primarily from mining (notably silver and gold), tribute, confiscations, and war plunder. During the campaigns of Alexander III, the majority of available state resources were directed toward military operations.

The logistical architecture was characterized by extreme mobility and minimal baggage trains. As demonstrated in classical military studies (Engels, 1978), Macedonian forces were capable of rapid marches—often exceeding 25–30 kilometers per day—supported by decentralized supply, requisitioning, and local extraction. This model reduced immediate fiscal burdens but structurally tied sustainability to continued territorial expansion. Once expansion ceased, the system lacked an institutionalized taxation and provisioning framework capable of maintaining long-term equilibrium.

The Macedonian case therefore illustrates a model of military power based on operational efficiency and expansionary extraction rather than bureaucratic fiscal capacity.

Roman Empire

The Roman Empire offers comparatively stronger fiscal documentation and modern economic reconstructions. During the Principate, state revenue is estimated at approximately 4–7% of reconstructed GDP (Duncan-Jones, 1994; Scheidel, 2019). Of this revenue, roughly 60–70% was allocated to the military establishment. This suggests that defence expenditure in stable periods likely represented between 2–4% of total economic output, acknowledging the reconstructed nature of such estimates.

What distinguished Rome was not merely the scale of expenditure but its institutional embedding. The *annona militaris* system integrated taxation in kind with logistical supply chains; an extensive road network—estimated at over 400,000 kilometers—facilitated rapid troop movement; centralized depots and professional supply officers standardized provisioning procedures. Military logistics were structurally embedded within administrative and infrastructural frameworks.

Despite a relatively moderate defence burden in GDP terms, Rome maintained political cohesion and military dominance for centuries. This indicates that institutionalized fiscal extraction and logistical integration, rather than high military ratios, underpinned durability.

Byzantine Empire

For the Byzantine Empire, particularly between the eighth and eleventh centuries, available fiscal reconstructions suggest that approximately 50–70% of public revenue was devoted to defence (Haldon, 1999; Treadgold, 1995). Reconstructed income levels indicate that total state revenue may have equaled 4–8% of economic output in stable periods. Defence expenditure therefore likely ranged between 3–5% of reconstructed GDP.

The thematic system constituted an innovative form of decentralized military-fiscal organization. Soldiers were granted land in exchange for service, effectively linking agrarian productivity to defence capacity. This arrangement reduced immediate cash outlays while embedding military obligations within provincial structures. Central reserves and sophisticated communication networks complemented this decentralized model.

Periods of Byzantine resilience coincided with institutional coherence and territorial integration. Conversely, fragmentation of administrative control—rather than excessive military percentages—proved decisive in moments of systemic crisis, particularly after 1204.

Ottoman Empire

Ottoman fiscal records, particularly from the classical and early modern periods, are comparatively robust. In the fifteenth and sixteenth centuries, military expenditures absorbed approximately 60–75% of central government expenditures (İnalçık, 1973; Pamuk, 2000). The *timar* system externalized cavalry costs to land-based revenue assignments, thereby reducing direct fiscal pressure on the central treasury.

During this classical phase, defence expenditure likely remained within a moderate reconstructed range relative to total economic output. However, in the eighteenth and nineteenth centuries, processes

of centralization and military modernization significantly increased fiscal demands. Recent economic-historical studies suggest that state revenue may have reached 15–20% of economic output in later periods (Karaman & Pamuk, 2022). With roughly half of this allocated to defence, the military burden may have approached 8–10% of GDP during peak militarization phases.

The transition from decentralized land-based military provisioning to centralized, cash-based armies generated increasing fiscal strain. The erosion of institutional flexibility and administrative coordination contributed to long-term structural vulnerability.

Comparative Synthesis and the Institutional-Logistical Efficiency Model (ILEM)

Across all four cases, the military sector dominated public budgets. Yet no linear correlation emerges between the reconstructed percentage of GDP allocated to defence and imperial longevity.

The Macedonian Empire exhibited extreme militarization and operational brilliance, but structural dependence on expansion limited durability. Rome maintained relatively moderate defence ratios but achieved long-term stability through infrastructural integration and administrative coherence. Byzantium demonstrated that decentralized military-fiscal mechanisms could sustain equilibrium when institutional cohesion remained intact. The Ottoman experience reveals that rising defence burdens became destabilizing primarily when institutional coordination weakened and fiscal adaptability declined.

These findings support the Institutional-Logistical Efficiency Model (ILEM), according to which long-term imperial stability is a function of:

- institutional coordination between fiscal and military organs,
- logistical autonomy and supply integration,
- fiscal adaptability to changing strategic demands,
- infrastructural and administrative coherence.

The absolute percentage of economic output devoted to defence is therefore an insufficient explanatory variable. What determines sustainability is the system's capacity to absorb, manage, and integrate military expenditure within a coherent institutional architecture.

The comparative evidence indicates that empires declined not simply when they spent “too much” on defence, but when military demands exceeded the adaptive capacity of their fiscal and institutional frameworks.

4. CONCLUSIONS

The comparative examination of the Macedonian, Roman, Byzantine, and Ottoman imperial systems confirms the central hypothesis of this study: the percentage of economic output allocated to defence is not, in itself, a sufficient indicator of military strength or long-term state stability. While in all four cases the military sector absorbed the majority of public fiscal resources, the decisive variable was the structure through which those resources were mobilized, coordinated, and sustained.

The Macedonian model achieved remarkable operational effectiveness through mobility and extraction, yet its sustainability depended on continuous expansion rather than institutionalized fiscal integration. The Roman Empire maintained long-term durability not because of an exceptionally high defence burden in GDP terms, but due to the integration of taxation, infrastructure, and professional logistics within a coherent administrative framework. Byzantine resilience rested on the balance between decentralized thematic structures and centralized coordination, linking agrarian productivity to military obligation. The Ottoman experience demonstrates that durability was strongest under decentralized, land-based provisioning systems, while later centralization and costly modernization generated fiscal rigidity and institutional strain.

Across these cases, military expenditure became destabilizing not when it reached a specific quantitative threshold, but when it exceeded the adaptive capacity of fiscal institutions and logistical systems. Premodern defence burdens must therefore be interpreted within reconstructed intervals and institutional contexts, rather than through mechanically applied economic ratios.

This study contributes to the political economy of empires by advancing the concept of Institutional-Logistical Efficiency as a primary explanatory variable in assessing imperial sustainability. Military power proved durable where fiscal extraction, administrative coordination, and logistical organization formed an integrated system capable of absorbing strategic pressures. Where such integration weakened, structural vulnerability followed—regardless of the nominal level of defence spending.

The findings suggest that imperial longevity was determined less by how much was spent on war, and more by how effectively states organized the institutions that sustained it.

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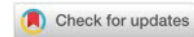
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FACTORS INFLUENCING THE ATTRACTIVENESS OF JOB POSITIONS IN IT COMPANIES DURING THE RECRUITMENT PROCESS

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Abstract: In the context of accelerated technological development and digital transformation, the information technology sector faces increasing competition for highly qualified professionals. Attracting and retaining talent has become one of the key challenges for IT companies, which has led to growing interest in the factors influencing job attractiveness during the recruitment process. The aim of this study is to identify and systematise the main determinants of job attractiveness in the IT sector through a comprehensive review of contemporary academic literature. The paper is based on an analysis of relevant international studies published between 2020 and 2025, focusing on recruitment, employer branding, digitalisation of hiring processes, talent management, and employee satisfaction. A review-based methodological approach was applied to identify dominant research trends and methodological patterns. The results indicate that job attractiveness represents a multidimensional construct encompassing financial incentives, career development opportunities, working conditions, organisational culture, work flexibility, employer reputation, and work-life balance. The reviewed studies confirm that although salary and material benefits remain important motivational factors, modern job seekers increasingly value non-financial aspects of employment, such as working environment, professional growth, and interpersonal relationships. Employer branding plays a particularly significant role by integrating various dimensions of attractiveness and shaping organisational image in the labour market. The findings suggest that successful talent attraction in the IT sector requires a holistic approach to human resource management, integrating financial, organisational, and technological strategies. This study provides theoretical and practical insights that may support managers and HR professionals in improving recruitment practices and developing sustainable talent attraction and retention strategies.

Keywords: *job attractiveness, IT sector, recruitment, employer branding, human resource management.*

Field: Social Sciences, and Humanities.

1. INTRODUCTION

In contemporary conditions of globalisation and rapid technological development, human resources represent a key source of competitive advantage, particularly in the dynamic IT sector. Due to the growing demand for highly skilled professionals, organisations face intense competition in the labour market and increasing challenges in attracting and retaining talent. Consequently, companies are required to develop effective recruitment strategies, while job attractiveness has emerged as a crucial factor influencing candidates' employer choices. Recruitment is therefore not merely a technical process, but a complex organisational and psychological phenomenon shaping employer perceptions. Cho and Lee (2021) emphasise that poor matching between employees and organisations leads to higher turnover and reduced workforce stability. Similarly, Chatzoudes and Chatzoglou (2022) argue that job satisfaction and organisational commitment are essential for long-term organisational success. Modern recruitment processes increasingly rely on digital technologies and automated systems. Nikolaou (2021) highlights the growing importance of social media, recruitment platforms, and applicant tracking systems. Rathore (2023) further points to the expanding use of artificial intelligence in candidate selection, enabling faster and more efficient processing of applications.

Nevertheless, technological tools cannot fully replace human judgement. Usmani (2020) demonstrates that while first impressions may influence initial evaluations, long-term recruitment decisions primarily depend on candidates' competencies and interpersonal skills. Jones et al. (2021) confirm that employers increasingly value the combination of technical expertise and soft skills. In addition to technological aspects, employer branding plays a crucial role in recruitment success. Samoliuk et al. (2022) and Wibowo et al. (2025) show that a positive employer image increases application intentions and employee loyalty. Van Hoa and Van Thu (2024) emphasise that employer branding must be grounded in authentic organisational values and ethical practices. Contemporary job seekers, particularly members of Generation Z, demonstrate distinctive expectations. Nguyen Ngoc et al. (2022) and Schietzel-Kalkbrenner et al. (2024) report that younger employees prioritise organisational culture, flexibility, digital

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communication, and social responsibility. Consequently, job attractiveness is no longer determined solely by salary levels, but by the overall employee experience. Work–life balance has emerged as a central determinant of employee well-being and performance. Herenz and Rani (2025) and Mubango et al. (2025) show that excessive workload and lack of flexibility negatively affect productivity and retention. In the IT sector, where overtime and project-based pressure are common, this issue is particularly relevant. Talent management constitutes another important dimension of job attractiveness. Xiao (2022) and Van Hoa and Van Thu (2024) argue that organisations must systematically identify, develop, and reward key employees to maintain competitiveness. Inadequate compensation and promotion systems often lead to talent loss. Decision-making processes in human resource management play a vital role in shaping recruitment strategies. Salehzadeh and Ziaeiian (2024) highlight the importance of multi-criteria decision-making methods in employee selection and management. Analytical tools enable more objective evaluations of job attractiveness factors. Although numerous studies address specific aspects of recruitment, relatively few adopt an integrated approach to analysing job attractiveness in the IT sector. Most existing research focuses on isolated variables, such as salary, satisfaction, or digitalisation, without examining their interrelationships.

Therefore, there is a need for a comprehensive framework that integrates economic, organisational, psychological, and technological dimensions of employment attractiveness. Such an approach enables organisations to develop more effective recruitment and talent management strategies. The main objective of this study is to identify and analyse key factors influencing the attractiveness of job positions in IT companies during the recruitment process. Particular attention is given to financial incentives, career development opportunities, working conditions, organisational culture, digital technologies, and work–life balance. In addition to its theoretical contribution, this study offers significant practical implications. The findings may assist managers and HR professionals in improving recruitment practices, enhancing labour market competitiveness, and fostering long-term employee retention. The paper is structured according to the IMRAD model. Following this introduction, the methodology section presents the research design. The third section reports and analyses the results, while the discussion relates the findings to existing literature. The final section summarises the conclusions and provides recommendations for future research.

2. METHODS

This study adopts a review-based research design aimed at the systematisation, analysis, and interpretation of existing academic studies addressing factors influencing job attractiveness in the IT sector during the recruitment process. Unlike empirical research based on primary data collection, this review relies on secondary sources, namely previously published scientific studies, which is consistent with the approach applied by Salehzadeh and Ziaeiian (2024) and Van Hoa and Van Thu (2024) in their review-based analyses. This methodological framework enables a broader understanding of the research problem and facilitates the identification of dominant theoretical and methodological patterns in human resource management. Review studies play a significant role in the development of scientific disciplines by contributing to the systematisation of knowledge, identifying research gaps, and guiding future studies, as confirmed by systematic reviews in the field of HRM (Salehzadeh & Ziaeiian, 2024). In the area of recruitment and talent management, this approach is particularly important due to the interdisciplinary nature of research and the diversity of theoretical perspectives (Nikolaou, 2021; Chatzoudes & Chatzoglou, 2022). For the purposes of this study, relevant international academic publications published between 2020 and 2025 were analysed. The literature was collected through academic databases such as Google Scholar, Scopus, and Web of Science, as well as through available institutional repositories, following procedures commonly applied in review studies in human resource management (Salehzadeh & Ziaeiian, 2024). In selecting the studies, attention was paid to their thematic relevance to IT recruitment, their focus on job attractiveness and talent attraction, the clarity of their methodological design, and their academic credibility. Particular emphasis was placed on studies addressing digital recruitment (Nikolaou, 2021; Rathore, 2023), employer branding (Samoliuk et al., 2022; Wibowo et al., 2025), organisational culture (Chatzoudes & Chatzoglou, 2022), work–life balance (Herenz & Rani, 2025; Mubango et al., 2025), talent management (Xiao, 2022), and decision-making processes in human resource management (Salehzadeh & Ziaeiian, 2024), as these topics directly contribute to understanding employment attractiveness.

The analysis of the selected studies indicates that research on job attractiveness is predominantly based on quantitative methodological approaches, primarily relying on survey questionnaires and statistical data analysis. This approach is dominant in the studies by Herenz and Rani (2025), Wibowo et al. (2025), Nguyen Ngoc et al. (2022), and Chatzoudes and Chatzoglou (2022), which employ standardised instruments and Likert scales to measure respondents' attitudes. Quantitative methods

enable the examination of relationships between variables such as salary, employee satisfaction, work flexibility, and application intention, as well as the comparison of results across different samples. The main advantage of this approach lies in its potential for generalisation, while its limitation relates to the relatively limited insight into individual experiences and subjective perceptions (Nguyen Ngoc et al., 2022). In addition to quantitative studies, a smaller number of qualitative investigations were identified, mainly based on interviews, focus groups, and case studies. Such methodological approaches are applied by, among others, Schietzel-Kalkbrenner et al. (2024) and Jones et al. (2021), who use expert interviews and textual data analysis to complement survey findings. Qualitative methods enable a more detailed understanding of candidates' and managers' attitudes, motivations, and experiences, as well as a deeper analysis of the context in which recruitment processes take place. However, they are often constrained by small sample sizes and limited generalisability. Some studies adopt mixed-methods designs that combine quantitative and qualitative techniques. This approach is evident in the research by Schietzel-Kalkbrenner et al. (2024) and Jones et al. (2021), where survey data are complemented by interviews. Such a methodological framework enables the simultaneous achievement of statistical validity and interpretative depth, as numerical data are enriched with qualitative insights, resulting in a more comprehensive understanding of job attractiveness. A considerable proportion of the analysed literature consists of review and theoretical studies that do not rely on primary data but are based on systematic analyses of existing research. This approach is applied by Salehzadeh and Ziaeian (2024) and Van Hoa and Van Thu (2024), who synthesise previous studies to identify key concepts, theoretical models, and methodological trends in recruitment and human resource management. These studies play an important role in developing theoretical frameworks and guiding future empirical research. The dominant use of quantitative methods in the analysed studies (Table 1) enables statistical testing of hypotheses and comparison of results across different investigations, thereby contributing to the objectivity and reliability of the findings. However, reliance on respondents' self-assessment through survey questionnaires may lead to subjectivity and response bias, as well as limited insight into individual experiences. Qualitative methods provide a deeper understanding of employees' attitudes and perceptions, but they are often constrained by smaller samples and reduced generalisability.

Table 1. Overview of methodologies of reviewed papers

Author(s)	Year	Study Type	Method	Sample / Source
Usmani	2020	Mixed / Experimental	Interviews + Survey + Experiment	Recruiters and candidates
Cho & Lee	2021	Quantitative	Regression analysis	Administrative data
Nikolaou	2021	Review / Theoretical	Literature review	Secondary sources
Jones et al.	2021	Mixed methods	Text analysis + Interviews	Employers, documents
Nguyen Ngoc et al.	2022	Mixed methods	Survey + Group discussion	Final-year students
Chatzoudes & Chatzoglou	2022	Quantitative	SEM	Employees
Xiao	2022	Quantitative	Questionnaire survey	Core employees
Samoliuk et al.	2022	Quantitative	Survey	Gen Y and Z respondents
Rathore	2023	Review / Analytical	Bibliometric analysis	Academic databases
Salehzadeh & Ziaeian	2024	Review	Systematic review (AHP/FAHP)	Academic papers
Van Hoa & Van Thu	2024	Review / Conceptual	Literature analysis	Scientific articles
Schietzel-Kalkbrenner et al.	2024	Mixed methods	Survey + Interviews	Generation Z
Herenz & Rani	2025	Quantitative	Survey + Regression	Employees
Wibowo et al.	2025	Quantitative	SEM-PLS	Job applicants
Mubango et al.	2025	Qualitative	Semi-structured interviews	IT employees

Source: Authors' research

Recent studies show an increasing application of analytical and multi-criteria decision-making methods, particularly in evaluating job attractiveness factors. Wibowo et al. (2025) employ the SEM-PLS model to examine relationships between digital recruitment and application intention, while Salehzadeh and Ziaeian (2024) analyse the application of AHP and related methods in HRM. These techniques enable the ranking of factors according to their relative importance and the examination of complex relationships between variables, thereby supporting more objective assessments of recruitment processes. Based on the literature review, it can be concluded that the most frequently used research

instruments in studies on job attractiveness include structured questionnaires with Likert scales, semi-structured interviews, secondary data sources, and bibliometric analyses (Nikolaou, 2021; Salehzadeh & Ziaei, 2024). Questionnaires dominate due to their simplicity, cost-effectiveness, and ability to generate large datasets suitable for statistical analysis. At the same time, qualitative instruments contribute to a better understanding of subjective aspects of employment, while review and bibliometric tools facilitate the identification of broader research trends. Overall, the analysed literature demonstrates that research on job attractiveness in the IT sector is characterised by methodological diversity, with a predominance of quantitative approaches and an increasing use of mixed and analytical models (Schietzel-Kalkbrenner et al., 2024; Wibowo et al., 2025). This methodological pluralism contributes to a more comprehensive understanding of recruitment processes and provides a solid foundation for future research in this field.

Review studies contribute to the systematisation of knowledge and the development of theoretical frameworks, yet their reliability largely depends on the quality of the sources used. The literature analysis indicates that combining different methodological approaches represents the most effective way to examine job attractiveness, as it enables the integration of statistical validity with interpretative depth. Mixed-methods models provide a more comprehensive insight into recruitment processes, particularly within the dynamic IT sector. This review study contributes to the existing literature by identifying dominant research methods, instruments, and analytical techniques in studies on job attractiveness. In this way, it facilitates a better understanding of contemporary research trends and establishes a foundation for the development of future empirical studies and the improvement of methodological frameworks in human resource management.

3. RESULTS

The analysis of relevant academic studies on job attractiveness in the IT sector reveals several recurring thematic dimensions, including financial aspects, professional development, working conditions and flexibility, organisational culture, digitalisation, employer branding, and work-life balance. The reviewed literature indicates that job attractiveness is a multidimensional construct encompassing both material and non-material factors. Most authors agree that candidates' employment decisions result from the interaction of organisational, technological, and psychological elements rather than from a single determinant. Financial factors remain among the most frequently analysed determinants. Salary, benefits, and job security are consistently identified as important elements of job attractiveness. Cho and Lee (2021) and Chatzoudes and Chatzoglou (2022) demonstrate that competitive compensation reduces employee turnover, while Wibowo et al. (2025) confirm its positive influence on application intentions. However, several studies emphasise that financial incentives alone are insufficient for long-term retention, as high salaries cannot compensate for poor working conditions and excessive workload (Herenz & Rani, 2025). Professional development and career advancement represent another central dimension, particularly in the IT sector, where continuous learning is essential. Nikolaou (2021), Jones et al. (2021), and Xiao (2022) highlight the importance of training, mentoring, and talent management, indicating that organisations offering structured development opportunities are more successful in attracting highly qualified professionals.

Working conditions, flexible working arrangements, and remote work options have become increasingly significant. Nguyen Ngoc et al. (2022) and Schietzel-Kalkbrenner et al. (2024) report that flexible models enhance employee satisfaction, while Mubango et al. (2025) show that digital tools support effective remote team management. Organisational culture and interpersonal relationships also play a crucial role in shaping job attractiveness. Chatzoudes and Chatzoglou (2022) and Van Hoa and Van Thu (2024) emphasise the importance of trust, transparency, and ethical standards, suggesting that candidates increasingly evaluate organisational values before making employment decisions. Digitalisation represents a prominent trend in modern recruitment. Nikolaou (2021) and Rathore (2023) demonstrate that digital platforms and artificial intelligence improve recruitment efficiency, while Wibowo et al. (2025) confirm their positive impact on candidate experience. However, excessive automation may reduce personalisation. Employer branding has emerged as a central mechanism integrating various dimensions of job attractiveness. Samoliuk et al. (2022) and Schietzel-Kalkbrenner et al. (2024) show that a strong employer brand enhances organisational credibility. Finally, work-life balance remains a critical factor influencing employee satisfaction and retention, as high workload and stress increase the risk of burnout (Herenz & Rani, 2025; Mubango et al., 2025).

Table 2. Key findings of reviewed studies

Author(s)	Year	Main Focus	Key Findings
Usmani	2020	Bias and evaluation in selection	Perception biases affect selection; structured assessments improve objectivity
Cho & Lee	2021	Worker–firm matching	Better matching reduces turnover and improves job stability
Nikolaou	2021	Technology in recruitment	Digital tools improve recruitment effectiveness and employer attractiveness
Jones et al.	2021	Skills and employability	Combined technical and soft skills enhance employability
Nguyen Ngoc et al.	2022	Job choice among young candidates	Young candidates prioritise culture, values, and flexibility
Chatzoudes & Chatzoglou	2022	Retention drivers	Satisfaction and commitment predict employee retention
Xiao	2022	Talent management	Structured talent development improves competitiveness and retention
Samoliuk et al.	2022	Employer branding	Strong employer branding increases organisational attractiveness
Rathore	2023	AI in recruitment	AI improves screening efficiency but requires ethical governance
Salehzadeh & Ziaieian	2024	HR decision-making	Multi-criteria models support better HR decisions
Van Hoa & Van Thu	2024	Talent attraction / HR practices	Credible HR practices strengthen talent attraction.
Schietzel-Kalkbrenner et al.	2024	Gen Z and recruitment process	Transparent recruitment increases Gen Z attractiveness
Herenz & Rani	2025	Work–life balance	Workload reduces well-being; balance policies improve outcomes
Wibowo et al.	2025	E-recruitment and application intention	E-recruitment increases application intentions
Mubango et al.	2025	Digital work / remote management	Digitalisation supports remote performance and engagement

Source: Authors' research

4. DISCUSSION

The literature review indicates that job attractiveness in the IT sector is a complex and multidimensional phenomenon shaped by the interaction of financial, organisational, technological, and psychological factors. Although salary remains an important motivator, its relative importance is declining in favour of non-financial aspects such as flexibility, professional development, and organisational culture, particularly among younger generations. These findings support motivational theories emphasising higher-order needs, suggesting that companies investing in employee development gain a competitive advantage. The digitalisation of recruitment improves efficiency and transparency but also carries the risk of depersonalisation, highlighting the need for a balanced approach combining automation and human interaction. Employer branding has emerged as a key mechanism integrating financial benefits, organisational culture, and social responsibility, making reputation a strategic resource in talent competition. Organisational culture, interpersonal relationships, and work–life balance strongly influence employee loyalty and retention, as high job demands increase the risk of burnout. Despite valuable insights, methodological limitations remain evident. The dominance of quantitative research restricts understanding of subjective experiences, while transitional economies are underrepresented. Future research should therefore incorporate longitudinal, qualitative, and comparative approaches to achieve a more comprehensive understanding of job attractiveness.

5. CONCLUSION

The aim of this review study was to analyse contemporary research on factors influencing job attractiveness in the IT sector. The reviewed studies show that employment attractiveness results from the interaction of financial, organisational, technological, and psychological factors. Although salary remains important, its role is declining in favour of non-financial factors such as professional development, flexibility, organisational culture, and work–life balance. Employer branding has also gained importance as a mechanism integrating these dimensions. Digitalisation has become an essential component of

modern recruitment, improving efficiency and access to information while requiring careful management to maintain personalisation. Working conditions, interpersonal relationships, and managerial support strongly influence employee loyalty, and their neglect leads to higher turnover. Existing research limitations highlight the need for more diverse methodological approaches, particularly longitudinal and qualitative studies. At a practical level, the findings provide guidelines for improving recruitment strategies. By combining competitive compensation, development opportunities, flexibility, and a positive organisational culture, IT companies can enhance their attractiveness and achieve long-term competitive advantage. Successful talent attraction therefore requires a holistic and sustainable approach.

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POLAND IN THE CONCEPT OF EXTENDED DETERRENCE: FROM THE SOLIDARITY MOVEMENT TO THE UKRAINIAN CONFLICT

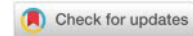
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Abstract: This paper examines Poland's experience with extended deterrence across two pivotal historical junctures: the Solidarity Movement crisis (1980 - 1981) and the ongoing Russo-Ukrainian conflict (2022 - present). The analysis applies a comparative historical method supported by primary sources including declassified CIA documents and Politburo transcripts, alongside secondary academic literature and quantitative defense data. Poland's geopolitical position, shaped by centuries of partition, Soviet domination, and the trauma of the Molotov - Ribbentrop Pact, has produced a security culture defined by acute vulnerability and deep-seated reliance on external guarantors. During the Solidarity crisis, the Carter and Reagan administrations pursued a proactive deterrence strategy through explicit threats of sanctions, material support for the opposition, coordination with NATO allies, and exploitation of the Sino-Soviet rivalry. While the strategy successfully prevented direct Soviet military intervention, it failed to prevent the imposition of martial law in December 1981. Nevertheless, Solidarity's underground survival, sustained by continued Western support, ultimately contributed to Poland's democratic transition and the broader collapse of the Eastern Bloc. In the context of the Ukrainian conflict, Poland has evolved from a passive object of geopolitical competition into an assertive security actor, dramatically increasing its defense budget to over 3% of GDP, providing substantial military assistance to Ukraine, deepening U.S. military presence on its territory, and actively pursuing NATO nuclear sharing arrangements. The paper identifies strong strategic continuity in Poland's transatlantic orientation across both periods, while also identifying key limitations: excessive dependence on an external guarantor creates moral hazard, and intensified militarization risks deepening the security dilemma with Russia.

Keywords: *extended deterrence, Russo-Polish relations, USA, Solidarity, NATO, Russia, Ukrainian conflict, security dilemma*

Field: Humanities

1. INTRODUCTION

The concept of deterrence represents one of the longest-studied phenomena in international relations theory. From Thucydides' analysis to contemporary debates on nuclear strategy, deterrence is a key analytical category for understanding how states attempt to prevent undesirable actions through the threat of unacceptable costs (Schelling, 1960; Jervis, 1979; Morgan, 2003). In the post - Cold War period, particularly following Russia's annexation of Crimea in 2014, the concept of extended deterrence has regained prominence (Lanoszka, 2018). Extended deterrence refers to a situation in which one state (the guarantor) provides security guarantees to another state (the client) against a third party, raising additional questions of credibility.

Poland represents a paradigmatic case for studying the dynamics of extended deterrence. Its geopolitical position between Germany and Russia, the trauma of four partitions, and half a century of Soviet domination have shaped a security culture deeply marked by a perception of vulnerability (Kupiecki, 2022).

To what extent has Poland's foreign policy strategy, based on its alliance with the United States, contributed to the effective deterrence of external threats, and what are the long-term implications of this approach?

From this central research question, the following hypotheses are derived:

H1: Poland's deterrence strategy demonstrates continuity in its reliance on the transatlantic alliance from the 1980s to the present day.

H2: The effectiveness of deterrence varies due to different contextual factors (bipolar vs. multipolar system).

H3: Excessive reliance on an external guarantor creates moral hazard and the risk of a security dilemma.

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2. METHODS

2.1. Research Design

The research employs a qualitative comparative historical method with a focus on two case studies: the Solidarity Movement (1980 - 81) and the Ukrainian conflict (2022 - present). The analysis draws on primary sources including declassified CIA documents, Politburo of the CPSU transcripts, and strategic documents, complemented by secondary academic literature and quantitative defense data. The process tracing method is used to identify causal mechanisms across the two cases (Beach & Pedersen, 2013).

The comparative case study design was selected because it enables systematic identification of similarities and differences across two temporally distinct but structurally related episodes of extended deterrence involving the same guarantor (the United States) and the same regional context (Central - Eastern Europe). Process tracing further allows reconstruction of the causal pathways through which deterrence signals influenced the decisions of Soviet and Russian leadership respectively.

2.2. Theoretical Framework

Deterrence is grounded in the assumption that rational actors make decisions based on cost-benefit calculations. Thomas Schelling (1960) defined deterrence as a strategy in which one actor attempts to influence the behavior of another through the threat of unacceptable consequences. The key elements are: (1) capability - the possession of means; (2) credibility - the convincingness that the threat will be carried out; (3) communication - the clear conveyance of intentions. Robert Jervis (1979) introduced the distinction between deterrence by punishment and deterrence by denial. The former is based on the threat of retaliation following aggression, while the latter rests on the ability to prevent the aggressor from achieving its objectives. Extended deterrence arises when state A (the guarantor) provides security guarantees to state B (the client) against state C (the challenger). This concept became central to NATO doctrine during the Cold War (Knopf, 2012; Lanoszka, 2018). Extended deterrence poses a specific credibility problem: is the guarantor's threat sufficiently convincing when its implementation could jeopardize the guarantor's own security? Patrick Morgan (2003) identified mechanisms for reinforcing credibility: forward deployment of military forces, formalization of commitments, public declarations, and demonstration of capabilities through exercises. Glenn Snyder (1984) identified the alliance dilemma: the risk of abandonment versus the risk of entrapment. The client fears that the guarantor will not protect it, while the guarantor fears that the ally will draw it into an unwanted conflict. The concept of the security dilemma (Herz, 1950; Jervis, 1978) further complicates the analysis. When a state strengthens its own security through increased military budgets, alliances, or armaments, other states may perceive this as a threat, resulting in a spiral of mutual mistrust. In the context of extended deterrence, the strengthening of the military alliance between the guarantor and the client can convince the challenger to become more aggressive through preventive logic, while the challenger's reaction in turn convinces the client of the necessity of an even stronger alliance.

2.3. Geopolitical Background: Poland's Historical Position

An understanding of the case studies requires contextualizing Poland's long-term geopolitical position. Poland's location at the crossroads of eastern and western influences has crucially shaped Polish statehood. The three partitions of Poland (1772, 1793, 1795) among Russia, Prussia, and the Habsburgs resulted in the disappearance of the state for 123 years, a trauma deeply rooted in the collective consciousness (Davies, 2005; Biskupski, 2018). The Molotov - Ribbentrop Pact (1939) and the simultaneous invasion by Germany and the USSR marked a "fourth partition," while the Katyn Massacre (1940)-in which the NKVD executed approximately 22,000 Polish officers - engraved a deep institutional mistrust that Soviet denial of responsibility until 1990 only deepened (Sanford, 2005). The postwar realignment pushed Poland into the Soviet sphere until the late 1980s. Formally independent, Poland had extremely limited sovereignty. The Brezhnev Doctrine and interventions in Hungary (1956) and Czechoslovakia (1968) clearly demonstrated the limits of permitted autonomy (Prazmowska, 2010). Workers' uprisings (1956, 1970, 1976) culminated in the emergence of the Solidarity Movement in 1980. The end of the Cold War created the most favorable conditions in Polish history, and accession to NATO (1999) and the EU (2004) marked a "return to the West." However, Polish security culture remained marked by a perception of vulnerability, a perception that became more pronounced following Crimea (2014) and the full-scale invasion of Ukraine (2022).

3. RESULTS

3.1. Case Study 1: Solidarity and American Deterrence (1980 - 1981)

3.1.1. The Emergence of Solidarity and Soviet Pressure

By the late 1970s, the economic situation in Poland had deteriorated dramatically. The strikes of July 1980 surpassed all previous protests, with strikers occupying factories and forming committees (Paczkowski & Byrne, 2007). In September 1980, the Independent Trade Union "Solidarity" was formed under the leadership of Lech Wałęsa, rapidly transforming into a mass movement with approximately 10 million members – nearly one third of the population. The general strike of March 27, 1981 demonstrated the movement's strength, constituting the largest collective action in the Eastern Bloc. Declassified documents reveal that the Soviet Politburo repeatedly considered military intervention in 1980–81 (MacEachin, 2002). The Warsaw Pact organized a series of military exercises on Polish borders, including "Zapad-81" - the largest peacetime concentration of Soviet troops. However, Soviet planning faced significant obstacles: intelligence assessments indicated the likelihood of serious armed resistance, unlike Czechoslovakia in 1968 (Domber, 2014). Beyond the military costs, intervention would have marked the end of détente, jeopardized SALT II, and led to economic sanctions.

3.1.2. USA Deterrence Strategy and Its Mechanisms

The Carter and Reagan administrations adopted a proactive deterrence strategy, with Zbigniew Brzezinski as chief architect, viewing the crisis as an opportunity to destabilize the Soviet bloc (Brzezinski, 2001). The strategy operated through five mechanisms: (1) explicit threats - in December 1980, Brzezinski directly warned the USSR via the "hotline" of "serious consequences," representing a dramatic departure from 1968; (2) concrete sanction preparation - including suspension of technology transfers, termination of grain agreements, suspension of credits, and an Olympic boycott, all communicated to the Soviets; (3) allied coordination - Carter sent letters to British, French, and German leaders, signaling Western unity despite a more reserved European response; (4) exploitation of the Chinese factor - Brzezinski hinted at American-Chinese military cooperation to amplify Soviet fears of encirclement (Vaughan, 2020); and (5) material support for Solidarity - the CIA provided printing presses, communications equipment, and financial assistance (Domber, 2014).

3.1.3. Martial Law and Its Long-Term Consequences

In the night of December 12/13, 1981, General Jaruzelski declared martial law, resulting in the arrest of approximately 6,000 activists, the suspension of organizations, and the militarization of the economy. The operation was carried out with Soviet planning but without direct Soviet troop participation (MacEachin, 2002).

Despite the initial setback, Solidarity survived as an underground movement. Continued Western support sustained the opposition through the mid-1980s. With Gorbachev's glasnost and perestroika, the circumstances shifted. The semi-free elections of June 4, 1989 marked a turning point: the Citizens' Committee won 99 out of 100 Senate seats, representing a decisive defeat for the communists. Crucially, Gorbachev's position that the USSR would not intervene proved decisive (Kemp-Welch, 2008). The Polish events triggered a domino effect: the fall of the Berlin Wall, the Velvet Revolution, and the dissolution of the USSR.

3.2. Case Study 2: Poland and the Ukrainian Conflict (2022–Present)

3.2.1. From Crimea to Full-Scale Invasion

Russia's annexation of Crimea (2014) and its support for separatists marked a turning point. For Poland, this confirmed long-standing warnings about Russian revisionism that had been frequently dismissed as "Russophobia" (Bouzarovski & Konieczny, 2010). Following the full-scale invasion of February 24, 2022, Polish assessments proved more accurate than the optimistic approach of Germany and France (Sikorski, 2022). The conflict directly activated Poland's deep-seated fears: Russian forces on the border via Belarus, a refugee exodus exceeding 3 million, and the possibility of strategic encirclement.

3.2.2. Polish Multilayered Deterrence Strategy

Poland responded with a multilayered deterrence strategy across four dimensions. First, in terms of humanitarian and geopolitical signaling, Poland became the primary transit point for military aid and received the largest number of refugees, providing temporary status, access to education, and healthcare – a policy serving the geopolitical function of demonstrating solidarity (Dyduch & Góra, 2024). Second, regarding military support for Ukraine, Poland was among the first states to provide significant military assistance - T-72 and PT-91 tanks, howitzers, rocket launchers, and air defense systems - amounting to over 3 billion dollars in the first year, one of the largest contributions relative to economic size. This support strengthened Ukrainian resistance (deterrence by denial) while signaling Polish resolve (deterrence by punishment). Third, Poland dramatically increased its defense spending, with the budget exceeding 3%

of GDP (approximately 16 billion dollars) in 2023, with plans for further increases to 4% (Geopolitical Futures, 2024). The funds supported an ambitious program: 980 tanks (500 South Korean K2, 250 American M1A2, 230 PT-91), 672 howitzers, 48 F-35A aircraft, missile defense systems, and an increase of active personnel to 300,000 - the largest army in the EU. Fourth, on nuclear deterrence, approximately 10,000 American soldiers were stationed in Poland - the largest concentration in Eastern Europe. Prime Minister Morawiecki expressed readiness in June 2023 for NATO nuclear sharing, in response to Russian deployment announcements in Belarus (Institute for Strategic Studies, 2023). Participation would entail hosting B61 bombs, F-35A certification, pilot training, and participation in the Nuclear Planning Group. Public support for this option grew from approximately 25% in 2016 to over 50% in 2022.

3.2.3. Geopolitical Objectives and Risks

Poland's strategy pursued four objectives: (1) preservation of a sovereign and pro-Western Ukraine as a security buffer; (2) strengthening its own military power to the level of credible deterrence even in a scenario of reduced American engagement; (3) consolidation of American presence and prevention of a strategic "pivot" toward Asia; and (4) blocking normalization of EU-Russia relations, particularly in the energy sector. However, the strategy carried corresponding risks: excessive militarization could deepen the security dilemma, nuclear sharing would make Poland a priority target, and dependence on the United States left a vulnerability to shifts in Washington, as illustrated by Trump's victory in 2024.

3.3. Comparative Analysis

3.3.1. Similarities Across Cases

Four structural similarities emerge across the two cases. First, in both cases Poland relied primarily on the United States, with European allies playing a more reserved role - a pattern that confirmed persistent Polish skepticism toward European security alternatives. Second, credibility was reinforced in both periods through explicit declarations, preparation of concrete measures, and physical presence. Third, economic measures were a key element in both cases: threatened sanctions in 1980 - 81 and massive sanctions from 2022 onward. Fourth, Western support in both cases extended beyond material assistance to include strengthening the legitimacy of oppositional actors - Solidarity and Ukrainian resistance respectively.

3.3.2. Differences Across Cases

Five important differences distinguish the two cases. First, Solidarity unfolded within a bipolar system with clearly defined spheres of influence, whereas the Ukrainian conflict takes place in a more fluid multipolar system. Second, during the Cold War, strategic nuclear parity created a "balance of terror"; in the present, the asymmetry in conventional capabilities and escalation perceptions is more complex. Third, in 1980 - 81, Poland was not a formal ally and deterrence was ad hoc; from 2022 onward, Poland is integrated into NATO with Article 5 protections. Fourth, during Solidarity, Poland was a passive object of deterrence dynamics; in the Ukrainian conflict, it is an active actor shaping Western strategy. Fifth, in 1980 - 81 the crisis was on Polish territory itself, whereas in 2022 the immediate conflict is in Ukraine.

3.3.3. Effectiveness Assessment

Solidarity (1980 - 81): Deterrence was partially successful. Direct Soviet intervention was prevented - a success of deterrence in the narrow sense, with Soviet sources suggesting that American threats significantly influenced the decision (Kramer, 1999). However, martial law represented a partial failure, as the objective had been the preservation of Solidarity and democratic opening. In the long term, the survival of the movement and its 1989 triumph were made possible.

Ukrainian conflict (2022 - present): The assessment is more complex as the conflict is ongoing. Deterrence has been successful in preventing a direct attack on NATO territory - the primary objective. The attack on Ukraine itself was not prevented, indicating the limitations of extended deterrence when the client state is outside the formal alliance. Long - term effectiveness will depend on the outcome of the war.

4. DISCUSSION

4.1. Hypothesis Verification

H1 (Continuity of strategy): CONFIRMED. The analysis demonstrates strong continuity in reliance on the transatlantic alliance across both periods. The United States remained the primary guarantor in both cases, with European allies in a secondary role.

H2 (Influence of context): CONFIRMED. Effectiveness is significantly conditioned by systemic context. The bipolar system of the Cold War provided a clearer structure of mutual deterrence, while the contemporary multipolar system introduces greater ambiguity and a more complex escalation landscape.

H3 (Risk of dependence): PARTIALLY CONFIRMED. There are indications of moral hazard - aggressive Polish rhetoric premised on the assumption of NATO intervention. However, Poland's dramatic strengthening of its own capabilities reduces absolute dependence, and the security dilemma dynamic is

demonstrably present in the current period.

4.2. Main Theoretical Contributions

First, the analysis confirms that historical experience profoundly shapes security culture in ways that transcend rational-actor models. The traumas of partition, occupation, and Soviet domination created a long-term perception of vulnerability that Kupiecki (2022) terms a “culture of danger,” rendering Poland more inclined toward maximalist deterrence strategies than structural conditions alone would predict.

Second, the cases confirm Morgan’s (2003) proposition that extended deterrence functions most effectively when supported by multiple reinforcing mechanisms simultaneously: military presence, economic measures, diplomacy, and institutional commitments. In both cases, the effectiveness of American deterrence was directly proportional to the comprehensiveness of the signaling package deployed.

Third, the analysis extends Snyder’s (1984) alliance dilemma framework by demonstrating its evolution across time: whereas Poland occupied the position of the dependent client in the 1980 - 81 case, it has partially transformed into a co-producer of deterrence in the contemporary period. This evolution suggests that extended deterrence relationships are not static but develop through iterative strategic interaction.

Fourth, the comparison highlights an underappreciated distinction between formal and informal extended deterrence. The absence of formal NATO membership in 1980 - 81 meant that American deterrence commitments were inherently less credible and more contingent, whereas Article 5 membership in the contemporary case provides a qualitatively different institutional foundation - one that is nonetheless not immune to political contestation, as Trump’s statements during the 2024 campaign demonstrated.

4.3. Policy Implications

The findings carry several implications for policymakers. First, diversification of security strategy is advisable. Although the alliance with the United States remains crucial, Poland should develop complementary mechanisms including European defense cooperation, regional initiatives such as the Three Seas Initiative, and diplomatic channels - reducing the structural vulnerability created by dependence on a single guarantor whose strategic priorities may shift.

Second, management of the security dilemma requires attention. Militarization should be combined with confidence-building measures: transparency of activities, reciprocal limitations, and crisis communication channels. Escalation management must be built into deterrence strategy, not treated as an afterthought.

Third, nuclear sharing decisions require careful deliberation. Participation may strengthen deterrence capabilities but simultaneously increases risk of becoming a priority target, represents a departure from the NATO-Russia Founding Act (1997), and may accelerate the very security dilemma dynamic it seeks to counteract.

Fourth, Poland should develop a coherent long-term vision for the post-war European security architecture, moving beyond reactive deterrence postures toward a sustainable regional order.

4.4. Limitations

The research has several limitations. The absence of comprehensive Russian primary sources constrains the analysis of decision-making on the other side of the deterrence relationship. The Ukrainian conflict remains ongoing, making definitive effectiveness assessments premature. The study’s qualitative focus on two cases limits generalizability, and the analysis would benefit from formal game-theoretic modeling of deterrence interactions.

Future research could broaden the comparative analysis to other Eastern European states, analyze the perceptions of Russian leadership through available primary materials, employ formal game-theoretic models, and examine public opinion dynamics in greater depth.

5. CONCLUSION

This paper examined Poland’s experience with extended deterrence across two pivotal historical junctures, applying a comparative historical method to identify structural continuities and contextual variations in deterrence dynamics. The analysis confirmed all three research hypotheses: continuity of transatlantic orientation (H1), context-dependent variation in effectiveness (H2), and structural vulnerabilities inherent in asymmetric alliance dependence (H3).

The Polish experience illustrates how history, geography, and identity shape security policy in ways that persist across radically different systemic environments. From Solidarity to Ukraine, Poland has consistently sought security through its alliance with the United States, perceiving this as the most effective strategy for deterring Russia. This strategy has yielded tangible successes: the prevention of

Soviet military intervention in 1980 - 81, the enabling conditions for democratic transition, and effective deterrence of direct attacks on NATO territory. However, it also generates structural risks: dependence on the volatile politics of Washington, moral hazard in alliance relationships, and the potential for self-fulfilling escalation through the security dilemma.

The key theoretical and policy question remains open: can long-term European security rest exclusively on deterrence, or does sustainable stability require a complementary strategy that includes dialogue, confidence-building, and institutional engagement with potential adversaries? The answer will determine not only the future trajectory of Polish security policy but the broader character of the European security order in the twenty-first century.

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TOWARDS ESTABLISHING THE AUXILIARY POLICE IN THE REPUBLIC OF SERBIA

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Abstract: Ensuring public safety is a fundamental task of the police. To carry out certain police duties, in addition to engaging the regular (professional) police force, it is often necessary to engage a larger (additional) number of personnel and resources. The nature and scale of contemporary security challenges, risks, and threats require that, alongside the police, other social actors — including citizens — take on a more active role in ensuring both their own safety and the safety of others. One of the mechanisms for achieving this is the establishment or existence of a reserve or auxiliary police force. The experiences of certain countries show that there are various models or forms of auxiliary police, which differ primarily in their purpose, role, and degree of integration within the overall police system. In the Republic of Serbia, in addition to the police, other actors also participate in maintaining public safety — such as the municipal police (a specialized body established within certain units of local self-government) and private security services. One possibility that includes the involvement of citizens in carrying out certain police tasks is their engagement through the auxiliary police, which may be formed in accordance with the Law on Police from 2016. The concept of auxiliary police is a kind of successor to the institution of the so-called reserve police force, which was regulated by the Law on Internal Affairs from 1991. After that law ceased to be in force, the formation of the auxiliary police was initially governed by the Law on Police from 2005, and later by the aforementioned 2016 Law. The detailed conditions for the formation of the auxiliary police were regulated by specific regulations adopted pursuant to these laws. Currently, within the legal framework of the Republic of Serbia, there is no regulation that would regulate in more detail the establishment of an auxiliary police force, and therefore, no such force exists at present. In this context, the paper will include a critical analysis of the aforementioned regulations, with the aim of proposing certain *de lege ferenda* solutions that would create the legal basis for the formation of an auxiliary police force.

Keywords: *public safety, policing, police, auxiliary police.*

Field: Social Sciences (Security and Law)

1. INTRODUCTION

Although the core functions of the police are similar across most nations, they are not identical in substance, given that the scope and content of police activities are significantly influenced by the specific social and political system of each individual country (Marković, 2009: 356). The contemporary trend in most states, including the Republic of Serbia, is the rationalization of public administration, primarily involving a reduction in the number of employees. This process, however, has certainly not been accompanied by a decrease in the workload, at least regarding the police force. On the contrary, the volume of tasks is constantly increasing under regular circumstances, and particularly within emergency (crisis) situations.

The most critical issues concerning the organization and jurisdiction of the police are regulated by law, which constitutes a fundamental characteristic of the rule of law. The specific nature of police activities, as compared to other public administration bodies, necessitates a specialized organizational structure, which further requires distinct legal solutions (provisions) regarding police organization. The fact that police officers are armed, specially equipped and trained, and vested with police powers that may restrict the freedoms and rights of citizens must, alongside other factors, be taken into account during the organizational process (Jugović, 2013b: 243-244). To this should certainly be added the specificities regarding centralization and decentralization as models of police organization (Jugović, 2014). Furthermore, the diversity of the required organizational units within the police is influenced by the very diversity of police functions. The variety of organizational units within the police force is more extensive than in other state administration bodies, particularly in comparison to those entities that perform only a one function (Miletić & Jugović, 2019: 92).

Over the past few decades, all contemporary systems of national and public security have undergone significant reforms. At the beginning of the 21st century, this reform process in the Republic of Serbia led to substantial conceptual innovations, particularly regarding the implementation of public security. One such innovation was the introduction of the auxiliary police concept by the Law on Police

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of 2005. The auxiliary police is a specific legal successor to the so-called reserve force of the Ministry of Internal Affairs (MUP), which had been introduced into the legal order by the Law on Internal Affairs of 1991. This institution was retained in the Law on Police of 2016 as an available option for the police force, with the specific conditions for the formation of the auxiliary police to be regulated by a Government regulation. Nevertheless, today—ten years after the adoption of the law - the relevant regulation that would enable the formation of the auxiliary police force still does not exist within the Serbian legal order. Namely, the Regulation on Service in the Auxiliary Police was adopted in late 2016, only to be abolished in early 2017. It is also noteworthy that the formation of the auxiliary police was envisaged by the Draft Laws on Internal Affairs of 2021 and 2022, which were subsequently withdrawn. Taking the aforementioned into account, our objective is to critically examine and describe the concept of the auxiliary police, as well as to conduct an analysis of the regulations that have governed and currently govern the issue of auxiliary police formation in Serbia. In doing so, we will specifically highlight *de lege ferenda* proposals, aimed at improving future legal activities in this field.

2. CONCEPTUALIZATION OF THE AUXILIARY POLICE

The fundamental task of the police is to achieve an optimal state of public security. This is accomplished through the daily engagement of regular police units and officers. However, in certain security-threatening conditions affecting the state, society, and its citizens, a need arises for the increased mobilization of a large number of police officers. In such situations, the functioning of the state and its institutions can occasionally be impeded. Circumstances in which the functioning of the state-legal system may be hindered can arise due to various factors that, to a greater or lesser extent, lead to a crisis in the operability of the legal and state system (Simović & Žekavica, 2012: 284). These extraordinary circumstances in the Republic of Serbia were particularly pronounced in the preceding period. Some instances include: the catastrophic consequences of floods in 2005 and 2014, migrant crises and the breach of state border security (notably during 2015 and 2016), and the COVID-19 pandemic in 2020 (which resulted in the declaration of a state of emergency). These circumstances were particularly burdensome when it came to police work. In such scenarios, fulfilling police tasks requires—in addition to the deployment of the regular (professional) police force—the engagement of a significant amount of additional personnel and resources. This new security reality has necessitated, among other things, a higher degree of interdependence between civilian and military actors, as well as the increased utilization of the military to supplement civilian resources during various crisis situations. This is particularly relevant in the context of relieving the burden on police forces when they are unable to fulfill their traditional roles (Jeftić & Mandić, 2020: 277). For instance, during the 2020 pandemic, the Serbian Armed Forces provided significant assistance to the police in the Republic of Serbia. The aforementioned clearly indicates the necessity for a certain reserve or auxiliary police force as a specific form of resilience and preparedness of the state security system for crisis situations.

Even during the performance of regular activities, the regular police force often proves insufficient for addressing standard (more frequent yet lower-risk) security issues. These regular security matters are managed through the execution of standard police tasks, such as foot patrols, mobile patrols, operational activities, and the protection of specific individuals and facilities (Stevanović & Stajić, 2015: 346; Subošić & Stevanović, 2023: 91). Even under such conditions, the regular police force may be assisted by the so-called reserve or auxiliary police (auxiliary officers). As such, members of the auxiliary police can be considered members of the police force in a broader sense; however, in a narrower sense, this term refers exclusively to police officers as permanent employees of the police service (Subošić & Kekić, 2008: 358).

Regarding the composition of the auxiliary police, the key question is who can (or should) constitute its force. The answer typically points to citizens as the key stakeholders of security in any society. Indeed, the auxiliary police represents a specific form of cooperation between the police and the citizenry (Jugović, 2013a: 146). Involving citizens in policing serves as a mechanism for strengthening public trust in the police and enhancing its legitimacy, as well as increasing its overall efficiency. However, one must remain cognizant of the fact that partnerships between the police and citizen volunteers are characterized by a high degree of integration of tasks and responsibilities, along with a high level of trust, where boundaries often become blurred and porous (Lofstrand Hansen & Uhnöo, 2020: 950). Furthermore, there are diverse motivations - such as confronting challenges, self-improvement, acquiring new skills, networking, enhancing personal employment prospects, helping others, contributing to a better society, and gaining a deeper insight into police work - that drive citizens to join the auxiliary police in a voluntary capacity (O'Connor, D. T., et al., 2021: 159-161).

The experiences of certain developed countries indicate diverse conceptual and terminological

approaches to defining the auxiliary police, resulting in terms such as volunteer police, auxiliary police, reserve police, and the like. These terms are often used interchangeably and encompass officers who may possess all or only selected police powers and who may or may not perform full policing functions. This is exemplified by the situation in the United States. In New York, the term 'auxiliary police officers' is utilized, whereas in Los Angeles, the term 'volunteer reserve officers' is preferred. This variation is primarily rooted in differing approaches to their powers, authority, work obligations, and the specific tasks they perform. A similar distinction exists in the United Kingdom, where a difference is made between 'police support volunteers' and 'special constables.' In England and Wales, volunteering in the police service is carried out by individuals who receive no remuneration, while special constables possess the same powers as regular police officers and may undertake a wide spectrum of duties (excluding, however, the carriage of firearms) (Wolf & Jones, 2018: 9-10). What these systems share in common is that the auxiliary police is composed of citizens who perform policing tasks on a voluntary and unpaid basis.

Taking all of the aforementioned into account, the auxiliary police could be defined as a legally regulated, planned, and organized voluntary engagement of specific trained citizens in the performance of (all or selected) policing tasks and duties, involving the application of (all or selected) police powers, either without remuneration or with financial or other compensation. Similarly, police volunteers are defined as „an individual who works directly for a government entity and is authorized with lawful powers for the prevention, investigation, and prosecution of criminal activity and the preservation of public order, and who provides this service without an imposed requirement and without significant remuneration for his or her services.“ (Wolf & Jones, 2018: 9).

Given the diversity of police functions and organizations, the specific characteristics of various national police systems, and the varying motivations for joining the auxiliary police, several classifications of the auxiliary police can be established based on different criteria. Thus, according to the powers vested in them, they can be categorized as: auxiliary officers with full police powers, those with limited powers, or those with no police powers. Based on the method of recruitment, there is voluntary enrollment or mandatory/obligatory service (based on the mobilization of specific categories of trained citizens). According to the degree of mobilization, it may be general or partial mobilization. Regarding previous security-related experience, members may include those with professional backgrounds in security (former or retired members of the police, military, other state security forces, or private security) and those without prior security experience. By the type of tasks performed, they are divided into operational-technical (security) tasks and non-security (typically administrative) tasks. In terms of training and qualification levels, a distinction is made between general and specialized auxiliary units. Depending on the circumstances requiring their deployment, they may be engaged in regular circumstances (due to increased workload) or extraordinary circumstances (resulting from a declared state of emergency, disaster, or war). Finally, based on the jurisdiction of deployment, they may operate at the national, regional, or local level, etc.

3. THE LEGAL FRAMEWORK OF THE AUXILIARY POLICE IN THE REPUBLIC OF SERBIA: PAST AND PRESENT

The institution of the reserve force of the MUP was introduced into the legal order of Serbia, as a federal unit of the Federal Republic of Yugoslavia, by the Law on Internal Affairs (ZoUP) of 1991, which, with subsequent amendments and additions, remained in force until 2005. The police were understood to be a collective of police members (authorized police officers and members of the reserve force), classified according to relevant functional criteria into numerous organizational units of the MUP (Stevanović, 2013: 149).

In accordance with the ZoUP 1991, it was stipulated that, in the event of an imminent threat of war or a state of war, the MUP would be replenished by military conscripts assigned to the MUP reserve force; furthermore, only conscripts meeting the legally prescribed requirements for employment within the MUP could be assigned to the reserve force (Article 27). Furthermore, the ZoUP 1991 provided the Minister of Internal Affairs with the authority to summon individuals from the reserve force to perform specific peacetime tasks of the MUP, particularly for the prevention of activities aimed at endangering the security of the Republic, preventing the disruption of public order or restoring it when disturbed on a large scale, and providing assistance in cases of general danger caused by natural disasters. Such individuals are engaged for as long as security reasons necessitate. During their engagement in peacetime tasks, members of the reserve force possess the rights and obligations of authorized police officers and are issued official identification. Additionally, these individuals are entitled to health, pension, and disability insurance benefits under the same conditions as authorized police officers of the MUP (Article 28). Members of the reserve force are required to undergo training and capacity building for the execution of

MUP tasks by attending training programs organized by the MUP. During the performance of peacetime tasks and during training sessions, in addition to the compensation established for time spent on military exercises, these individuals are entitled to the difference up to the amount of the salary established for the positions to which they are assigned (Article 29).

From the aforementioned, it is evident that during this period, the system was based on a mobilization principle applicable exclusively to military conscripts, specifically those who met the requirements for employment within the MUP. These individuals could be deployed both in cases of an imminent threat of war or a state of war, as well as during peacetime under various threatening circumstances that undermined national and public security. Once engaged, these individuals possessed all the rights and obligations of authorized police officers. Furthermore, they were mandatory required to undergo training and capacity building for the execution of assigned tasks.

The beginning of the 21st century marked a period of extensive socio-political, economic, and security system reforms. In alignment with changes regarding military conscripts, the Law on Police of 2005 (ZoP 2005) abolished the police reserve force and established the legal conditions for the potential introduction of an auxiliary police (Articles 191-192). The auxiliary police represent a novel institution in our legal system, replacing the former police reserve (Jugović, 2013a: 146). As such, it is founded on entirely different premises compared to the preceding period. The fundamental difference between the former reserve force and the current auxiliary police lies in the fact that the reserve force was based on the principle of mandatory service (applicable to military conscripts), whereas the auxiliary police is based on the principle of voluntarism (the interest of citizens in serving within the auxiliary police) (Miletić, 2009: 369).

ZoP 2005 (Article 191, Paragraph 1 and Article 14) regulated that the MUP may establish an auxiliary police force to perform policing tasks in cases where it is necessary to compensate for the deployment of a large number of police officers for: 1) the execution of high-security-risk tasks; 2) natural and other disasters; 3) securing the state border; 4) other cases where internal security is severely threatened; and 5) preparation for operations during a state of emergency or a state of war. The types of policing tasks that the auxiliary police may perform certainly justify its existence, especially considering the necessity of engaging a vast number of police officers in such situations. In this manner, upon the occurrence of legally prescribed situations, regular police forces can rely on so-called 'standby forces' (Miletić, 2009: 370), which constitutes the very essence of the auxiliary police concept.

Furthermore, ZoP 2005 stipulated that candidates for the auxiliary police must meet the specific requirements for employment within the MUP, as prescribed by Article 110. In addition, retired police officers up to the age of 60 are eligible to participate in the auxiliary police. The deployment of the auxiliary police for the performance of policing tasks is decided by the Minister, upon the proposal of the Director of Police (Article 191, Paragraphs 2 and 3). In accordance with the ZoP 2005 (Article 193, Paragraph 1, Item 4), the Government adopted the Regulation on Service in the Auxiliary Police and the Rights and Duties of Auxiliary Police Officers (Uredba 2006). The Uredba 2006 distinguishes between a 'candidate for an auxiliary police officer' and an 'auxiliary police officer.' A candidate for the auxiliary police is an individual undergoing training for the execution of tasks within the auxiliary police force, with the provision that basic training lasts at least three months, during which a contract is concluded with the candidate. During basic training, candidates are not authorized to exercise police powers independently. Conversely, an auxiliary police officer is an individual who is not in a permanent employment relationship with the MUP and who concludes a contract for voluntary service in the auxiliary police. A voluntary service contract may be concluded with a candidate for an auxiliary police officer who has successfully completed basic training, as well as with a retired police officer up to the age of 60. The contract for voluntary police service is concluded for a minimum period of five years. Auxiliary police officers attend advanced and supplementary training organized during their voluntary service. While undergoing training and performing policing tasks, auxiliary police officers wear police uniforms with distinctive insignia indicating their affiliation with the auxiliary police (Uredba 2006, Articles 2 and 3).

Upon completion of training, an auxiliary police officer may exercise all police powers during their deployment for the execution of policing tasks. An auxiliary police officer may be engaged for a period of up to one month within the same calendar year. During the period of engagement, they possess the rights and duties established by the Uredba 2006, in accordance with the corresponding rights and duties of police officers as prescribed by the ZoP 2005. Given the possibility that an auxiliary police officer may also be an employed individual, the law stipulates that an employer may not terminate the auxiliary officer's employment contract during their engagement, nor may the employer impose conditions on the regulation of their contractual relations with the MUP. Conversely, the auxiliary police officer is obligated to return to work for their primary employer no later than two working days after the termination of their engagement

in the auxiliary police. The police force maintains records of both candidates and auxiliary police officers (ZoP 2005, Article 192). Despite the relatively good regulatory framework of the auxiliary police institution during the observed period (from 2005 to 2016), no auxiliary police force was actually formed.

The ZoP 2016 envisaged nearly identical security conditions under which the MUP may establish an auxiliary police force, consistent with the ZoP 2005. The auxiliary police may be formed to perform policing tasks in cases where it is necessary to compensate for the deployment of a large number of police officers for: 1) the execution of high-security-risk tasks; 2) natural and other disasters; 3) securing the state border; and 4) other cases where internal security is threatened. Exceptionally, the auxiliary police may also be engaged when there is a mutual interest between the MUP and a local self-government unit, based on specific agreements (ZoP 2016, Article 249, Paragraphs 1 and 2). The aforementioned provision represents a significant innovation, emphasizing the role of the local self-government (community) in the realization of security.

When deployed, members of the auxiliary police are subject to the application of the provisions of the ZoP 2016 concerning the rights and duties of police officers. Decisions regarding the deployment of the auxiliary police for the performance of policing tasks are made by the Minister, upon the proposal of the Director of Police. Further conditions for candidate selection, the rights and obligations of auxiliary police members, training, methods of engagement, and the organization and operation of the auxiliary police were regulated by the 2016 Regulation on Service in the Auxiliary Police (ZoP 2016, Article 249, Paragraphs 3–5). The model of auxiliary police engagement based on the principle of voluntarism was retained, while the prescribed method for candidate application was a public competition announced by the MUP. Exceptionally, it was stipulated that the Minister of Internal Affairs could (in accordance with requirements) engage individuals in the auxiliary police without a public competition, provided they had completed basic police training, the Secondary School of Internal Affairs, the Higher School of Internal Affairs, the Police Academy, the Academy of Criminalistic and Police Studies, or other individuals meeting the criteria prescribed by the regulation (Uredba 2016, Article 4, Paragraphs 1 and 3). This provision granted significant discretionary powers to the Minister, who was permitted to assess 'in accordance with requirements' whether the exhaustively listed persons, and particularly 'other individuals,' could be engaged in the auxiliary police. Setting aside the fact that individuals who have completed specific levels of police education belong within the regular police force rather than the auxiliary police, the question arises as to who these 'other individuals' might be.

The Uredba 2016 limited the number of individuals who could be engaged in the auxiliary police. The total number of auxiliary police members could not exceed 15% of the total number of systematized positions for uniformed authorized police officers. Interestingly, the age limit for auxiliary police members was defined by the Uredba 2016 itself rather than by law, which constitutes a significant oversight of the ZoP 2016. Specifically, the Uredba 2016 stipulated that individuals eligible for the auxiliary police—in addition to meeting general requirements for employment in state bodies and specific MUP requirements—must be unemployed, between the ages of 18 and 50, and possess at least a four-year secondary education (Article 3, Paragraph 2 and Article 5). We can observe that the Uredba 2016 restricted the pool of candidates solely to the 'unemployed,' unlike the previous ZoP 2005. While this move was pragmatic in terms of incentivizing engagement, it deviated from the core principle of voluntarism. Overall, the definition of these requirements constitutes a matter that should have been regulated by law, leaving only 'more detailed conditions' to be determined by a regulation. Due to public pressure resulting from these issues, the Government adopted a Regulation on the Termination of the Regulation on Service in the Auxiliary Police in early 2017. The repealed Uredba 2016 remained in force for only seven days. Since then, no regulation has existed in the legal order of Serbia to further regulate the formation of the auxiliary police, which aligns with public statements made at the time indicating that such a force would not be established (Miletić, 2024: 308).

4. CONCLUSION

Through an analysis of the legal framework that governed and currently governs the institution of the auxiliary police (specifically the ZoP 2016), it can be concluded that the model of forming an auxiliary police based on the principle of voluntarism has not taken root in the practice of the Republic of Serbia. Considering specific historical circumstances, cultural heritage, and legal tradition, the question arises as to whether it is justified to base such a significant police component exclusively on the principle of voluntarism. The existence of auxiliary police is most prominent in countries with a highly developed civic consciousness regarding the need for public security. Furthermore, the need for an auxiliary police is pronounced in states whose capacities - both personnel and material - are limited while security demands

are increasing, which is undoubtedly the case with Serbia. Various crisis situations in our region in the preceding period attest to the necessity of establishing such a force. To achieve this, it is essential to work more extensively on strengthening cooperation and partnership between citizens and the police, particularly in the domain of establishing mutual trust.

Furthermore, in the forthcoming period, it may be prudent to reconsider the fundamental principles underpinning the concept of the auxiliary police, particularly in light of the early 2026 announcement regarding the adoption of a new Law on Internal Affairs. In this regard, the possibility of re-establishing the auxiliary/reserve police based on the mobilization principle - similar to the model under ZoUP 1991 - warrants serious consideration. Following recent announcements by high-ranking state officials concerning the reinstatement of mandatory military service, we might anticipate a return to a model wherein military conscripts once again constitute a portion of the auxiliary police force. Beyond conscripts, it is essential to look toward other societal entities whose characteristics, level of training, equipment, and numerical strength make them viable candidates for the auxiliary police. Specifically, the private security sector should be considered, especially given that it already functions as a collaborative partner with the police in emergency situations (Lončar et al., 2019), crime prevention (Radivojević & Stajić, 2025), and the protection of critical infrastructure (Radivojević, 2019; Marković, 2025).

In a state governed by the rule of law, it is essential that the fundamental aspects of such a police force's existence in modern conditions are regulated by law and further elaborated through bylaws. The key issues that must be legally addressed include: the principles underpinning the auxiliary police concept (voluntarism or obligation); the specific security situations and conditions under which such personnel can be deployed; the specific police tasks and duties to be performed by auxiliary officers; the requirements candidates must meet for engagement (age, psychophysical ability, employment status, prior experience in security agencies); the knowledge and skills candidates must possess, as well as their training and further professional development; the method and authority responsible for candidate selection; the authority responsible for the decision on their deployment; and the rights and duties of individuals engaged in the auxiliary police (the exercise of police powers - specifically the use of means of coercion—the carrying of official identification and uniforms, compensation for engagement, protection of data confidentiality acquired during service, etc.). It must be noted that there is no single, universal model for the organization and functioning of auxiliary police. Therefore, it is necessary to objectively and comprehensively assess the experiences of other countries, alongside existing needs and capacities, before deciding on an optimal model that will be acceptable to our state and society.

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RESILIENCE OF CRITICAL INFRASTRUCTURE AS A NATIONAL SECURITY FACTOR: STUDENT PERCEPTIONS OF ITS PERFORMANCE IN A CURRENT HYBRID ENVIRONMENT

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Abstract: The contemporary hybrid security environment positions critical infrastructure as both a strategic asset and a potential vulnerability for national security. The growing interdependence among infrastructure sectors increases the risk of systemic disruptions with broad social and economic consequences. Evidence from recent armed conflicts, including the war in Ukraine, confirms the significance of infrastructure facilities as targets of combined and hybrid operations.

The aim of the present study is to assess the level of awareness among students at the Rakovski National Defence College regarding the resilience of critical infrastructure and its impact on national security. The research employs a qualitative design based on semi-structured questionnaires administered to a sample of 23 participants. The analysis focuses on determining the level of knowledge, the assessment of the condition and functioning of national infrastructure systems, as well as perceived risks and vulnerabilities.

The findings indicate a relatively high level of awareness concerning the strategic importance of infrastructure systems, while also identifying deficiencies related to resilience assessment and interinstitutional coordination. On this basis, recommendations are formulated to enhance education and professional training, and to strengthen the integrated civil-military approach to risk management. The resilience of critical infrastructure is conceptualized as a dynamic process requiring systematic prevention, protection, and recovery measures in the context of hybrid threats.

The results of the study indicate that Bulgaria's national critical infrastructure has clear regulatory frameworks and certain protective mechanisms in place, but practical effectiveness remains limited. The main challenges are related to the human factor, inter-agency coordination, preparedness, and vulnerability to hybrid and multi-domain threats. The international environment and regional conflicts significantly increase these risks. An integrated approach is required, including updating regulatory documents, enhancing technical and cyber protection, conducting regular exercises, facilitating information sharing, and promoting cross-sector cooperation, in order to ensure the resilience of critical infrastructure and the security of the state.

Keywords: *critical infrastructure, resilience, national security, war in Ukraine.*

Field: Social sciences (security)

1. INTRODUCTION

Critical infrastructure is a set of systems and assets whose functioning constitutes a structural determinant of the functioning of society, the economy, and national security through its capacity to provide vital raw materials and services (Sertov, 2008). In its role as the foundation of state functioning, encompassing interrelated sectors, critical infrastructure represents an element of national security whose destruction leads to strategic vulnerability and reduced strategic autonomy (Flynn, 2004). Any attack against a specific sector may trigger systemic failure and cascading effects (Flynn, 2024) across the broader sphere of economic stability, governance, and societal well-being.

In this sense, the contemporary paradigm of interaction between critical infrastructure and national security is shifting from "asset protection" and sectoral protection toward the development of systemic resilience (Yossi Sheffi, 2013; Directive (EU) 2022/2557). A key concept describing reliability and continuous operation over time in the presence of vulnerabilities is resilience. The resilience of critical infrastructure is defined as the capacity to timely and effectively prevent, absorb, recover, adapt, and transform its core structures and functions in the face of threats, risks, and compromised security (UNDRR, 2022; NATO Strategic Concept, Madrid, 2022). Under conditions of interdependence and hybrid threats, critical infrastructure resilience becomes a central component of national strategy and a factor of deterrence (Nye, 2011). A state's ability to protect and restore its structures and functions enhances its strategic resilience and deterrence potential.

The conflict between Russia and Ukraine has affirmed and demonstrated its significance as a strategic instrument for achieving political and military objectives through humanitarian consequences for the population and the intensification of social tensions. The destruction of energy sector systems has

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had a profound negative impact on civilians by depriving them of access to essential everyday resources necessary for survival.

The management of incidents of this type is gaining increasing importance not only at the tactical and operational levels but also at the strategic level, as it affects the long-term resilience of the state, the development of protective capabilities, and the ability to prevent and deter future threats. In this context, the war in Ukraine may be viewed as an infrastructural struggle for survival, in which the protection and resilience of critical infrastructure are decisive for the functioning of the state and its population under conditions of armed conflict (Ostrowski & Zych, 2024). Such a line of reasoning gives rise to the concept of “infrastructural warfare” or “war of attrition through systemic strikes,” in which attacks against critical infrastructure are used as a means of disrupting state functioning and public services (Piekarski, 2025; Berezutskiy & Tokhtamysh, 2024).

2. MATERIALS AND METHODS

The present study examines the role of critical infrastructure as a strategic determinant of national security by analyzing the perceptions of students at the Bulgarian Military Academy. The empirical component covers a sample of 23 participants and is primarily based on a qualitative research design aimed at assessing the level of knowledge, degree of awareness, and expert judgment regarding the state and functioning of national critical infrastructure. A questionnaire consisting of 16 questions with open-ended response options was applied. Some questions also included a three-level quantitative scale -“Yes”, “No”, and “Partially”. This publication presents and analyzes the responses to the items that the authors subjectively considered the most important.

Empirical Study Design:

Research Aim: to analyze students’ perceptions of the resilience of national infrastructure as a factor of national security in the current hybrid environment.

Research Objectives:

1. To investigate the level of security culture among students through an analysis of their understanding of the essence, resilience, and determining factors of national critical infrastructure.
2. To assess the validity of students’ evaluations of critical infrastructure resilience.

Hypothesis 1:

A higher level of awareness and understanding of the mechanisms that ensure the resilience of critical infrastructure is associated with a higher degree of established security culture.

Rationale:

The hypothesis is based on the theoretical relationship between awareness, risk perception, and the formation of a security culture. Knowledge of critical infrastructure resilience mechanisms—regulatory, organizational, technological, and operational—increases the ability to identify vulnerabilities, assess threats, and critically evaluate institutional readiness. Awareness functions as a cognitive prerequisite for developing resilient value attitudes and responsible behavior in the security domain. Therefore, a higher level of understanding of protective mechanisms correlates with a higher degree of established security culture (Schein, 2010).

Hypothesis 2:

The validity of students’ evaluations of critical infrastructure resilience is negative.

Rationale:

Evidence indicates that Bulgarian critical infrastructure is outdated and inherited from the socialist period, and informed citizens recognize these structural weaknesses, leading to lower assessments of resilience. Frequent failures and incidents in water supply, energy, transport, and cybersecurity highlight insufficient risk management capacity. Greater knowledge fosters a critical security culture and recognition of real risks. While society often holds optimistic perceptions, awareness leads to a more critical evaluation of the current state. Thus, knowledge correlates with increased security culture and lower resilience assessments (Beck, 1992).

3. RESULTS

Below are the analyses of seven questions.

1. State of Critical Infrastructure

Critical infrastructure is defined as a structurally determining element of the national security system, directly, systematically, and proportionally influencing its functioning. Disruption of the functioning of facilities and elements of critical infrastructure creates an immediate threat to the life and

health of the population, including through the interruption of vital services and means of information and communication. The state of critical infrastructure is also considered a key factor for the effective command and control of elements of the national security system, particularly through communication and information networks. Disruption of these networks can lead to the disturbance of the planned functioning of security structures. Some respondents emphasize the strategic dimension of the issue, noting that the state of critical infrastructure can directly affect the sovereignty of the state, the capacity of the national economy, and the governability of state processes.

A comparison of EU and Bulgarian critical infrastructure reveals a perception of partial agreement dominance (57%), although a significant proportion of responses are positive (43%). Analysis of the open-ended responses shows that the linkage is sector-based. Elements of road infrastructure, the energy grid, healthcare systems, and information exchange between police and military structures are most often considered basic elements that function within broader European policies and mechanisms but are frequently subject to various national management and protection regimes.

2. Vulnerability of Critical Infrastructure Facilities

The vulnerability of critical infrastructure facilities is a key issue when considering it as a factor of national security. Respondents' perceptions outline a picture of complex and systemic vulnerability, in which interdependence between individual sectors amplifies the potential consequences of incidents. Particular concern is noted regarding the insufficient protection of the energy and transport sectors, including power transmission infrastructure, fuel and gas pipelines, and natural gas compressor stations. Airports, seaports, and main transport networks, as well as dams and dam walls, represent high risks to the population and the environment in the event of accidents or targeted impacts.

3. Risk and Threat Prevention Measures for Critical Infrastructure

Students identify a wide range of preventive measures aimed at mitigating risks and threats to critical infrastructure, covering strategic, operational, technological, and regulatory levels. At the strategic and defense level, air defense and missile defense (AD/MD) systems, monitoring and early warning systems, as well as aerial and technical surveillance capabilities, are highlighted.

At the operational and technological level, respondents emphasize the importance of advanced cybersecurity, integrated physical security systems—including video surveillance, sensors, and detectors—and the maintenance of rapid response teams. Limiting and controlling access to critical facilities is identified as a key preventive tool against sabotage and diversionary actions.

Significant emphasis is placed on intelligence and counterintelligence activities, including effective border control, gathering reliable information on planned impacts against critical infrastructure, and systematic monitoring of personnel across all agencies involved in its protection.

The importance of the regulatory and organizational framework is also noted, including the implementation of adequate prevention and protection plans, as well as the regular testing and evaluation of security systems through exercises and inspections. Respondents perceive the most effective protective measures as those that are integrated and function in synergy, rather than as isolated actions. The need to combine technical, organizational, and human components of security is emphasized.

4. Effectiveness of the National Response System to Risks, Threats, and Incidents Targeting Critical Infrastructure

Effectiveness is predominantly assessed negatively—responses indicating partial compliance dominate (61%), followed by clearly negative responses (30%). Affirmative responses confirming effectiveness account for only 9%.

The qualitative analysis of open-ended responses supports the trend observed in the quantitative assessments. The problems are differentiated across several areas: misalignment between the regulatory framework and its practical implementation, insufficient preparedness of personnel, weaknesses in interagency cooperation, alert systems, traffic management and control, as well as in the continuity and consistency of state administration in recent years. Some respondents expressed doubts regarding the ability to respond adequately to incidents affecting key energy facilities (substations, power transmission networks, thermal power plants) and critical healthcare institutions.

Although some opinions rated the level as “average” or providing “basic protection,” the dominant perception is of limited, deteriorated, or insufficient readiness, as well as the absence of a comprehensive (“360-degree”) protection model. Some respondents directly expressed distrust, rating capabilities as low or below expectations.

5. High-Risk Means of Impacting Critical Infrastructure Facilities

The criterion for classifying the highest-risk means of impacting critical infrastructure facilities is their potential to cause large-scale, long-lasting, and difficult-to-control consequences for the population, the environment, and state functioning. In this regard, weapons of mass destruction (nuclear, chemical,

and biological contamination) are highlighted, as well as kinetic impact means (conventional munitions, explosive devices, and improvised explosive devices), whose blast waves can cause serious destruction to infrastructure facilities. Cyberattacks and sabotage, which can disrupt management, coordination, and trust in institutions, are also noted, along with hybrid impacts, in which multiple elements or sectors of critical infrastructure are affected simultaneously, amplifying the cumulative effect and complicating response efforts.

6. Hybrid Attacks as a Form of Threats to Critical Infrastructure

Hybrid threats are perceived as among the most dangerous and impactful forms of direct threats to critical infrastructure facilities and systems due to their multi-domain, covert, and hard-to-detect nature. They exert strategic influence on the functioning of state institutions, the armed forces, and the national security system, with their primary role being the destabilization and erosion of state governance, social order, and public trust in institutions. By combining cyberattacks, diversionary actions, sabotage, and manipulation of public attitudes, hybrid attacks can overcome existing protective measures and distort objective reality. Significant emphasis is placed on the subversive nature of hybrid threats, which divert the attention of national security elements and decision-making bodies, thereby complicating timely and adequate responses.

7. Influence of the International Environment on National Critical Infrastructure

A clear consensus emerges regarding the direct impact of the international security environment on critical infrastructure, reflecting a high level of awareness of the interdependence between global security dynamics and the resilience of national critical infrastructure. Key factors identified include geopolitical instability, the expansion of regional conflicts, migration pressures, and the intensification of hybrid threats. Bulgaria's membership in NATO and the European Union is perceived both as a factor providing additional security guarantees and as increasing exposure to risks arising from allied commitments and geopolitical positioning.

The conflict in Ukraine is viewed as a catalyst for hybrid impacts, including cyberattacks, sabotage, and heightened intelligence activity, particularly in the context of the confrontation between Russia and Euro-Atlantic structures.

1. Analysis of Students' Understanding of the Nature, Resilience, and Determining Factors of National Critical Infrastructure

Analysis of Results in Relation to Hypothesis 1

Hypothesis 1 stated: A higher level of awareness and understanding of the mechanisms ensuring the resilience of critical infrastructure is associated with a higher degree of established security culture.

To evaluate the first hypothesis, two types of criteria were used: criteria for assessing awareness and criteria for assessing expertise.

Awareness includes: knowledge of the object or system (understanding of structural elements and functions), understanding of mechanisms (operation, vulnerabilities, protections, etc.), and understanding of interconnectedness (sectoral, transnational, strategic).

Criteria for assessing expertise relate to applied, practically grounded knowledge and the ability to analyze, evaluate, and make decisions. The main indicators are critical judgment and applied skills, systems thinking, forecasting abilities, and strategic planning.

The tables 1 and 2 below presented the number and content of semantic units supporting each of the criteria.

Table 1. Semantic Units from the Text Supporting the Criteria for Awareness

Criterion	Semantic Units (Number)	Examples of Semantic Units
Cognitive Knowledge	5	"structurally determining element of the national security system," "impact on vital services," "impact on information and communication," "impact on sovereignty," "impact on the national economy"
Understanding of Mechanisms	6	"AD/MD systems," "monitoring and early warning systems," "advanced cybersecurity," "video surveillance, sensors, detectors," "rapid response teams," "prevention plans and exercises"
Understanding of Interconnectedness	5	"road infrastructure, energy grid, healthcare systems," "interagency cooperation," "transnational coordination," "EU and NATO frameworks," "European policies"

Source: Authors' research

Table 2. Semantic Units from the Text Supporting the Criteria for Expertise

Criterion	Semantic Units (Number)	Examples of Semantic Units
Critical Judgment and Applied Skills	5	"misalignment between regulatory framework and practice," "assessment of personnel," "interagency cooperation," "assessment of vulnerabilities in thermal power plants and substations," "assessment of transport hubs"
Systems Thinking	5	"interdependence between energy, transport, water supply, and healthcare," "complex consequences of incidents," "impact of hybrid effects," "strategic impact on state functioning," "influence on national security"
Forecasting Abilities and Strategic Planning	4	"updating the regulatory framework," "building specialized capabilities," "regular training and exercises," "anticipating hybrid and cumulative effects"

Source: Authors' research

The results in the tables show that the students' open-ended responses contain numerous semantic units that directly correspond to the criteria for awareness (16 units) and expertise (14 units). The distribution of semantic units indicates that the text provides both a theoretical foundation (awareness) and practically oriented knowledge and skills (expertise), which supports the hypothesis that students who master the content and acquire objective knowledge develop a higher security culture. Therefore, the first hypothesis can be considered confirmed.

2. Validity of Students' Evaluations of Critical Infrastructure Resilience**

Analysis of Results in Relation to Hypothesis 2

Hypothesis 2 stated: The validity of students' evaluations of critical infrastructure resilience is negative.

Table 3. Total Number and Examples of Semantic Units from the Text Supporting the Criteria for Awareness

Criterion	Valence	Number of Semantic Units	Example Quotes from the Text
Awareness	Positive	4	"...high level of awareness of the interdependence between global security dynamics and the resilience of national critical infrastructure."
"Respondents perceive elements of road infrastructure, energy grid, healthcare systems..."			
Awareness	Negative	9	"...geopolitical instability, the expansion of regional conflicts, migration pressures..."
"Insufficient protection of the energy and transport sectors..."			
"Deficits in specific areas, such as water and underwater security..."			
Expertise	Positive	6	"...the need to combine technical, organizational, and human components of security."
"...updating the regulatory framework, building specialized capabilities, conducting regular training and exercises."			
"...integrated protective measures functioning in synergy."			
Expertise	Negative	8	"...respondents directly expressed distrust, rating capabilities as low..."
"...hybrid attacks can overcome existing protective measures..."			
"...complicating timely and adequate response by the national security system."			

Source: Authors' research

The results in the table illustrate that the number of negative units (17) exceeds the positive ones (10), indicating that the validity of students' evaluations of critical infrastructure resilience is predominantly negative. The presence of numerous semantic units for awareness and expertise shows that their knowledge is objective and well-reasoned, not merely descriptive. The table supports Hypothesis 2.

4. DISCUSSIONS

Identifying students' perceptions of critical infrastructure in a context of hybrid challenges is valuable not only because of the demonstrated factual knowledge and analytical capabilities but also as an indicator of strategic culture, sensitivity to security issues, and a factor in political legitimacy and support for measures. According to Slovic (1987, pp. 280–285), perceptual assessments shape public pressure, political backing for measures, and the overall resilience of society. Similarly, Renn (2008, pp. 45–60) emphasizes that risk perception forms public attitudes and the willingness to support institutions and security measures, which is particularly significant in the context of hybrid and complex threats. Homer-Dixon (2006, pp. 45–52) postulates that if the future elite perceives critical infrastructure as vulnerable, this fact has direct implications for strategic planning, personnel effectiveness and motivation, as well as institutional legitimacy.

Respondents clearly identify hybrid threats as among the most dangerous for critical infrastructure due to their covert, multi-layered, and subversive nature. Their strategic impact on trust in institutions and state governability is emphasized. There is also a clear awareness of the interdependence between the international security environment and the resilience of national critical infrastructure. The war in Ukraine is perceived as a catalyst for hybrid impacts, including cyberattacks and sabotage, particularly in the context of the confrontation between Russia and Euro-Atlantic structures.

The demonstrated ability to strategically link the external environment with the state of internal infrastructure is a sign of a high level of analytical and professional maturity—a crucial element of security culture.

Empirical data confirm the existence of a paradoxical, yet logically grounded, effect: students with a deeper understanding of protective mechanisms identify more structural weaknesses. Awareness of the complex interdependence between sectors enhances the perception of systemic vulnerability. Knowledge of contemporary hybrid and cyber threats leads to a more critical assessment of national preparedness. Therefore, a lower evaluation of resilience is not an indicator of the absence of security culture; on the contrary, it reflects its presence at a higher level. These results can be explained through Ulrich Beck's concept of the "risk society": "Increasing awareness of systemic risks leads to greater criticality and caution in decision-making" (Beck, 1992, p. 22). High student awareness and expertise foster critical thinking and recognition of infrastructure vulnerabilities, which is a key component of security culture.

5. CONCLUSIONS

The approach to data analysis in the present report is based on a multidimensional methodological framework, in which specific specialized knowledge of critical infrastructure is used to derive indirect conclusions regarding students' trust in society, institutions, and security culture. Awareness and the level of expertise are considered both in their direct dimension—as indicators of cognitive levels of knowledge, understanding, and interpretation—and in a projective dimension, as a means of identifying deeper social attitudes, value orientations, and perceptions of institutional effectiveness. In this way, the analysis goes beyond a descriptive level and acquires an explanatory character, allowing the relationship between knowledge, evaluative positions, and trust in the national security system to be traced.

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INNOVATION PERFORMANCE OF SERBIA: EVIDENCE FROM THE GLOBAL INNOVATION INDEX

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Abstract: This paper examines Serbia's innovation performance during the period 2021–2025 using the Global Innovation Index (GII) framework, with particular emphasis on the dynamics between innovation inputs and outputs and their interaction. The study applies a quantitative approach based on secondary data analysis. Empirical data are drawn from annual GII reports published by the World Intellectual Property Organization (WIPO). The analysis focuses on sub-index values rather than ranking positions in order to capture changes over time and evaluate the efficiency of input-output transformation. The findings reveal a consistent positive trajectory between 2021 and 2024 across both sub-indices. However, a structural break is observed in 2025, marked by a significant decline in innovation inputs, particularly in pillars Business sophistication, Market sophistication, and Institutions. A simultaneous decrease in innovation outputs - most notably in Knowledge and technology outputs - indicates a reduced capacity to effectively convert innovation inputs into measurable outcomes. The results suggest the presence of structural imbalances within Serbia's innovation system, primarily associated with institutional instability, market constraints, and financing limitations rather than deficiencies in human capital or research intensity. The decline in 2025 highlights the sensitivity of emerging innovation systems to fluctuations in key enabling conditions. The paper emphasizes the importance of improving institutional quality, strengthening market mechanisms, and diversifying innovation financing structures in order to enhance long-term systemic resilience and sustainable innovation growth. By providing a five-year input-output assessment in an upper-middle-income economy, this study offers empirical insight into recent innovation trends and systemic dynamics.

Keywords: *innovation, innovation performance, Global Innovation Index, Serbia, innovation indicators.*

Field: Social Sciences

1. INTRODUCTION

In today's turbulent business environment, innovation is a *conditio sine qua non* for market survival and long-term competitiveness. At the microeconomic level, innovation is a key driver of competitive advantage and financial performance. On the other hand, it is widely acknowledged that innovation is essential not only for enterprises, but also for economies (Vukojevic & Tanovic, 2025). In this regard, innovation is widely regarded as a fundamental driver of economic growth across different economic systems (Challoumis, 2024). Porter (1990) emphasizes the central role of innovation in determining national competitiveness. In this context, competitiveness is viewed as a function of a country's sustained commitment to innovation and continuous improvement. From this standpoint, national innovation performance reflects the effectiveness of an innovation system in converting available inputs into tangible and measurable outputs (Iglesias-Sánchez, 2019). As the importance of innovation becomes increasingly recognized, countries strive to improve their rankings and strengthen their position in the global innovation landscape (Sokolov & Vukojevic, 2019).

According to some authors, national competitiveness can be assessed on the basis of a country's innovation capacity and its degree of digital development (Marti et al., 2023). Several global indicators have been developed to compare and monitor innovation performance. The Global Innovation Index represents one of the most widely used instruments for comparing innovation performance between countries. In contrast, the European Innovation Scoreboard (EIS) and the Digital Economy and Society Index (DESI) focus on European countries.

The GII provides a systematic framework for analyzing national innovation systems; therefore, it is adopted as the most appropriate instrument for analysis in this paper. It also enables global comparability over time. Although innovation performance is often compared through several ranking systems, there is limited analysis of the mutual effects of innovation inputs and outputs and the efficiency of their transformation, especially in developing countries. This gap raises the question of systemic efficiency within national innovation systems.

According to the latest GII report, Serbia is classified as an upper-middle-income economy and ranked 54th among the 139 economies featured in the GII 2025. Moreover, the index provides a clear separation of input and output dimensions, allowing for accurate tracking of performance changes over

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time.

The main goal of this paper is to analyze innovation performance of Serbia based on the Global Innovation Index over the period 2021–2025, with particular emphasis on changes in innovation inputs and outputs.

2. MATERIALS AND METHODS

This study is based on secondary data analysis. The paper applies a quantitative approach using descriptive methods to examine innovation performance in Serbia. The empirical findings are grounded in the annual reports on national innovation performance issued by the World Intellectual Property Organization (WIPO). The GII represents one of the most widely used international frameworks for assessing and comparing the innovation capacity and performance of national economies.

The study covers the period from 2021 to 2025 and focuses on the values of GII sub-indices rather than country ranking positions, in order to provide a more precise evaluation of changes in innovation performance over time. As emphasized in the annual WIPO report for 2025, the GII's conceptual framework is founded upon two equally important sub-indices: Innovation Input Sub-Index and the Innovation Output Sub-Index (WIPO, 2025). Within the GII framework, innovation inputs are reflected through five pillars addressing institutional quality, research capacity, infrastructure development, market conditions, and business sophistication. Innovation outputs are measured through two performance-oriented pillars: Knowledge and technology outputs and Creative outputs.

Descriptive analysis is applied to identify the main trends and dynamics of innovation inputs and outputs over the observed period, as well as to determine key areas of improvement and decline. Particular emphasis is placed on the comparative examination of changes in the values of innovation inputs and outputs over time, as well as their interaction. Given that this research uses the officially published sub-index scores provided by WIPO, without recalculating the composite index, potential variations in the internal weighting structure do not materially influence the descriptive analysis conducted in this paper.

3. RESULTS

This section presents the results of the descriptive analysis of innovation performance of Serbia during the period 2021–2025. This analysis is focused on trends in the GII (Global Innovation Index), and its sub-indices, Innovation Input and Innovation Output. The main purpose is to identify key trends and changes during this period.

According to the WIPO annual report (2025), the five pillars of the Innovation Input Sub-Index capture the key economic conditions that support and stimulate innovation activity. Specifically, these pillars are:

1. Institutions,
2. Human capital and research,
3. Infrastructure,
4. Market sophistication and
5. Business sophistication.

Institutions represent the political stability and the regulatory and legal framework. Human capital and research illustrates education, investments in R&D and science. The infrastructure pillar reflects digital infrastructure, information and communication technologies and logistics. Market sophistication indicates financing and investment activities. Business sophistication illustrates innovation linkages.

On the other hand, the output dimension of the GII focuses on tangible innovation outcomes and is structured around two pillars: Knowledge and technology outputs and Creative outputs. Knowledge and technological outputs include patents, scientific publications and technological products. Creative outputs include results of creative industries, such as like designs and brand values.

Trends in innovation sub-indices in Serbia for the period 2021 to 2025 are shown in Table 1. Most of the pillars of the Innovative Input Sub-Index show successive growth during the period of 2021–2024. However, in 2025 a significant decline can be observed in all pillars within Innovation Input Sub-Index, except Human capital and research.

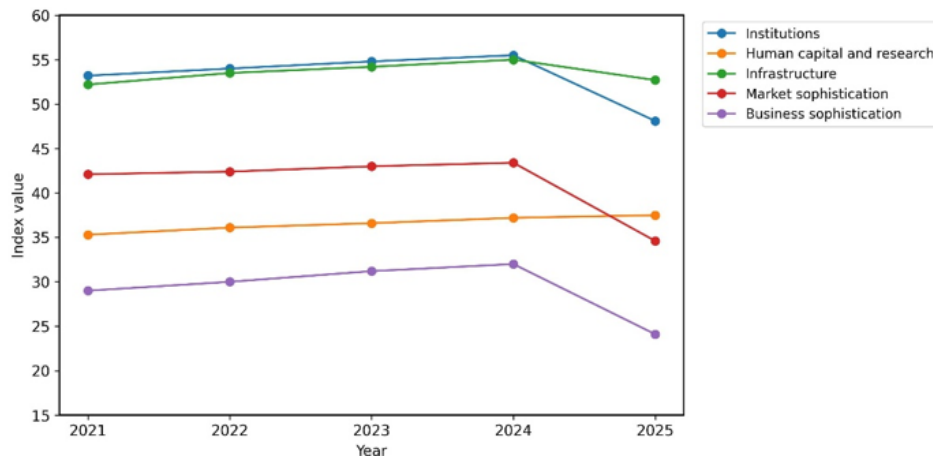
Table 1: Global Innovation Index - Serbia (2021–2025)

Year	Global Innovation Index						Innovation outputs	
	Innovation inputs					Business sophistication	Knowledge and technology outputs	Creative outputs
	Institutions	Human capital and research	Infrastructure	Market sophistication				
2021	53.2	35.4	52.3	42.2	29.1	34.4	17.0	
2022	54.0	36.1	53.5	42.5	30.0	35.0	18.2	
2023	54.8	36.6	54.2	43.1	31.2	35.8	19.1	
2024	55.3	37.2	54.9	43.5	32.0	36.5	20.0	
2025	48.1	37.5	52.8	34.6	24.2	30.8	17.3	

Source: Author's elaboration based on WIPO (2021–2025)

Figure 1 shows dynamics of pillars within Innovation Input Sub-Index. The most substantial decline was recorded in Business sophistication (-24.38% compared to 2024), followed by Market sophistication (-20.46% compared to 2024) and Institutions (-13.02% compared to 2024). Human capital and research was the only pillar which demonstrated stable growth even in 2025.

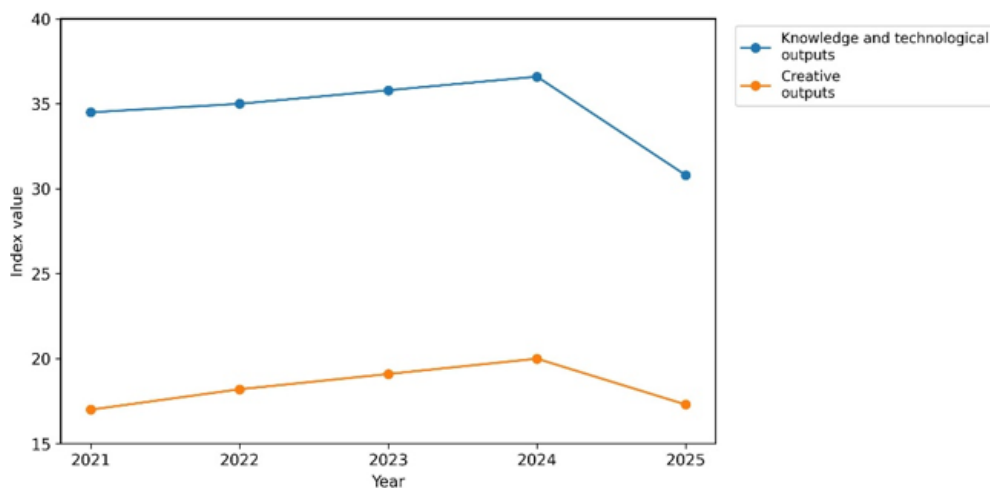
Figure 1: Changes in Innovation Input Sub-Index pillars in Serbia (2021–2025)



Source: Author's elaboration based on WIPO (2021–2025)

If we look at innovation outputs, a similar pattern can be observed. From 2021 to 2024, both pillars demonstrated stable growth, however, in 2025, significant decline was recorded. As shown in Figure 2, pillar Knowledge and technological outputs (-15.61% compared to 2024) demonstrated a steeper decline than Creative outputs (-13.6% compared to 2024).

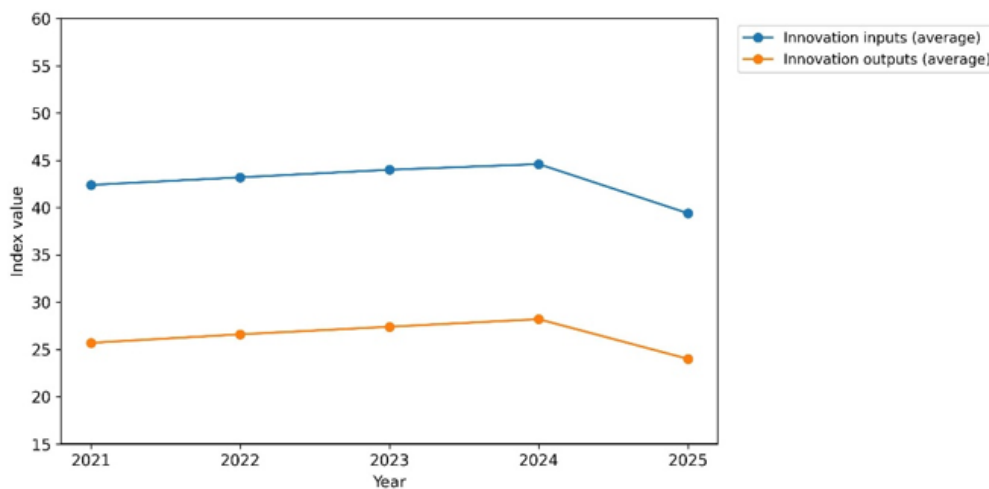
Figure 2: Changes in Innovation Output Sub-Index pillars in Serbia (2021–2025)



Source: Author's elaboration based on WIPO (2021–2025)

Figure 3 represents the average values of innovation inputs and innovation outputs during the period 2021–2025. This graph confirms the upward trend until 2024, followed by a noticeable decline in 2025, particularly within innovation inputs.

Figure 3: Trends in innovation inputs and outputs in Serbia (2021–2025)



Source: Author's elaboration based on WIPO (2021–2025)

Overall, these descriptive results provide a foundation for the following discussion on Serbia's innovation performance during the period 2021–2025.

4. DISCUSSION

The results emphasize the relevance of examining the relationship between innovation inputs and outputs in order to assess the determinants of innovation efficiency in Serbia.

The findings indicate that Serbia's innovation performance followed a positive trend between 2021 and 2024, reflecting a strengthening of innovation capacity during this period. This development may be associated with the implementation of measures defined in the Strategy for Scientific and Technological Development of the Republic of Serbia 2021–2025 "Power of Knowledge" (Government of the Republic of Serbia, 2021). However, the decline observed in 2025 appears to be primarily linked to the weakening of market and business conditions.

The simultaneous decline in both sub-indices suggests reduced systemic efficiency. Although the Human capital and research pillar demonstrated resilience, the deterioration of market and business components indicates constraints in financial and commercialization mechanisms, which may limit the effective utilization of knowledge and research resources.

The decline in the Institutions pillar further supports this interpretation. Since this pillar captures the regulatory environment, rule of law, and policy stability, its weakening may reduce investor confidence and complicate long-term business planning. These findings suggest structural weaknesses in the institutional framework, extending beyond financial and market aspects. While strategic documents emphasize the importance of institutional support for innovation, the results indicate that regulatory instability may represent a significant constraint.

The more pronounced decline in the Knowledge and technology outputs pillar reinforces this conclusion. Science-and-technology-based outcomes appear particularly sensitive to changes in institutional and financial conditions. The findings therefore indicate structural constraints in the conversion of innovation inputs into market-relevant outputs.

A closer examination of the input-output relationship shows that the decline in 2025 was not entirely proportional. Although innovation inputs decreased significantly, innovation outputs declined even more sharply. This pattern suggests weakened efficiency in transforming innovation investments into measurable outcomes, which is consistent with WIPO's (2025) assessment of a structural gap between innovation inputs and outputs in Serbia. Overall, the results indicate a reduced capacity of the innovation system to generate measurable outputs within a deteriorating institutional and market environment.

5. RECOMMENDATIONS

Based on these findings, several important implications for innovation policy can be highlighted. As some authors emphasize, establishing an institutional framework that supports innovation significantly influences a country's position in the international environment (Sepashvili, 2020).

Institutional stability represents a fundamental condition for the effective functioning of the innovation system. Strong intellectual property protection, regulatory consistency, and predictable enforcement mechanisms contribute to a stable and supportive business environment. Improving the transformation of innovation inputs into commercially viable outputs requires strengthening entrepreneurial infrastructure and enhancing cooperation between research institutions and the business sector. The findings also suggest the importance of developing more diversified financing mechanisms, including domestic venture capital and public-private partnerships.

Although the decline observed in 2025 does not necessarily imply long-term structural deterioration, the results point to the importance of balanced development across institutional, market, and financial dimensions in order to enhance systemic efficiency and long-term innovation performance.

6. CONCLUSIONS

The main purpose of this paper was to analyze Serbia's innovation performance during 2021–2025 based on the Global Innovation Index (GII), with particular emphasis on the dynamics of innovation inputs and outputs. The findings show gradual growth between 2021 and 2024, followed by a noticeable decline in 2025, particularly within the Innovation Input Sub-Index.

The observed pattern suggests that recent constraints are more closely associated with institutional instability, market limitations, and financing conditions than with deficiencies in human capital or research capacity. The concurrent decline in both sub-indices indicates reduced efficiency in transforming innovation inputs into measurable outputs.

Although the short-term decline in 2025 does not imply structural collapse, it reveals vulnerabilities that may affect the long-term stability and effectiveness of Serbia's innovation system.

ACKNOWLEDGEMENTS

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THE REAL OF AGING AND THE “NOT-ALL” OF WOMAN: A LACANIAN READING OF BABA YAGA LAID AN EGG

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Abstract: This article offers a sustained Lacanian reading of *Baba Yaga Laid an Egg* (2009; Eng. trans. 2010) by Dubravka Ugrešić, arguing that the novel stages aging femininity as an encounter with the Real and reconfigures the Slavic myth of Baba Yaga as a figure of feminine jouissance beyond phallic signification. Drawing on the psychoanalytic theory of Jacques Lacan - particularly the mirror stage, the tripartite registers (Imaginary, Symbolic, Real), sexual difference, the “not-all” (*pas-toute*), and jouissance - this study demonstrates how Ugrešić’s tripartite narrative structure formally enacts the split subject. The novel’s representation of the aging female body, grotesque corporeality, and maternal ambivalence reveals the instability of identity and the failure of the Symbolic order to provide signifiers for elderly womanhood outside ridicule or invisibility. Engaging recent scholarship (2021–2026) on aging, gender, and Lacanian theory, this article situates Ugrešić within post-socialist literary discourse and contemporary feminist psychoanalysis. Ultimately, *Baba Yaga Laid an Egg* reclaims the monstrous feminine as a site of excess rather than lack, exposing the Real of female jouissance as that which resists symbolic domestication.

Keywords: *Lacan, aging, jouissance, post-socialist literature, feminine subjectivity, Baba Yaga*

Field: Humanities

1. INTRODUCTION

In *Baba Yaga Laid an Egg*, Dubravka Ugrešić constructs a complex narrative meditation on aging, exile, myth, and femininity in post-socialist Europe. The novel’s hybrid form - interweaving autobiographical fragments, fictionalized spa episodes, and mythographic commentary - destabilizes genre and foregrounds fragmentation as both thematic and structural principle. At its center stands Baba Yaga, the ambivalent Slavic witch, traditionally depicted as grotesque, cannibalistic, and dangerous, yet also wise and transformative.

This article argues that Ugrešić’s novel can be productively interpreted through Lacanian psychoanalysis. The narrative’s fragmentation mirrors the Lacanian split subject; its aging female bodies stage the Real as traumatic excess; and its reworking of myth reveals the impossibility of symbolically containing “Woman” within phallic discourse. Rather than representing aging as mere decline, Ugrešić exposes it as a site where the Symbolic falters and feminine jouissance emerges beyond patriarchal coding.

Dimitrijovska-Jankulovska & Denkovska (2025b) refer to Butler’s *Gender Trouble: Feminism and the Subversion of Identity* to point out that gender is not an essential category but a construct maintained through performative practices - socially learned and repeated acts. However, the guiding thesis in this paper is that *Baba Yaga Laid an Egg* dramatizes what Lacan formulates as the “not-all” (*pas-toute*) of woman: the structural impossibility of fully inscribing femininity within the Symbolic order (Lacan, 1998). *Baba Yaga* becomes the embodiment of this excess - neither fully maternal nor monstrous, neither inside nor outside culture, but occupying a liminal space analogous to the Real.

2. UGREŠIĆ AND POST-SOCIALIST CONTEXT

Criticism on Ugrešić frequently emphasizes exile, displacement, and post-Yugoslav identity. Early scholarship (Boym, 2001; Hammond, 2018) situates her within transnational and post-socialist discourse, foregrounding nostalgia, irony, and cultural critique. More recent analyses highlight aging and corporeality in Eastern European literature (Bahun-Radunović, 2022; Petrović, 2023), noting how elderly women often function as grotesque or abject figures in transitional societies.

Yet psychoanalytic approaches to *Baba Yaga Laid an Egg* remain comparatively underdeveloped. While feminist readings interpret *Baba Yaga* as a recuperated archetype of female power, few studies deploy Lacan systematically to analyze the novel’s structure and representation of subjectivity.

2.1. Lacanian Feminist Theory

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Lacan's later seminars, particularly *Encore* (Seminar XX), articulate sexual difference through the formulas of sexualization. His provocative assertion that “La femme n'existe pas” (Woman does not exist) indicates not empirical non-existence but the absence of a universal signifier for woman within the phallic Symbolic (Lacan, 1998). Woman is “not-all,” meaning that feminine *jouissance* exceeds phallic logic.

Feminist Lacanian theorists such as Luce Irigaray and Julia Kristeva rework this notion to expose patriarchal symbolic structures. Contemporary Lacanian scholars - including Slavoj Žižek (2022), Alenka Zupančič (2023), and Ragland (2021) - emphasize the Real as a site of corporeal and political rupture.

Bringing this framework to Ugrešič allows us to read aging not merely as sociological marginalization but as structural exclusion within the Symbolic order.

3. THEORETICAL FRAMEWORK: LACAN'S REGISTERS AND SEXUAL DIFFERENCE

3.1. The Mirror Stage and Imaginary Coherence

Lacanian analysis has been fruitfully applied to literature, as in studies using the mirror stage and Symbolic/Real registers to read character identity and silences in narrative (Dimitrijovska-Jankulovska & Denkovska, 2025a). In “The Mirror Stage” (1949), Lacan describes ego formation through identification with an external image (Lacan, 2006). This misrecognition (*méconnaissance*) produces the illusion of unity while masking bodily fragmentation. The Imaginary thus sustains a fantasy of coherence.

In Ugrešič's novel, aging women confront mirrors that no longer reflect a stable Imaginary identity. Wrinkles and sagging flesh disrupt self-recognition, revealing the gap between ego-image and corporeal reality. The mirror becomes a site of estrangement rather than affirmation.

3.2. The Symbolic and the Law

The Symbolic order, structured by language and the paternal function, organizes social meaning. It provides signifiers for youth, beauty, and reproductive femininity - but not for elderly women outside caricature. The aging female subject thus occupies a structural void within the Symbolic.

3.3. The Real and *Jouissance*

The Real resists symbolization. It returns as trauma, bodily excess, or anxiety. In Seminar XX, Lacan distinguishes phallic *jouissance* from feminine *jouissance* - an additional enjoyment beyond symbolic containment (Lacan, 1998). This surplus *jouissance* aligns with Baba Yaga's excess, grotesquery, and unpredictability.

4. FRAGMENTED FORM AND THE SPLIT SUBJECT

The novel's tripartite structure parallels Lacan's three registers:

- **Autobiographical section** – Imaginary identifications and maternal memory
- **Spa narrative** – Symbolic social comedy
- **Mythographic commentary** – Confrontation with the Real

This formal fragmentation enacts the split subject (\$), barred by language and structured by lack. No single narrative voice achieves coherence. Instead, subjectivity emerges as dispersed and decentered.

The first section centers on the narrator's aging mother, whose decline destabilizes filial identity. The second section's satirical spa narrative exposes commodified femininity. The third section's mythographic analysis ruptures narrative illusion, confronting the reader with the myth's archaic excess.

4.1. The Maternal Body and the Uncanny

The narrator's mother occupies an ambivalent position: nurturing yet oppressive, familiar yet strange. Freud's notion of the uncanny (*unheimlich*) illuminates this ambivalence, but Lacan deepens it by situating maternal presence prior to symbolic separation.

As the mother ages, her body becomes fragile and abject. The daughter confronts mortality - her own future inscription within the same corporeal decline. This confrontation stages the Real of death.

Recent scholarship (Ragland, 2021) links Lacan's later work to aging and the death drive, emphasizing how bodily deterioration reveals the limits of Imaginary coherence. Ugrešič's depiction of the mother exemplifies this revelation.

4.2. The Spa as Neoliberal Symbolic Order

The Czech spa in the novel promises rejuvenation - Imaginary restoration of wholeness through cosmetic and therapeutic rituals. Yet its commodification of youth underscores the Symbolic's demand for desirability.

The aging protagonists are simultaneously customers and failures: consumers of beauty who cannot fully re-enter erotic circulation. Their humiliation exposes the fantasy underlying neoliberal femininity.

Žižek (2022) argues that contemporary capitalism intensifies surplus enjoyment while masking

structural lack. The spa becomes a microcosm of this logic - selling jouissance while revealing its impossibility.

4.3. Grotesque Corporeality and the Real

Ugrešić does not aestheticize aging. Instead, she foregrounds bodily fluids, sagging flesh, and awkward sexuality. Such grotesque imagery recalls Bakhtinian carnival, but Lacanian analysis reveals a deeper function: these bodies represent the Real breaking through Imaginary fantasy.

Petrović (2023) observes that the grotesque aging body in Southeast European fiction destabilizes national and gender narratives. In Lacanian terms, the grotesque marks the failure of the Symbolic to contain corporeal excess.

5. BABA YAGA AND THE "NOT-ALL"

Baba Yaga inhabits the forest - a liminal space outside civilization's law. In Ugrešić's retelling, she becomes a metaphor for aging women themselves: feared, ridiculed, yet powerful.

Lacan's formulas of sexuation describe woman as "not-all" under the phallic function. This does not imply deficiency but structural non-totalization. Baba Yaga embodies this non-totality. She cannot be reduced to mother, witch, or crone.

Zupančič (2023) emphasizes that the feminine position introduces a structural crack within universal logic. Baba Yaga, as mythic figure, occupies this crack - an embodiment of excess rather than absence.

5.1. Exile, Language, and Symbolic Displacement

Ugrešić herself experienced exile following the Yugoslav wars. The novel's multilingual and transnational setting reflects symbolic displacement. Language becomes unstable; identity unmoored.

Lacan insists that the unconscious is structured like a language. Exile thus intensifies the split subject's alienation. Baba Yaga's wandering mirrors this displacement.

5.2. Aging as Ethical Position

Rather than sentimentalizing old age, Ugrešić presents it as confrontation with lack. The protagonists' solidarity suggests an ethics of acceptance - acknowledging fragmentation without fantasy restoration.

Ragland (2021) argues that Lacanian ethics involves fidelity to desire beyond imaginary identification. The elderly women's refusal to conform to youth ideals exemplifies such fidelity.

6. POLITICAL IMPLICATIONS

The novel's exploration of aging intersects with post-socialist transformation. Elderly women, often marginalized in neoliberal economies, embody historical memory.

Žižek (2022) suggests that the Real appears as political rupture. Baba Yaga's disruptive presence can be read as resistance to commodified femininity and nationalist nostalgia.

Through Lacanian analysis, *Baba Yaga Laid an Egg* emerges as a meditation on the impossibility of total identity. The aging female body reveals the cracks in symbolic structures that privilege youth and beauty.

Baba Yaga functions as the Real of woman - excessive, unruly, irreducible. The novel reclaims monstrosity as subversive potential.

7. CONCLUSION

By mobilizing Lacanian psychoanalysis, this article demonstrates that Ugrešić's novel stages aging femininity as encounter with the Real and reconfigures myth to expose the Symbolic's limits. Baba Yaga embodies feminine jouissance beyond phallic containment, transforming grotesque excess into a site of ethical and political resistance.

Baba Yaga Laid an Egg thus stands as a profound literary articulation of Lacanian subjectivity in post-socialist Europe - revealing that what culture seeks to exclude as monstrous may in fact mark the irreducible truth of the subject.

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THE PRO-ENVIRONMENTAL AWARENESS OF YOUNG PEOPLE IN SERBIA ABOUT CLIMATE CHANGE – A CASE STUDY

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Abstract: Although there is rising public awareness and discussion about climate change, which is primarily caused by human production and consumption habits, there is a noticeable lack of study on the attitudes and behaviors of young people toward climate change in the Serbian social environment. Despite the fact that young people are the future of every society and the carriers of progress, their understanding and opinions about climate change and pro-environmental conduct, such as minimizing the detrimental effects of humans on the environment, have not been clearly examined in detail. The focus of this study was on analyzing the correlation between young people's understanding of climate change and their conduct in Serbia, specifically in terms of reducing their detrimental effects on the environment. The survey, which was a component of the "Youth and Climate Change" initiative, served as the foundation for the research. With the intention of learning about the attitudes and opinions of students at the Faculty of Occupational Safety in Niš regarding climate change, we conducted a survey to determine the behaviors they are willing to take in order to help mitigate the effects of climate change on Serbian society.

Keywords: youth, climate change, youth awareness of climate change, pro-environmental behaviour

Field: Humanities

1. INTRODUCTION

The main actors in both the existing and future challenges related to climate change, one of the key challenges of humanity, are young people (Steffen et al., 2015). Humanity is already facing the negative consequences of climate change, which is why scientists point to the need for urgent action (e.g., Ripple et al., 2021). Therefore, it is precisely today's generations of young people, as witnesses of the increasing dangers but also as future decision-makers and bearers of agreed-upon changes, who are in the best position to define a long-term collective response to climate change.

On the other hand, young people are also the most sensitive to the inherited decisions and approaches of older generations. Recently, there has been collective action by young people in Serbia, who have engaged in the fight for environmental preservation through various associations. A review of the literature on the subject of ecology and human-induced climate change reveals a paucity of studies on the environmental attitudes and behavior of young people, notably in Serbia, despite increasing public awareness and debate.

There is no significant amount of research on the attitudes of young people in Serbia regarding the impact of climate change. Therefore, in this study, we started from the results of the research conducted in the region. According to the obtained results (Šimac et al., 2021), the biggest increase in support for environmental protection was recorded among the Central European countries considered (Czech Republic, Hungary, Poland, Slovakia, and Slovenia) over a ten-year period (2008 vs. 2018). Previous research shows that sociodemographic characteristics (except for the level of education in some cases) are generally not relevant sources of differences in environmental attitudes and behaviour (Ančić et al., 2016; Landau et al., 2008; Šimac et al., 2021; Maglić et al., 2022). Thus, Ančić et al. (2016), based on data from the International Social Survey Programme (ISSP) from 2011 and 2013, confirmed that a higher level of concern and willingness to act in the form of environmental protection, as well as recognition that the increase in temperature is caused by climate change, are important determinants of citizens' willingness to make material sacrifices for the sake of environmental protection. The findings indicate the importance of awareness and information about the negative consequences of climate change as potentially important determinants of pro-environmental behaviour. Of course, it should be noted that attitudes and behaviour regarding climate change and environmental care are intertwined with many other attitudes and dispositions, i.e., contextual characteristics such as values or worldviews at the individual or societal level, which is confirmed by previous results (Brajdić Vuković, 2014; Brajdić Vuković, Ančić & Domazet, 2020; Kufirin, 2014).

The few studies to date on the environmental and climate attitudes and/or behaviours of young

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people have mostly been conducted on small convenience samples (Dolenec and Pejnović, 2014; Hadžiselimović, 2015; Lukšić et al., 2019) or as part of bachelor's theses (Cvetković, 2017; Toljan, 2020). Overall, the results show that young people are more or less informed and relatively aware of environmental problems and generally express a willingness to preserve the environment and natural resources (Gvozdanić et al., 2019; Lukšić et al., 2019; Stanić and Buzov, 2009). At the same time, they express a greater preference for simpler and more concrete activities for environmental protection (Hadžiselimović, 2015; Toljan, 2020).

Surveys show that young Europeans are equally or more interested in and concerned about climate change than older people. Data from surveys of young people in countries such as Australia, Germany, and the United States (Borgstedt, Christ, and Reusswig, 2010; Thielking et al., 2002; Stevenson et al., 2014) show that women are more concerned about climate change than men. Thus, in some countries, female students assess themselves as more aware, while in others, male students do. According to individual research findings in the region, among secondary school students, female students express a more positive attitude towards environmental topics compared to male students (Dolenec and Pejnović, 2014), and female students are somewhat more environmentally aware and inclined toward environmentally friendly behaviour than male students (Cvetković, 2017). Similarly, Henn, Sloam, and Nunes (2022), in a more comprehensive analysis of data from the 2017 European Values Study (EVS), found that among young people (aged 18–25) from ten countries, women are more likely to be environmentally active than men. Their findings also confirm the level of education of young people as an important source of differences in environmental activism, pointing to the importance of education for empowering and more intensively involving young people in environmental policies. We can assume that school, as an instrument of socialization, teaching, and upbringing, as in many other spheres of life, plays an important role in encouraging young people to act towards contributing to the fight against climate change.

In Serbian educational programs, climate education does not exist as a separate subject. Also, knowledge about environmental protection in primary school is studied as part of the content of other specialized subjects (e.g., The World Around Us; Nature and Society; Biology). Unlike research on the representation of environmental topics, no research has been conducted in Serbia that would examine in more detail the role of school in the formation of environmental attitudes and behaviour of young people. Thus far, the individual findings indicate that young people believe that they do not have enough opportunities to learn about environmental protection issues in educational institutions (Gvozdanić et al., 2019; Gvozdanić et al., 2022).

2. MATERIALS AND METHODS

The research aimed to survey 90 young people aged 15 to 29. All respondents were students at the Faculty of Occupational Safety in Niš. The majority of respondents were from urban areas (Figure 4). The research was conducted using a simple random sample to ensure reliable data analysis and objective conclusions. More precisely, an online survey was available to all students at the Faculty of Occupational Safety, but only some completed it. The survey was conducted via Google Surveys. Data was collected in May 2024. A questionnaire with open-ended and closed questions was created for the respondents. The respondents included in the research were guaranteed anonymity, which contributed to obtaining more honest and accurate data. Software called SPSS (Statistical Package for Social Sciences) was used for data entry and processing, it has the required logical control and is utilized for data processing and analysis.

The goal of this of the quantitative study is to evaluate how well young individuals in Serbia understand climate change, the release of harmful gases, their effects on health and the environment, and the risks linked to climate change in their local area and the country as a whole. The findings from this study will help to set priorities in this field, ensuring that the views of young people will be considered in future planning and decision-making regarding climate change. The study was carried out on a group of 90 students, mostly categorized as young people aged 29 and under.

Table 1. Demographic structure of the sample

Gender structure	Male 31.11%
	Female 68.89%
Age structure	(15-19) 6.67%
	(20-24) 57.78%
	(25-29) 35.56%
Educational structure	High school 58.89%
	Academic studies 32.22%
	Master studies 7.78%
	Doctoral studies 1.11%
Place of residence	Village 23.33%
	City 76.67%

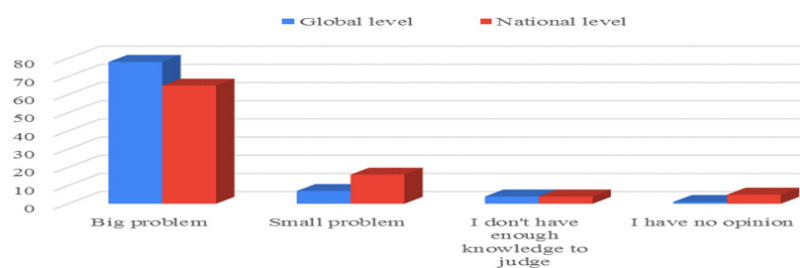
Source: Authors' research

Regarding the demographic characteristics of the research sample, specifically its gender structure, slightly more than two-thirds of the respondents are female. More precisely, the sample comprises 68.99% women and 31.11% men. This indicates that there is a higher representation of female students compared to male students in the surveyed sample (Table 1). The most represented age category is from 20 to 24 years old (57.78%) (Table 1). The largest percentage of respondents completed secondary school (58.89%) (Table 1), while 76.67% of respondents are city residents (Table 1).

3. RESULTS

The research entitled 'Attitudes of Youth in Serbia on the Impact of Climate Change' was carried out by a team of researchers from the Faculty of Occupational Safety in Niš, based on the research conducted globally and in southeastern Europe by the United Nations Development Programme (UNDP). The aim of the research was to assess the extent to which the topic of climate change is prevalent among young people in Serbia. In addition, a preliminary assessment was made of key perceptions and awareness of young people of the topic of climate change, emissions of harmful gases, their impact on human health and the environment, the recognition of risk factors associated with climate change in the local environment and the country, the future development of Serbia regarding climate change. Young people in Serbia believe that the impact of climate change is a major problem, especially at the global level (87%). The research showed that young people from urban areas aged 25 to 29 are more aware of the impact of climate change at the national and global levels, as shown in Figure 1.

Figure 1. Evaluation of the effects of climate change on the national and global level (%)

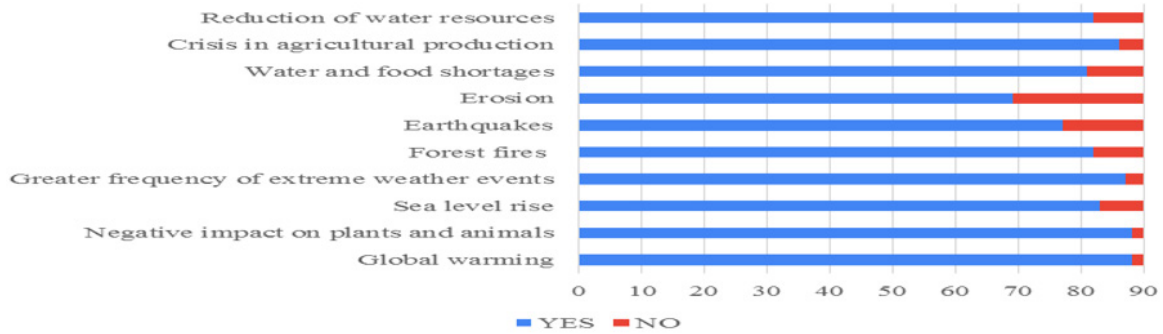


Source: Authors' research

The level of awareness of young people regarding the consequences of climate change can be assessed as high (more than 70%). They are most familiar with the negative consequences of climate change on plants and animals (97.77%) and the impact on the frequency of extreme weather events (96.66%), but they are least familiar with the negative consequences of erosion (76.66%). Women are more familiar with the consequences of climate change than men, Greater awareness is observed among young people aged 25 to 29 compared to those aged 15 to 19 or 20 to 24. Young people from urban areas are more familiar with the consequences of climate change than those from rural areas, as observed by

type of settlement (Figure 2).

Figure 2. Respondents' knowledge about the consequences of climate change (%)



Source: Authors' research

Statistics show that a third of young people are concerned about climate change (32.22%). Responsibility for environmental protection was shown by 18.89% of young people. Ten percent of young people feel scared, and 12.22% feel powerless to change anything (Table 2).

Table 2. How do you feel about climate change? (%)

Confused	6.67%
Interested	18.89%
Concerned	32.22%
Scared	10.00%
Responsible (protect the environment)	18.89%
Disinterested	1.11%
Powerless to change anything	12.22%

Source: Authors' research

Two-thirds of young people identified industry/ factories (88.80%) and traffic and air pollution (82.50%) as the main causes of climate change, but uncontrolled waste generation and disposal (62.50%) is not far behind. A small percentage of young people stated that climate change is a natural process (3.80%). Unlike young people from urban areas who recognized uncontrolled waste generation and disposal as the biggest cause of climate change, young people from rural areas believe that industry and factories are some of the main activities contributing to the occurrence of climate change (Table 2).

Table 3. What contributes most to climate change on scale of 1 to 100 (%)?

Natural process	3.80%
Agricultural production	21.30%
Waste	62.50%
Devastation of natural habitats	41.33%
Traffic and air pollution	82.50%
Households	15.00%
Energy industry	28.70%
Industry	88.80%

Source: Authors' research

More than half of the respondents (68.89%) believe that most young people are unaware that their behaviour can affect climate change, while 11.11% of the respondents believe that young people are not aware of this at all (Table 3).

Table 4. Are young people in Serbia aware that they can influence climate change through their behaviour? (%)

I can not estimate	31.11%
I believe they are not aware of it at all	11.11%
I believe most are aware of it	12.22%
I believe most are not aware of it	68.89%

Source: Authors' research

Slightly more than half of the respondents indicated that they were familiar with the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, as well as with Serbia's commitments to reduce greenhouse gas emissions (58.89%). In terms of the respondents' age, older respondents (25 to 29) are more familiar with the UN Convention and the Paris Agreement than younger ones. On the other hand, young people from rural areas are less familiar with the UN Convention and the Paris Agreement, as well as Serbia's commitments, than young people from urban areas (Table 5 and Table 6).

Table 5. Are you familiar with the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement (%)?

No	41.11%
Yes	58.89%

Source: Authors' research

Table 6. Are you aware of the commitments that Serbia has made (as well as other countries that are signatories to the Paris Agreement) to reduce greenhouse gas emissions (%)?

No	40.00%
Yes	60.00%

Source: Authors' research

Of the total number of respondents, as many as 26.67% cannot assess how informed they are about climate change. On the other hand, 58.89% of the respondents believe that they are well informed, while 13.33% believe that they are poorly informed about climate change. More women believe that they are well informed about climate change compared to men, while a greater number of men cannot assess their level of informed Ness (Table 7).

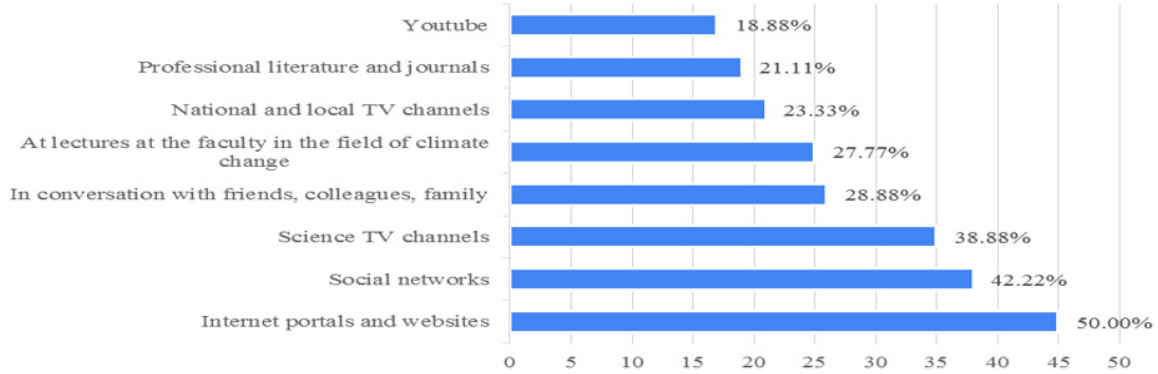
Table 7. Level of informedness about climate change (%)

I can not estimate	26.67%
It is not a topic that interests me	1.11%
Poorly informed	13.33%
Well informed	58.89%

Source: Authors' research

Around half of the respondents (51.11%) learned about climate change at university; considering that we surveyed the student population, such results are expected. In addition, 50% of the respondents learned about it through internet portals and websites, while 42.22% of the respondents learned about it through social networks. It was noted that young people listen to the radio or read the daily press very little, so they receive very little information in this way, and there is also a small percentage of those who attend lectures, round tables, and panels on this topic (Figure 3).

Figure 3. How do you get information about climate change? (%)



Source: Authors' research

Interest in the topic of climate change was expressed by 33.33% of the respondents, as it is very important for them to learn more about this topic. Almost half of the sample (46.67%) stated that they would learn more if they knew that they could contribute to reducing harmful impacts. Interest in this topic is equally represented among young people in both urban and rural areas, while young people aged 15 to 19 showed less interest in receiving more information about climate change compared to older respondents (Table 8).

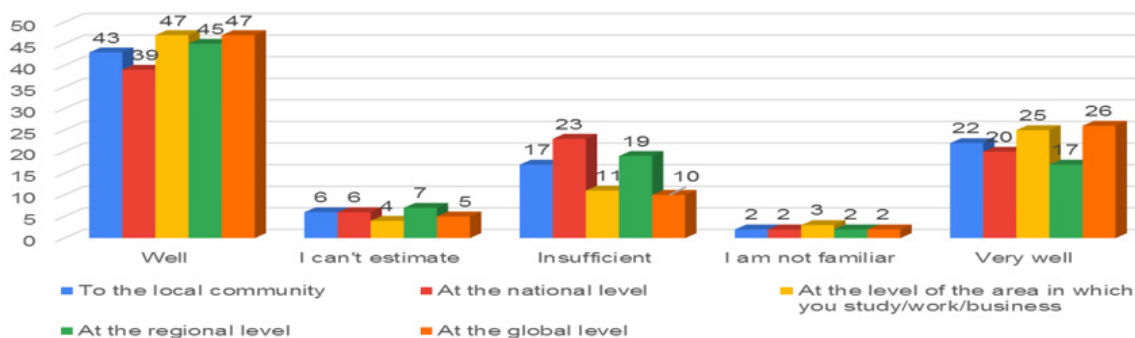
Table 8. Do you want to learn more about climate change? (%)

Yes, that is very important to me	33.33%
Yes, if you knew beforehand that it was important to me	8.89%
Yes, if I knew that I could contribute to the reduction harmful impacts	46.67%
I can not estimate	6.67%
No	4.44%

Source: Authors' research

Almost one in two respondents rates their awareness of the impacts of climate change as "sufficient" at all levels. Around 20% of the respondents state that they do not have enough knowledge about the impacts of climate change at all levels (Figure 4).

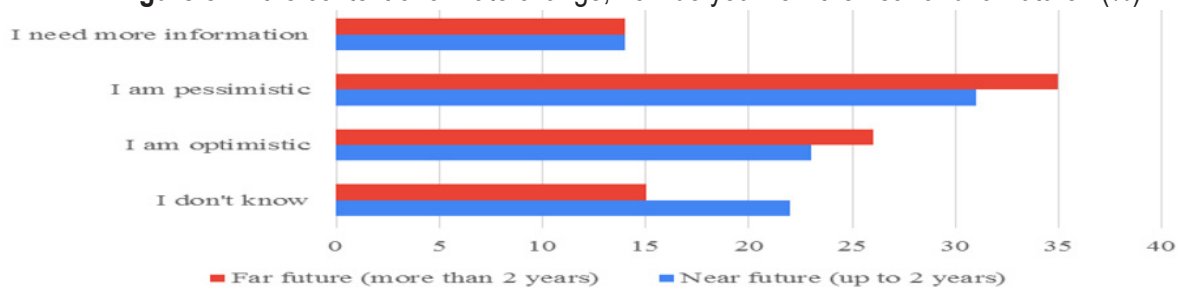
Figure 4. Are you aware of the impact of climate change? (%)



Source: Authors' research

Young people are generally equally pessimistic about climate change in the near and distant future, but they are more concerned about the far future (Figure 5).

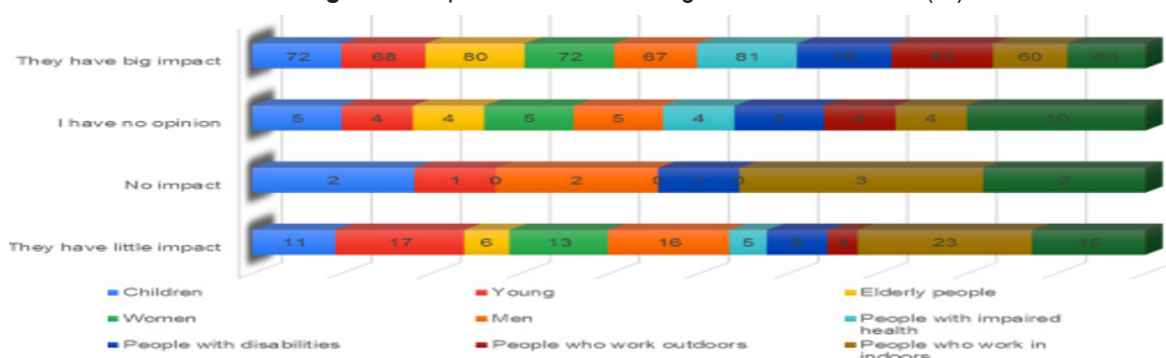
Figure 5. In the context of climate change, how do you view the near and far future? (%)



Source: Authors' research

Young people in Serbia believe that climate change has a significant impact on the health and lives of people in general (over 75%) (Figure 6). The largest number of respondents, more precisely 80 out of 90 respondents, said that climate change has a significant impact on the health and lives of older people.

Figure 6. Impact of climate change on health and life (%)



Source: Authors' research

The largest percentage of respondents (88.66%) believe that the state is responsible for the problems arising as a result of climate change, followed by the local community (68.88%) (Table 9).

Table 9. Do you want to learn more about climate change? (%)

Scientists	7.77%
Young people	15.55%
Non-governmental organizations, associations	18.88%
International community	24.44%
Private sector (companies, enterprises)	50.00%
Society and local community	68.88%
A country with laws and regulations	88.66%

Source: Authors' research

Among the respondents of all ages, there is a great willingness to change their lifestyle habits in order to protect the environment or reduce human impact on climate change (Table 10).

Table 10. Are you willing to change your lifestyle to reduce the negative impact of humans on the environment? (%)

Yes	88.89%
I have no opinion	7.78%
No	3.33%

Source: Authors' research

4. DISCUSSIONS

Research on young people's attitudes and behavior regarding climate change in the context of Serbian society is conspicuously lacking, despite the public's growing interest in and conversations about the topic of climate change brought on by human activity. The relationship between their awareness of climate change changes and behavioral intentions in the form of reducing the negative human impact on the environment was not sufficiently investigated, despite the fact that young people are the future of every society and the bearers of development. In this paper, we examined the relationship between young people's awareness of climate change and their intention to take actions that will lessen its detrimental effects on the environment. It is important to note that this research is not a nationally representative sample when interpreting the findings, particularly the descriptive ones. All young people in Serbia cannot be said to be represented by the average values of awareness, behavioral intention, and assessment of the likelihood of learning about climate change. However, the results clearly show that young people are aware of the detrimental influence of climate change on the local and global community, understand the most important global pollutants that contribute to the degree of environmental degradation and, as a result, the development of climate change. Furthermore, they recognize climate change as a societal phenomenon, want to learn more about its roots and implications, use current media to get information, and are willing to change their own behavior to mitigate its negative impacts.

5. CONCLUSIONS

Based on the results of the research *Attitudes of Youth in Serbia on the Impact of Climate Change*, it can be concluded that young people have some knowledge about climate change and its impacts. Based on the research conducted and the analysis of the results obtained, several relevant conclusions can be drawn. The prevailing opinion among young people is that climate change is a very serious problem on a global level. Likewise, in Serbia, more than two-thirds of the respondents believe that climate change is a problem. Young people's awareness of the consequences of climate change is at a high level. They most often cited negative impacts on plants and animals, frequent weather-induced disasters, rising sea levels, and forest fires as possible effects or consequences of climate change. Young people of all age categories share the opinion that industries/factories, traffic, and uncontrolled waste generation and disposal are the main causes of climate change. More than half of young people are unaware that their behaviour can affect climate change. Young people in Serbia are familiar with the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, as well as with Serbia's obligations to reduce greenhouse gas emissions. More than half of young people believe that they are informed about climate change. The most suitable way to acquire new knowledge and information about climate change is the Internet, social networks, and scientific TV channels, as well as educational institutions. Women are more interested in learning about climate change than men, especially if they know in advance that they can contribute to reducing its harmful effects. The dominant view is that climate change has a significant impact on people's health and lives, which is especially pronounced among older people. Young people believe that the state is most responsible for solving problems arising as a result of climate change. The contribution of young people to environmental protection is reflected in daily walking instead of using motor vehicle transport, reducing waste, and using environmentally friendly products. Young people believe that it is very important for Serbia to choose its priorities regarding climate change, the most prominent of which are the following: nature protection and integration of climate change issues into all sectoral policies, investment in renewable energy sources, improvement of energy efficiency, and better management of biodiversity.

The results of this research should be taken with caution, given the type and size of the sample. However, despite these methodological shortcomings, the research provided a wealth of information about the attitudes and values of young people in determining their attitude towards the most significant problem of the 21st century – climate change.

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LEXICAL TRANSFER IN L3 CHINESE: A QUALITATIVE STUDY OF COLLOCATIONAL ERRORS AMONG SERBIAN-SPEAKING LEARNERS

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Abstract: This paper investigates lexical transfer in L3 Chinese through a qualitative analysis of collocational errors produced by Serbian-speaking learners. The study focuses on how cross-linguistic influence shapes learners' use of Chinese collocations and how conceptual patterns from the first and second language, as well as dictionary-mediated lexical choices, lead to semantically deviant combinations. A corpus of learner collocations, gathered from written production across several HSK proficiency levels, was compiled and manually annotated. Each erroneous collocation was analysed in terms of presumed source expression in Serbian or English, and type of transfer involved. The analysis identifies two major groups of errors: (1) conceptual transfer from Serbian or English and (2) errors driven by "false synonyms", where near-synonymous items treated as equivalent in dictionaries and English-based materials are not interchangeable in Chinese. The results indicate that collocational competence in Chinese as a third language is strongly constrained by L1 and L2 conceptualisation, the mediating role of English, bilingual lexicographic practices and structural properties of Chinese, rather than by overall proficiency alone. The study concludes that teaching materials and dictionaries for Serbian speaking learners of Chinese should be designed to highlight collocations rather than isolated words, systematically contrast Serbian, English and Chinese ways of expressing high-frequency concepts, and make subtle semantic and collocational differences between near-synonymous items explicit. As additional data, the study offers a qualitatively annotated set of learner collocations, their reconstructed Serbian and English source expressions and their target equivalents in Chinese, which can be used as a resource for further research and for the development of classroom activities focusing on collocational awareness.

Keywords: *lexical transfer; L3 Chinese; collocational errors; cross-linguistic influence; conceptual transfer; false synonyms; qualitative error analysis*

Field: Humanities

1. INTRODUCTION

Collocations, which are recurrent, conventional combinations of content words, are a central component of vocabulary knowledge and play a key role in fluent, idiomatic language use. For learners of Chinese as a third language, collocational competence poses particular challenges. Chinese is a typologically analytic language without inflectional morphology, and it relies heavily on function words and fixed multi-word patterns to express grammatical and semantic relations. This means that the learner cannot rely on inflectional cues to signal argument structure or word class, and small changes in lexical choice often have large effects on acceptability. At the same time, high-quality, easily accessible collocation resources for Chinese have historically been scarce, which has prompted the recent developments of tools based on a large-scale collocational knowledge base, intended to support both teaching and self-directed learning (Hu, et al., 2016). In terms of research, collocational errors in Chinese have been studied far less extensively than in better-researched target languages. In comparison with the extensive body of work on collocations and collocational errors in L2 English, empirical research on phraseology and collocation use in L2 Chinese remains relatively limited, a situation reflected in the small number of available L2 Chinese learner corpora (Wu et al., 2025; Iurato, 2022).

Research on crosslinguistic influence shows that prior languages affect learners' lexical choices and structural preferences in both facilitating and interfering ways, leading to conventional target-like uses as well as systematic deviations from target norms (Jarvis & Pavlenko, 2007). Research on L3 acquisition indicates that cross-linguistic influence from previously acquired languages is conditioned by factors such as typological similarity, learners' proficiency in those languages, their recency of use, and L2 status (Hammarberg, 2001). Recent large-scale research on Chinese as an additional language has shown that the linguistic distance between learners' L1 and Chinese affects the acquisition of different components of language knowledge, including characters, vocabulary, and grammar (Chai & Bao, 2023). While there is growing evidence that L1 also shapes learners' collocational knowledge in Chinese (e.g. the studies reviewed in Chai & Bao, 2023), systematic work on collocational transfer, especially for learners from

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South Slavic backgrounds, remains limited. Experimental work on dictionary use for collocation learning shows that electronic dictionaries can significantly improve learners' productive collocation knowledge, but many learners struggle to exploit dictionary information effectively; they often fail to use hyperlinks, have difficulty distinguishing between subsenses, and tend to rely on the first sense in overcrowded entries (Chen, 2017). In such situations, it is plausible that learners will treat near-synonymous items as interchangeable and overlook subtle collocational and register constraints, especially when these are not made salient in the reference tools they consult.

The present study addresses these gaps by examining lexical transfer in the collocational choices of Serbian-speaking learners of Chinese, for whom Chinese functions as an L3 learned after at least one foreign language. Building on a corpus of written production compiled across several HSK-based proficiency levels, the analysis focuses on collocational errors and explores how cross-linguistic influence shapes learners' use of Chinese collocations. In particular, the study investigates two interrelated sources of transfer: (a) conceptual transfer from Serbian, where learners map L1 conceptualisations and phraseological patterns directly onto Chinese; (b) transfer mediated by "false synonyms", where dictionary or English-based materials suggest equivalence between near-synonymous items that are not interchangeable in Chinese, also sometimes linked to overgeneralisation of Chinese word-class flexibility in interaction with Serbian morphosyntax. By providing a qualitative account of these error types in the specific context of Serbian learners of L3 Chinese, the paper aims to deepen our understanding of how L1 conceptualisation, lexicographic practices and structural properties of Chinese jointly shape the development of collocational competence, and to draw pedagogical implications for the design of materials and classroom activities that address collocational constraints and cross-linguistic influence more explicitly.

2. METHODS AND MATERIALS

The corpus for this study consists of written texts produced by learners of Chinese as L3 over the course of one academic year (2024/2025) at the University of East Sarajevo (Bosnia and Herzegovina). At the beginning of the academic year, the students completed a language repertoire questionnaire (L1, L2, L3) to establish their linguistic backgrounds and eliminate the influence of other languages. Of the 47 students in total (third- and fourth-year students studying Chinese as a major), 42 informants were included in the study, as they reported Serbian as their L1, English as their L2, and Chinese as their L3. The remaining five students, who reported German or Russian as their L2, were excluded from the analysis. They were excluded based on possible cross-linguistic influence (CLI) from different L2s and in order to keep the sample as homogeneous as possible.

HSK (Hànyǔ Shuǐpíng Kǎoshì) is the standardised proficiency test for learners of Chinese as a foreign language (Chen, 2022). Broadly speaking, HSK levels 3 and 4 correspond to intermediate levels of proficiency, while HSK 5 indicates a lower-advanced level. Among the 42 students included in the study, 17 (40.5%) held an HSK 3 certificate, 9 (21.4%) held HSK 4, 8 (19.0%) held HSK 5, and the remaining 8 students (19.0%) had not yet taken the HSK exam. Reporting these levels is important because they provide an external, independent indication of the learners' overall command of Chinese, which helps to contextualise their collocational performance and to distinguish errors that may be related to general developmental stage from those more clearly attributable to cross-linguistic influence.

In total, more than 400 homework essays were collected; from these, 112 texts that contained at least one non-target-like collocation were selected for analysis. Only texts in which a collocational error could be clearly identified were included in the corpus examined in this paper. The texts were primarily homework essays, each no longer than one A4 page, written on specific topics closely related to the lessons covered in class.

Collocations are habitual combinations of words that recur frequently in texts and form an important part of speakers' mental lexicon (Yu et al., 2025). They are understood here as frequent, conventional combinations of at least two content words that stand in a syntactic or semantic relationship (Xu, 2007) and, in corpus-based work, as co-occurrences whose frequency is statistically higher than would be expected by chance (Lehecka, 2015; Gablasova et al., 2017). These definitions underlie the selection of target and non-target combinations in the learner data.

The first step in the analysis was to note all multi-word combinations in the learner corpus that appeared to be non-idiomatic or structurally unusual in Chinese. Only combinations fulfilling the above definition of collocation were retained for further analysis. Following the researcher's initial identification and analysis of collocations, their correctness was further verified through native-speaker judgement by two Chinese lecturers. All candidate collocations were manually examined by these lecturers, who

assessed whether each combination was acceptable in contemporary standard Chinese. In cases where a collocation was judged non-target-like, they proposed the conventional expression used in actual language use, and this was adopted as the target form for the subsequent analysis.

3. RESULTS

The qualitative analysis of the learner corpus revealed a set of recurrent non-target-like collocations in the Chinese written production of L1 Serbian-speaking students. These collocations could be grouped into two main types according to their primary source: (a) combinations shaped by the “logic” of Serbian (L1) or English (L2), and (b) false synonyms and dictionary-mediated transfer.

a) A number of the non-target-like collocations were traced to conceptual transfer from L1 Serbian or L2 English. In these cases, learners appeared to translate L1 or L2 expressions into Chinese in a largely word-for-word fashion, preserving Serbian- or English-based conceptual structures, “logic” and lexical choices even where Chinese uses different patterns. For instance, the verb–object collocation 吃汤 *chī tāng* ‘eat soup’ was used instead of the target-like 喝汤 *hē tāng* ‘drink soup’: while Serbian or English conceptualises *jesti supu* / eat soup, Chinese encodes the consumption of soup with the verb ‘drink’. A similar pattern emerged in expressions of language proficiency, where learners produced 知道汉语 *zhīdào hàn yǔ* ‘know Chinese’ modelled on the Serbian expression ‘znati jezik’ or the English ‘to know a language’, whereas in Chinese the relevant ability is expressed by 会说汉语 *huì (shuō) hàn yǔ* ‘be able (to speak) Chinese’. Another similar example is 吃药 *hē yào* ‘drink medicine’, where the default Chinese collocation is 吃药 *chī yào* ‘take (lit. eat) medicine’. This mirrors the Serbian expression *piti lijek* ‘drink medicine’, which is the usual way to describe taking medicine regardless of its physical form. In Chinese, however, 药 *yào* ‘medicine’ most often collocates with 吃 *chī* ‘eat’, and 吃药 *hē yào* ‘drink medicine’ is reserved for cases where the medicine is specifically in liquid form. There was another representative example: Serbian uses the verb *nositi* both for wearing clothes (*nositi jaknu* “wear a jacket”) and for carrying bags (*nositi torbu* “carry a bag”), whereas Chinese systematically distinguishes between 穿 *chuān* “wear (clothes, shoes, etc.)” and 背/提 *bēi / tí* “carry (on the back / in the hand)”. In the corpus we had the example of the collocation 穿包 *chuān bāo* “wear a bag” by analogy with 穿衣服 *chuān yī fu* “wear clothes”, instead of the idiomatic 背包 *bēi bāo* “carry a bag / backpack”. The collocation 生活生活 *shēnghuó shēnghuó*, intended as a direct transfer of the Serbian pattern *živjeti život* (verb ‘live’ + noun ‘life’) or the English to live life, also stood out. Although 生活 *shēnghuó* can function as both a verb and a noun in Chinese, these two uses do not normally appear side by side, and the idiomatic expression would be (过)生活 *(guò) shēnghuó* ‘(to) lead/live one’s life’. Such examples indicate that students overapplied the possibility of word-class conversion in Chinese, combining it with Serbian phraseological patterns. Most of the examples from the corpus include learners combining the adjective 漂亮 *piàoliang*, ‘beautiful’) with nouns such as 茶 *chá*, ‘tea’), 咖啡 *kāfēi*, ‘coffee’) and 天气 *tiānqì*, ‘weather’), producing collocations like 茶漂亮 *chá piàoliang*, lit. ‘tea [is] beautiful’), 咖啡漂亮 *kāfēi piàoliang*, lit. ‘coffee [is] beautiful’) and 天气漂亮 *tiānqì piàoliang*, lit. ‘weather [is] beautiful’). These expressions are formally grammatical, but they are not idiomatic in contemporary standard Chinese. The problem lies in the mismatch between the semantic profile of 漂亮 *piàoliang* and the preferred evaluative patterns for these nouns. In Chinese, 漂亮 *piàoliang* is primarily used for visual attractiveness (e.g. 漂亮的衣服 *piàoliang de yī fu*, ‘beautiful clothes’; 漂亮的风景 *piàoliang de fēngjǐng*, ‘beautiful scenery’), and is not normally used to evaluate the taste of drinks or the quality of the weather.

These cases, among others, showed that learners sometimes relied on L1 or L2 phraseological templates when constructing collocations in L3 Chinese, even when the resulting expressions were pragmatically unnatural or conceptually unnatural in the target language.

b) The second group of errors involved false synonyms, where learners selected near-synonymous Chinese items as if they were fully interchangeable. For example, the collocation 住生活 *zhù shēnghuó* ‘live life’ frequently appeared instead of the idiomatic 过生活 *guò shēnghuó* ‘lead/live (one’s) life’. In the learners’ principal reference tools, the Pleco Chinese Dictionary (version 3.2.80) and the textbook *New Practical Chinese Reader* (2003, p. 209), 住 *zhù* is glossed in English as “live, reside, stay” or “to live, to stay”, respectively. Such broad translations may have blurred its core meaning of ‘reside in a place’ and thereby encouraged learners to treat it as synonymous with more general verbs meaning ‘to live’. There were many other examples of errors that showed transfer mediated by English, reflecting the role of English both as the learners’ L2 and as the metalanguage of many dictionaries and textbooks. One clear example involved the verb 回 *huí*. In the above-mentioned reference tools used by the students, the Chinese verb 回 *huí* was translated into English simply as “return, go back”. When this English gloss was subsequently translated into Serbian, the reflexive nuance present in Chinese - ‘to return oneself (to a

place)' - was in some cases further obscured. As a result, learners produced collocations such as 回钱 *huí qián* 'return (self) + money' and 回书 *huí shū* 'return (self) + book' instead of the target 还钱 *huán qián* and 还书 *huán shū*, where 还 *huán* is the appropriate verb for 'giving something back'. In another case, learners produced the collocation 国家表面 (*guójiā biao miàn*, lit. 'country surface') instead of the idiomatic 国家面积 (*guójiā miàn jī*, lit. 'country area'). This error can be traced to the English (and Serbian) noun *area*, which can refer both to a geographical expanse (the area of a country, *površina države*) and to a more general surface (surface area, *površina stola*). In Chinese, however, these two meanings are lexicalised by different nouns: 面积 (*miàn jī*) is used for the size/area of land, rooms, countries, etc., whereas 表面 (*biao miàn*) typically refers to the surface of an object (e.g. the surface of a table, the surface of water) and does not collocate with 国家 'country' in this sense. Other examples of this type include 开自行车 *kāi zìxíngchē* (lit. 'drive a bicycle') instead of the idiomatic 骑自行车 *qí zìxíngchē* 'ride a bicycle'; 打扫街道 *dasao jiēdào* 'clean/sweep the street' instead of 打扫房子 *qīngsǎo fángzi* 'sweep/clean the street'; 打扫家 *dasao jiā* 'clean the home/family' instead of 打扫房子 *dasao fángzi* 'clean the house/flat'; and 打开饭馆 *dākāi fànguǎn* (lit. 'open [like a door] a restaurant') instead of 开饭馆 *kāi fànguǎn* 'start/run a restaurant'. For learners with Serbian as L1 and English as L2, these errors are readily interpretable as transfer from overlapping patterns in the previously acquired languages: Serbian uses *voziti* both for vehicles and bicycles (*voziti auto*, *voziti bicikl*), which encourages the choice of 开 'to drive, to operate' rather than 骑 'to ride'; the verb *čistiti* is used broadly for cleaning both houses and streets, which supports extending 打扫 to contexts where Chinese prefers 清扫 or a more specific object such as 房子; and *otvoriti* 'to open' in Serbian, like 'to open' in English, is used both for physical opening and for starting a business (*otvoriti restoran* / open a restaurant), which makes 打开饭馆 appear plausible even though Chinese distinguishes 打开 for concrete, physical opening and 开 for starting or running an enterprise.

This pattern highlighted the limitations of using English as a universal metalanguage in lexicographic and pedagogical materials and underscored the need for language-specific resources that are tailored to Serbian learners and explicitly address the transfer risks arising from their L1 and L2. The absence of a clear distinction in the translation sometimes encouraged learners to treat similar Chinese verbs as interchangeable. In such cases, students chose the item that matched the translation they associated with the Serbian source expression, even when its collocational and semantic restrictions in Chinese were narrower or different.

4. DISCUSSIONS

The findings of this study indicate that collocational errors in L3 Chinese among L1 Serbian, L2 English learners were not accidental slips, but systematic reflections of how prior languages and learning tools shaped their emerging collocational knowledge. At the core of many erroneous combinations was the projection of entrenched L1/L2 phraseological frames onto Chinese, such as 'eat soup', 'know a language', 'live life' or 'drink medicine', with only partial adjustment to target norms. Learners activated familiar multilingual templates and filled them with Chinese lexical material, producing combinations that were grammatically possible but pragmatically non-idiomatic. This pattern suggests that, for these learners, collocational transfer operated primarily at the level of conceptual and phraseological units, not isolated lexemes: once an L1 or L2 frame was selected, it strongly guided the choice of Chinese verbs and nouns, even when Chinese encoded the same situation through different, often more specialised, collocational patterns.

The study also showed that lexicographic mediation was not a neutral support, but an additional source of shaping the collocations. English glosses and Serbian translations often compressed several Chinese items into a single broad equivalent ('to live', 'to return', 'area'), which made near-synonymous verbs and nouns appear mutually interchangeable. In such cases, learners tended to select the Chinese item that best matched the translation they had internalised, rather than the one that best matched actual Chinese collocational norms. This mapping - Serbian \rightleftharpoons English \rightleftharpoons Chinese - was especially problematic when Serbian itself did not lexicalise a contrast that is overtly encoded in Chinese (e.g. "reside" vs "lead one's life", "return oneself" vs "give something back", "surface" vs "area of land"). The errors involving 住生活, 回钱 / 回书 or 国家表面 are therefore best understood not simply as vocabulary gaps, but as consequences of how dictionary entries and textbook glosses package semantic space: where the tools present a single, undifferentiated label, learners are encouraged to treat distinct Chinese items as false synonyms in collocation.

A further contribution of the study lies in its treatment of word-class flexibility in Chinese. The data showed that learners were aware that many Chinese forms (e.g. 生活) can function as both verbs and

nouns, but they sometimes overgeneralised this flexibility, combining two possible uses in ways that are structurally conceivable yet not idiomatic, as in 生活生活. This finding nuances the common view of Chinese as “simpler” because of its lack of inflection: the absence of overt morphological marking does not reduce complexity, but rather shifts it into the domain of lexical patterning and collocation. For L3 learners coming from a morphologically rich L1 like Serbian, where case and inflection help signal argument structure and word class, the burden of interpretation in Chinese is redistributed onto fixed multi-word patterns and conventional pairings. The present results suggest that, without sustained exposure to authentic collocations and explicit attention to their distribution, learners may use word-class flexibility as a licence for creative recombination that exceeds what is acceptable in actual usage.

Taken together, these observations highlight that the development of collocational competence in L3 Chinese is constrained by a network of interacting factors: L1 or L2 conceptualisation, L2 English as a mediating system, lexicographic practices, and language-internal properties of Chinese. They also point to several implications for research and pedagogy. For research, the study underscores the value of qualitative, learner-specific analyses that trace collocational errors back to concrete L1/L2 source expressions and dictionary entries, particularly for under-represented language pairings such as South Slavic L1s and L3 Chinese. For pedagogy, the results argue for materials and tasks that (a) foreground collocations rather than single words, (b) systematically contrast Serbian, English and Chinese ways of expressing high-frequency meanings, and (c) make semantic, register and collocational differences between near-synonymous Chinese items explicit.

Finally, the study’s limitations, such as informants from a single institution, written homework data, and a focus on intermediate to lower-advanced learners, suggest clear directions for future work, including analyses of spoken collocations, longitudinal tracking of collocational development, and experimental studies of how different dictionary designs affect learners’ collocational choices in L3 Chinese.

5. CONCLUSIONS

This study examined lexical transfer in L3 Chinese through a qualitative analysis of collocational errors in the written production of Serbian-speaking learners with English as their L2. The analysis showed that non-target-like collocations were not sporadic mistakes, but systematic outcomes of how learners mobilised their existing linguistic resources when writing Chinese. Two main sources of deviation were identified. First, many erroneous collocations arose from the direct projection of entrenched L1 and L2 phraseological frames onto Chinese: expressions such as ‘eat soup’, ‘know a language’, ‘live life’ or ‘drink medicine’ were transparently mapped onto Chinese verbs and nouns, yielding combinations that were structurally possible but not idiomatic (e.g. 吃汤, 知道汉语, 生活生活, 喝药). Second, a substantial group of errors involved false-synonym choices and dictionary-mediated transfer: broad English glosses and Serbian translations encouraged learners to treat distinct Chinese items (e.g. 住 vs. 过生活, 回 vs. 还, 表面 vs. 面积) as interchangeable, leading to collocations such as 住生活, 回钱, or 国家表面 that are semantically interpretable yet infelicitous. A smaller set of examples also pointed to overextension of Chinese word-class flexibility, where learners combined verb and noun uses of the same form in ways that go beyond accepted usage.

These findings have several implications for research on L3 Chinese and for the teaching of Chinese to learners with South Slavic backgrounds. They show that collocational competence in L3 Chinese is jointly shaped by L1 and L2 conceptualisation, the mediating role of English, the way bilingual reference tools package semantic space, and language-internal properties of Chinese, rather than by overall proficiency or vocabulary size alone. For the field, the study underlines the importance of examining collocation and phraseology in under-researched language constellations and of tracing collocational errors back to concrete L1/L2 source patterns and dictionary entries.

For pedagogy, the results point to the need for language-pair-sensitive materials and tasks that foreground collocations instead of isolated words, systematically contrast Serbian, English and Chinese ways of expressing high-frequency concepts, and make subtle semantic and collocational differences between near-synonymous Chinese items explicit. Such an approach can support the gradual restructuring of learners’ multilingual mental lexicon around Chinese-specific patterns of lexical combination and, ultimately, more successful development of idiomatic collocational use in L3 Chinese.

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