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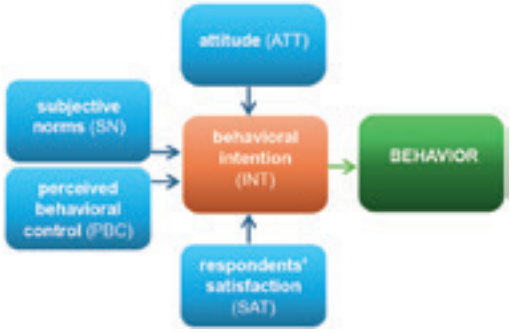

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Fakultet poslovne ekonomije

The Excellence School of Management

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WOMEN'S ECONOMIC INDEPENDENCE AS A FACTOR OF SOCIAL EQUALITY

Radmila Pejić | Assistant Professor, Faculty of Business Economics, Pan-European University Apeiron, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, radmila.v.pejic@apeiron-edu.eu, ORCID ID: 0009-0003-8742-6003

Abstract: *Women's economic independence plays a crucial role in promoting social equality, empowering marginalized groups, and dismantling patriarchal power structures. This paper analyzes the role of women's economic independence in fostering social equality, with a particular focus on the factors shaping it, the challenges women face, and the possibilities for overcoming them. Through an empirical analysis of data from the Republic of Srpska and examples of good practice drawn from international sources, the study examines the impact of educational policies, labor market conditions, and institutional barriers on gender equality. Special attention is given to identifying mechanisms that contribute to increasing women's economic autonomy, including support for women's entrepreneurship, education, and changes in social norms. The paper provides a critical review of existing inequalities and proposes recommendations for improving systems that support women's economic empowerment as a key instrument of social transformation and the strengthening of gender equality. The findings indicate that achieving full economic independence for women is essential for building a more stable and just society.*

Keywords: *economic independence, social equality, labor market, education, social policy*

JEL classification: *I29*

INTRODUCTION

The issue of women's economic independence has gained increasing importance in contemporary societies striving for social justice, inclusion, and gender equality. Although certain advances have been made over recent decades in women's rights, access to education, employment, and public life, full economic equality for women remains an unattained goal, particularly in transition countries, including the Republic of Srpska. The research problem lies in the discrepancy between formally recognized rights and the actual economic position of women. The gender pay gap, horizontal and vertical segregation in the labor market, insufficient institutional support for reconcil-

ing professional and family responsibilities, and the marginalization of women's labor represent manifestations of broader economic inequality. The subject of this paper is the analysis of factors influencing women's economic independence and its significance for achieving social equality. The aim of the study is to provide a multidisciplinary examination of women's economic independence as a key factor of social equality in the context of transition challenges, institutional frameworks, and cultural patterns in the Republic of Srpska. Based on this objective, the following research hypothesis was formulated: *Women's economic independence represents a key factor in achieving social equality, and its level depends on educational opportunities, institutional support, and socio-cultural norms shaping the labor market.* The motivation for conducting this research stems from the need for stronger empirical and theoretical foundations for policies addressing gender equality. The paper is structured into six sections. Following the introduction, the second section presents a review of relevant literature and theoretical approaches to gender equality and women's economic independence. The third section describes the research methodology. The fourth section presents and analyzes empirical data from the Republic of Srpska. The fifth section discusses the research results and provides a critical interpretation within a broader social context. The final section offers conclusions and policy recommendations aimed at enhancing women's economic empowerment.

LITERATURE REVIEW

Theories of social stratification provide a fundamental framework for understanding the social position of women, their economic (in)dependence, and broader patterns of social inequality. Social stratification refers to systematic and persistent inequalities between different social groups in terms of access to resources, power, and privileges. Such inequalities are not accidental but rather the result of historical, economic, political, and cultural processes.

Conflict theories of social stratification, associated primarily with Karl Marx and Max Weber, offer a critical framework for understanding social inequality, including the gender dimension of economic dependence. These theories emphasize that social hierarchies are the result of historically established relations of power and exploitation. Marx argued that class differences are rooted in control over the means of production. The bourgeoisie, which owns capital and the means of production, exploits the labor of the proletariat, who possess only their labor power. According to Marx, stratification is the consequence of this fundamental exploitation and class conflict. Max Weber expanded Marx's analysis by introducing additional dimensions of stratification—status and power. He argued that social inequalities do not arise solely from ownership of economic resources but also from prestige (status groups) and the capacity to exercise authority (power). Weber's approach enables a deeper understanding of how gender norms and social values shape women's positions even within the same economic class. For example, women who formally belong to higher economic strata may simultaneously be subordinated within familial, cultural, and political structures. Within this theoretical framework, women's economic dependence is not the result of individual choice or lack of qualifications but rather of systemic marginalization within capitalist systems and patriarchal social patterns

Functionalist theorists such as Talcott Parsons and Kingsley Davis interpret

stratification as an inevitable mechanism that ensures the efficient functioning of society. According to the classical formulation by Davis and Moore, societies must ensure that the most important positions are filled by the most capable individuals, who are adequately rewarded, thereby legitimizing stratification. However, feminist scholars criticize this perspective for ignoring unequal starting positions and structural barriers that constrain women. (Milovanović, Novaković, & Koryagina, 2025). Contemporary conflict analyses, including feminist theories, emphasize that reproductive labor, childcare, and emotional labor form the foundation of the economic system, yet these forms of work are systematically undervalued and neglected. As a result, women's access to economic resources and status positions is limited, and their full civic and political participation is undermined, deepening economic dependence and social inequality. Feminist theories of social stratification reject the neutrality of class-based analyses and highlight gender as a central category of social inequality. Scholars such as Ann Oakley and Sylvia Walby argue that women's subordination is not based solely on economic position but also on normative and institutionalized gender roles. Oakley maintains that gender is a social construct rather than a biological destiny (Oakley, 1972), while Walby conceptualizes patriarchy as a systemic structure operating alongside capitalism (Walby, 2009). Tanja Rener introduces a more complex approach, emphasizing that gender inequalities cannot be analyzed separately from class and ethnic hierarchies (Rener, 2002).

Pierre Bourdieu develops a theoretical framework that transcends the simple dichotomy of class and income by offering a multidimensional approach to social stratification through the concept of capital. In addition to economic capital (material goods and financial resources), Bourdieu introduces cultural, social, and symbolic capital as key dimensions shaping individuals' and groups' positions within the social hierarchy. Each of these dimensions functions as a source of power and differentiation, and their distribution and accumulation influence opportunities for social mobility. Cultural capital, manifested through education, linguistic competencies, cultural practices, and symbolic knowledge, plays a crucial role in the reproduction of social inequalities. In this context, women—particularly those from lower socio-economic backgrounds—often lack equal access to this form of capital and its institutional validation. Social capital, referring to networks of support, acquaintances, professional connections, and social ties, is also unevenly distributed. Women are frequently excluded from influential social networks, especially in decision-making and political spheres, which further limits their access to resources and opportunities for advancement. Symbolic capital—recognition, prestige, and social legitimacy—is linked to societal perceptions of the value of specific roles, identities, and behaviors. Since women's characteristics and contributions are often symbolically devalued or marginalized, women are disadvantaged within processes of symbolic exchange that determine social status (Bourdieu, 1984).

Feminist political economy and institutional theory offer additional insights into the dynamics of power, labor, and gender relations. Feminist economists such as Diane Elson (Elson, Gender justice, human rights and neo-liberal economic policies, 2002) , Nancy Folbre, and Lourdes Benería (Benería, 2003) emphasize that mainstream economics neglects gender differences and unpaid labor. They criticize standard household models that assume equal distribution of resources within families while ignoring

internal hierarchies. Ferber and Nelson highlight the importance of analyzing unpaid labor, the gendered division of labor, and unequal power relations within economic institutions (Ferber, 2003).

According to Amartya Sen's capability approach, genuine individual freedom depends on actual access to resources rather than merely formal rights (Sen, 1999). Women's economic independence enables them to choose education, professions, and lifestyles, as well as to participate equally in democratic society. Nancy Fraser proposes a dual strategy of social justice: redistribution of economic resources and recognition of identities (Fraser, 2013). This approach is particularly relevant for post-transitional societies such as the Republic of Srpska, where economic insecurity and traditional gender norms operate simultaneously (Sasic, 2015).

According to a UN Women report (Women, 2023), increased female participation in the economy contributes to overall GDP growth, poverty reduction, and greater community resilience. The International Labour Organization (ILO, 2023) estimates that reducing the gender employment gap by 25% would increase global GDP by more than 5%. In the context of the Balkans and Bosnia and Herzegovina, women exhibit lower employment rates, are less likely to hold leadership positions, and are more often engaged in precarious forms of work (Rudić, 2021). Women's participation in political decision-making structures remains extremely low, and longitudinal trends do not indicate consistent progress, as noted by (Babović, 2010) in her analysis of Serbia. (Blagojević, 2009) emphasizes that the resources available to women are often culturally undervalued and socially invisible, leading to symbolic inferiority. Knowledge, skills, and experiences acquired through everyday work—particularly unpaid and emotional labor—are not recognized as legitimate forms of capital. Consequently, although women contribute significantly to social reproduction, they remain excluded from spheres of recognition and reward.

Women's economic independence has become a central topic of contemporary theoretical and empirical research, as it is regarded as one of the key indicators of social development and gender equality. A common denominator in contemporary studies is the need for an interdisciplinary approach that integrates economic, sociological, cultural, and legal perspectives on gender inequality, particularly in the context of women's economic empowerment and the achievement of social equality.

METHODOLOGY

This study employed a mixed-methods research approach integrating quantitative and qualitative methods in order to provide a comprehensive and multidimensional analysis of the economic position of women in the Republic of Srpska. Such an approach enables the simultaneous examination of structural patterns and individual experiences, as well as a deeper understanding of the factors shaping women's economic independence in the contemporary social context.

The primary objective of the research was to examine the relationship between women's economic independence and the level of social equality, as well as to analyze the interconnections between education, employment, and women's participation in decision-making processes. Particular attention was paid to identifying the barriers and constraints women face in realizing their economic rights and potential. A descriptive-analytical research design was applied, allowing both the description of the

existing situation and the analysis of causal relationships among key variables. The quantitative component of the study focused on the analysis of existing statistical data obtained from secondary sources, while the qualitative component involved primary data collection through semi-structured interviews and focus groups. Secondary data used in the quantitative analysis were collected from several relevant sources, including the Institute of Statistics of the Republic of Srpska (publications from 2018–2024), (Srpske, 2024) the Agency for Gender Equality of Bosnia and Herzegovina, UN Women, the International Labour Organization (ILO) , the World Bank, and other international and domestic institutions. The indicators analyzed included employment rates, the number of enrolled and graduated students in higher education institutions in the Republic of Srpska, gender wage gaps, women's representation in managerial positions, the prevalence of informal employment, and women's participation in entrepreneurship.

Quantitative data were processed using the statistical software package SPSS (version 26). The analysis included descriptive statistics (frequencies, percentages, mean values, and standard deviation) as well as cross-tabulation analysis to identify associations between education level, employment status, and participation in decision-making. The qualitative component of the research consisted of 20 semi-structured interviews with women employed in the public and private sectors, five interviews with representatives of organizations working in the field of women's rights and gender equality, and three focus groups with six participants each, conducted in both rural and urban settings, thereby capturing diverse social perspectives. The sample was formed using purposive sampling to ensure diversity according to the following criteria: gender (women), age (25–65), level of education, professional status, and place of residence (urban/rural). All interviews and focus group discussions were audio-recorded with participants' consent and analyzed using thematic analysis following the methodological steps proposed by (Braun, 2006). The identified thematic categories included barriers to employment and career advancement, challenges in balancing professional and family responsibilities, perceptions of institutional support, motivation and obstacles related to entrepreneurship, and subjective perceptions of economic independence. Primary data were collected between March and April 2025. A total of 300 questionnaires were distributed via online platforms, of which 113 were validly completed. Additional open-ended questions were included to obtain qualitative explanations of quantitative responses. The analysis of available statistical data indicates a significant discrepancy between women's educational achievements and their professional positions.

EMPIRICAL DATA

The empirical data collected during the research provide a foundation for understanding the current economic position of women in the Republic of Srpska, as well as for identifying the factors shaping their economic independence. The combination of quantitative and qualitative methods enabled a multidimensional examination of the complex social reality in which women operate, as well as an analysis of the interdependence between education, employment, income, and institutional support.

Table 1. Descriptive Statistics for Selected Variables (N = 113)

Variable	Mean	SD	Min	Max	Percentage (%)
Age (years)	39.7	9.8	25	65	—
Education level: Secondary school or lower	—	—	—	—	23.0
College/University degree	—	—	—	—	52.2
Master's/specialist or higher degree	—	—	—	—	24.8
Employed (yes)	—	—	—	—	68.1
Employment sector: Public	—	—	—	—	40.7
Private sector	—	—	—	—	59.3
Average monthly salary (BAM)	850	320	400	1,800	—
Informal employment (yes)	—	—	—	—	27.4

Source: Author's calculations using SPSS 26. Percentages are calculated based on the total number of respondents (N = 113).

Descriptive statistics indicate that the average age of respondents is 39.7 years, suggesting that most participants are in a phase of active economic and family engagement. More than two-thirds of women (68.1%) are employed, with employment in the private sector predominating (59.3%), which is often characterized by lower job security, higher risk of exploitation, and weaker institutional protection. The average monthly salary amounts to BAM 850, which is below the level required for financial autonomy, particularly in the context of family and housing obligations. A particularly concerning finding is that 27.4% of respondents are engaged in informal employment, meaning they work without formal contracts and access to social rights, further exacerbating their economic vulnerability.

Table 2. Correlation Matrix of Selected Variables (N = 113)

Variable	1	2	3	4	5
1. Age	—				
2. Education level	0.12	—			
3. Salary level (BAM)	0.08	0.45**	—		
4. Employment sector (1 = private)	-0.05	-0.10	0.30**	—	
5. Managerial position involvement	0.15	0.38**	0.52**	0.25*	—

Source: Author's calculations using SPSS 26.

***Notes:** *p < .05; *p < .01. Variable 4 coded as binary (private/public sector). Variable 5 coded as binary (managerial position yes/no).

The correlation analysis (Table 2.) reveals significant relationships between education level, salary level, and involvement in managerial positions. Women with higher levels of education are more likely to achieve higher incomes ($r = 0.45$, $p < .01$) and to occupy managerial positions ($r = 0.38$, $p < .01$). However, although education significantly contributes to economic independence, it does not constitute a sufficient guarantee of equal opportunities.

Table 3. Independent Samples t-Test by Education Level (N = 113)

Variable	Secondary school or lower (N = 26)	Higher education (N = 87)	t-value	df	p-value
Average salary (BAM)	650	920	-5.23	111	< .001
Managerial positions (%)	15.4%	38.0%	-3.12	111	002

Source: Author's calculations using SPSS 26.

The t-test results (Table 3.) confirm statistically significant differences in income and hierarchical positioning between women with higher education and those with secondary education. Despite substantial educational attainment—over 77% of respondents possess higher or university-level education—their representation in managerial positions remains low. This finding indicates the presence of the so-called *glass ceiling*, an invisible barrier that prevents women from advancing in their careers regardless of competence and experience.

The qualitative segment of the study provided additional insight into women's experiences and perceptions of the challenges associated with achieving economic independence. The analysis of 20 in-depth interviews, five interviews with representatives of women's rights organizations, and three focus groups involving a total of 18 participants from urban and rural areas revealed a range of obstacles that cannot be fully captured by quantitative methods.

According to the results of the thematic analysis (Table 4.), the most frequently mentioned themes are clearly identified. These findings complement the statistical data and offer a deeper understanding of the causal relationships between women's individual strategies and the structural barriers that hinder the realization of full economic autonomy. The data point to the multilayered nature of the economic challenges faced by women in the Republic of Srpska.

Table 4. Thematic Categories and Frequency of References

Thematic category	Number of references	Example quotations
Barriers to employment	27	"Gender stereotypes hinder women's access to managerial positions."
Work–family balance	23	"Employers do not understand the needs of mothers."
Perception of institutional support	15	"Programs exist, but they are not accessible to everyone."
Motivation for entrepreneurship	18	"Entrepreneurship is often the only path to independence."
Importance of education	20	"Education is the key to better pay and career advancement."

Source: Author's calculations using SPSS 26.

From a sociological perspective, education is not merely an instrument for acquiring knowledge and skills, but also a mechanism through which attitudes, values, and aspirations are shaped. Providing equal educational opportunities for women contributes to dismantling stereotypes and opens space for the transformation of gender roles within the family, the community, and the workplace.

RESULTS AND DISCUSSION

The results of this study confirm the initial hypothesis that women's economic independence is a key factor in the construction of social equality, while also demonstrating that its realization in the Republic of Srpska is constrained by numerous structural, institutional, and cultural barriers. Quantitative findings clearly indicate the existence of significant gender disparities in economic position. Women remain underrepresented in the formal labor market, are less likely to occupy high-ranking positions, are more frequently engaged in the informal economy, and continue to face a pronounced gender wage gap. Such conditions reflect insufficient structural inclusion of women in economic processes, which directly affects their capacity to act as autonomous agents in society.

Education represents one of the key mechanisms of social mobility and individual emancipation, and in the context of gender equality, it has the potential to serve as the most important instrument for achieving women's economic independence. Traditional social structures, which have largely favored patriarchal patterns of behavior and gender roles, have systematically limited women's access to education - particularly in higher and technical fields - thereby directly suppressing their competitiveness in the labor market and their opportunities for economic empowerment. Qualitative findings indicate that women who had access to additional education (especially in information technology, foreign languages, and management) were more likely to achieve economic advancement. However, women from rural and socioeconomically underdeveloped areas often lack access to such resources, resulting in social polarization within the female population itself.

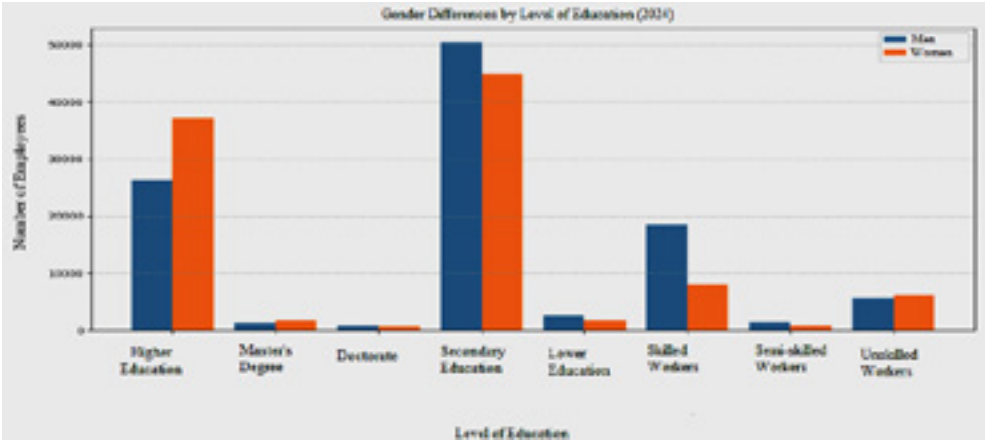

Figure 1. Gender differences in the structure of employment by level of education (2024)
Source: Author's research

An analysis of the structure of employment in business entities in 2024, disaggregated by gender and level of education (Figure 1.), reveals the persistent existence of gender-conditioned patterns within the labor market. A total of 246,213 employed persons were recorded, of whom 128,905 were men (52.4%) and 117,308 were women (47.6%). Women dominate the category of higher education attainment, with 37,246 women (59%) compared to 26,254 men (41%). This distribution indicates a strong

presence of women in fields requiring higher education, consistent with global trends of feminization in certain professional sectors, particularly services, public administration, healthcare, and education. In the category of master's degree holders, women also predominate (1,840 women compared to 1,242 men), while at the highest educational level—doctoral degrees—men continue to prevail (863 men compared to 680 women).

These data testify to a gradual reduction of the gender gap in academic and scientific personnel, but also to the continued presence of structural inequality at the top of the educational hierarchy. At the level of secondary education, men are slightly more represented (53%) than women (47%), reflecting traditional gender divisions in occupational choice: men are more frequently employed in technical, manufacturing, and industrial sectors, while women are more concentrated in administrative and service occupations. At the level of lower education, gender differences are more pronounced, with 2,709 men (60.9%) compared to 1,739 women (39.1%). This distribution points to long-term educational and professional dispositions shaped through socialization and expectations regarding "male" and "female" occupations.

The categories of skilled and semi-skilled workers further reinforce gender dichotomies: men are overwhelmingly dominant, with 18,556 skilled workers (compared to 7,956 women) and 1,455 semi-skilled workers (compared to 844 women). This reflects greater male participation in crafts, physically demanding jobs, and technical production. Conversely, women constitute the majority among unskilled workers—6,186 women compared to 5,555 men. Although numerically smaller, this group is analytically significant as it points to gender segregation at the bottom of the labor market, where women more frequently perform low-paid, insecure, and flexible jobs with limited opportunities for professional mobility. Data for 2024 confirms the existence of gender stratification within the educational and professional structure of employment. Although women increasingly dominate higher education segments, their presence in low-paid and unstable positions remains substantial. This polarization of the female labor force underscores the need for systemic interventions and gender-sensitive policies in education, labor markets, and career advancement to reduce structural barriers and ensure full gender equality.

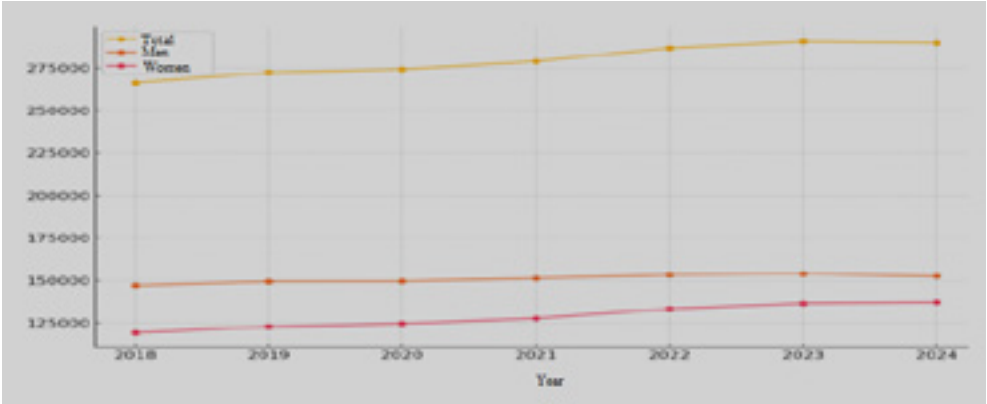

Figure 2. Employment Growht in the Republic of Srpska (2018-2024)

Source: Author's research

Based on official statistical data, the period from 2018 to 2024 (Figure 2.) shows an overall increase in employment in the Republic of Srpska. The total number of employed persons rose from 266,309 to 289,722, representing an increase of 8.8%. However, a gender-disaggregated structural analysis reveals significant sociological implications. While men remain the majority of the employed population, their number increased only modestly—from 147,106 in 2018 to 152,513 in 2024 - representing a relative growth of just 3.7%. A slight decline was even observed in 2024 compared to 2023, which may indicate shifts in labor market structure or increased flexibility in female labor participation.

Female employment recorded a substantially more pronounced increase—from 119,203 in 2018 to 137,209 in 2024—representing a growth of 15.1%. Women's share of total employment increased from 44.7% to 47.4%, significantly narrowing the gender employment gap. These trends point to a gradual transformation of gender roles in the sphere of economic activity.

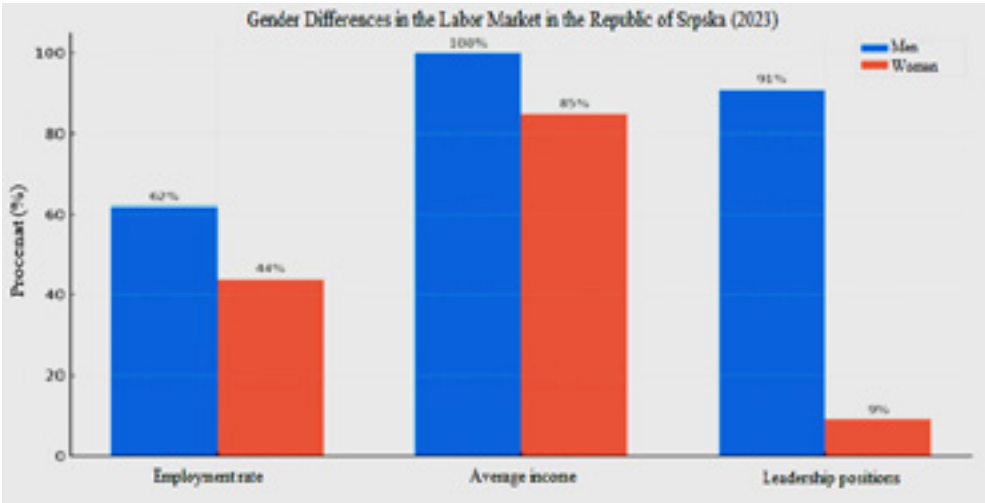

Figure 3. Gender Differences in the Labor Market in the Republic of Srpska (2023)
Source: Author's research

Women with higher education levels have better employment prospects; however, on average, they still earn 12–15% less than men with the same education and qualifications. (Figure3.). Additionally, only 9% of managerial positions in public enterprises and public administration are occupied by women, indicating an unequal distribution of power and influence. Despite the fact that women have constituted the majority of highly educated individuals for years, their representation in leadership structures remains minimal. This imbalance reflects deeply entrenched social barriers. The first barrier is the so-called *glass ceiling*, which prevents women's advancement due to informal decision-making networks and the preferential selection of male candidates. The second barrier is related to gender roles, whereby women are still predominantly perceived as primary caregivers and managers of household responsibilities, limiting their professional engagement. The third barrier is the lack of institutional support, including flexible working arrangements, childcare services, and an equitable

distribution of parental responsibilities, all of which further complicate women's position in the labor market. The fourth factor consists of persistent gender stereotypes portraying women as emotional, indecisive, and insufficiently assertive for leadership roles. (Bank, 2023) These findings confirm that women's economic independence is not merely a matter of employment, but also of job quality, fair remuneration, and equal opportunities for career advancement. At the same time, women's underrepresentation in leadership positions reflects deeper patterns of social power and influence that continue to favor men.

In comparison with international frameworks, Eurostat data indicate that women in the European Union account for approximately 60% of university graduates but remain underrepresented in STEM fields. In Nordic countries, where education and equal opportunity policies are strategically developed, the highest rates of women's economic activity and the smallest gender pay gaps are recorded. These examples demonstrate that institutional support, affirmative measures, and systematic education are key factors in overcoming deeply rooted gender inequalities. The results of focus groups and interviews further confirm the persistence of a patriarchal culture in which women are expected to primarily fulfill family and domestic roles. Many participants reported experiencing a "double burden"—professional work combined with household responsibilities—which significantly limits their opportunities for career development. Although laws formally guarantee gender equality, informal discrimination continues to dominate in practice, particularly with regard to career advancement and working conditions after maternity leave. An analysis of existing mechanisms supporting women's entrepreneurship and employment indicates that these mechanisms are insufficiently developed and poorly accessible. Women are often inadequately informed about subsidy programs, while procedures are complex and inadequately promoted. Individual success stories are largely the result of personal initiative and local support networks rather than systemic policy measures.

Nevertheless, the study also identifies a strong transformative potential of women's economic independence. Women who have secured stable incomes, started their own businesses, or obtained employment in highly qualified sectors exhibit higher levels of self-confidence, social engagement, and readiness to initiate change within their communities. Their economic autonomy positively affects the quality of life of their children, families, and the broader social environment. These findings confirm that women's economic empowerment has a multilayered impact: it is not merely an individual act of emancipation, but a crucial mechanism for dismantling unequal social structures and building a more just system in which women are equal agents of development.

CONCLUSION

The initial hypothesis of this study posited that women's economic independence represents one of the key factors in achieving social equality. Based on the analysis of quantitative and qualitative data, this hypothesis has been confirmed. Empirical findings unequivocally indicate that women who possess stable sources of income, formal employment, higher levels of education, and a certain degree of institutional support demonstrate greater autonomy in decision-making and more active participation in social processes. Despite positive trends reflected in increased interest in education

and entrepreneurship, the results reveal persistent and systematic gender inequalities in the economic status of women in the Republic of Srpska. The theoretical contribution of this study lies in the identification and analysis of the multilayered factors that determine women's economic independence. Its practical relevance is reflected in its potential to inform policymakers and contribute to the development of gender-sensitive public measures aimed at overcoming economic inequalities. Research limitations, particularly those related to sample size and limited access to certain data, point to the need for further studies employing more diverse methodologies and broader empirical coverage. Finally, women's economic independence cannot be viewed in isolation, but rather as the result of the interaction between individual capacities and structural conditions. Comprehensive policies integrating education, labor markets, social protection, and gender equality are necessary to create a social environment that fosters a fair distribution of power, resources, and opportunities.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

THE IMPACT OF AI-DRIVEN PERSONALIZATION ON CONSUMER BEHAVIORAL INTENTION AND SATISFACTION IN DIGITAL ADVERTISING

Dragana Nikolić Ristić | Assistant Professor, Metropolitan University, Belgrade, Serbia, Metropolitan University, Belgrade, Republic of Serbia, dragana.nikolic@metropolitan.ac.rs; ORCID: 0000-0003-0066-8644

Tatjana Mamula Nikolić | Full Professor, Belgrade Banking Academy, Faculty of Banking, Insurance and Finance, Belgrade, Serbia, Belgrade, Republic of Serbia, tatjana.mamula@bba.edu.rs; ORCID ID: 0000-0002-1217-8303

Mirjana Milovanović | Associate Professor, Higher Education Institution Banja Luka College, Banja Luka, Banja Luka, Bosnia and Herzegovina, mirjana.milovanovic@blc.edu.ba; ORCID ID: 0000-0003-3746-5517

Abstract: *The contemporary marketing environment, shaped by dynamic technological development, positions artificial intelligence (AI) as one of the key factors transforming communication between companies and their consumers. As an integral component of digital marketing strategies, artificial intelligence enables the identification of target consumer segments, automated content creation, and personalized real-time communication. The aim of this paper is to analyze the impact of AI-driven personalization in digital marketing on consumer satisfaction through the framework of the extended Theory of Planned Behavior (TPB). The empirical part of the study examines the relationships between TPB variables - attitudes, subjective norms, perceived behavioral control and consumer satisfaction as an additional variable, within the context of AI personalization in digital advertising. The research is based on data collected from 205 respondents from Serbia and Bosnia and Herzegovina, with the analysis conducted on the full sample. The results indicate that respondents' attitudes, subjective norms, and perceived behavioral control regarding AI personalization have a statistically significant positive effect on both behavioral intention and consumer satisfaction. Furthermore, consumer satisfaction has a positive effect on behavioral intention, while education does not have a statistically significant impact on either behavioral intention or consumer satisfaction in digital advertising. The findings contribute to a better understanding of how the integration of AI-driven personalization and digital marketing influences consumer perceptions and loyalty.*

Keywords: *consumer satisfaction, digital marketing, artificial intelligence, personalization, theory of planned behavior*

JEL classification: *O33, Z11, M31, D83, L86*

INTRODUCTION

The era of digital transformation has motivated companies to adopt artificial intelligence (AI) based platforms in their operations to stimulate consumer behavior in online purchasing. The key to a company's success in the new digital environment is undoubtedly an understanding of consumer intentions within an ecosystem that employs AI tools. In addition to placing the consumer at the center of attention, contemporary marketing increasingly emphasizes the creation of personalized content tailored to users' individual interests (Milovanović, Miljanović, & Novaković, 2022). In the process of evaluating the application of AI tools in the digital environment and their impact on consumer behavior and marketing communications, brands must continuously adapt to the emerging conditions of a dynamic and evolving ecosystem (Mamula Nikolić, 2021). Brand promotion, persuading consumers to use a product or service, and influencing purchase intention represent some of the core objectives of a marketing campaign (Mamula Nikolić, Popović-Pantić, & Perčić, 2023). A 2024 McKinsey Global survey on the adoption of generative artificial intelligence revealed that, despite high employee enthusiasm and the fact that nine out of ten employees use AI in their work, only 21% of respondents are intensive users, while the formal adoption of AI tools remains lagging in most organizations. Practice indicates that we are living in an era marked by the emergence of AI natives (Mamula, Popović Pantić, & Muller, 2020) (Mamula Nikolić, Perčić, & Nećak, 2022), who are predominantly younger employees that use generative AI tools in their everyday work (e.g., for email writing, coding, and data analysis, as well as customer support teams employing AI chatbots to generate responses). The use of AI tools often results in a substantial increase in employee efficiency and productivity. However, some managers express concerns regarding security, governance, or the initial costs of the technology, while others focus on analyzing, refining, and facilitating the broader adoption of these tools (McKinsey, 2024). The application of the Theory of Planned Behavior has demonstrated strong predictive validity in explaining individual behavior across various fields, including psychology, marketing, and public relations. For this reason, the Theory of Planned Behavior is employed in this study to explain consumer behavior in the context of AI-driven personalization in digital marketing.

LITERATURE REVIEW

The Role of AI in Marketing

The adoption of AI tools by companies is motivated by the opportunity to provide consumers with highly personalized and optimized services (Wang, Wang, H., Li, Dai, Gu & Yu, 2024) (Reinartz, Wiegand, & Imschloss, 2019). Jiang, Sun, Fu, and Lv (2024) emphasize that the rapid development of artificial intelligence (AI) technology is one of the key factors influencing various aspects of human life, opening numerous opportunities for research in the field of human-AI interaction, and identifying four main research themes: human-AI collaboration, competition, conflict, and symbiosis. One of the advantages of AI lies in its consumer-centered orientation, as it enables well-informed purchase decision-making (Bhagat, Chauhan, & Bhagat, 2023) (Yoo, Lee, & Park, 2010). The results of multiple studies indicate that consumers experience a higher level of security and perceive lower risk in the online purchasing process when using websites that integrate AI (Arachchi & Samarasinghe, 2024) (Haenlein, Kaplan,

Tan, & Zhang, 2019) while the broad potential for AI application has contributed to its widespread adoption (Shankar, 2018). The automation of data analysis, content creation, and advertising optimization through AI tools enables increased efficiency and faster decision-making within marketing departments. Kotler, Kartajaya, and Setiawan (2023) emphasize that one of the key aspects of AI application in marketing is its continuous ability to acquire new knowledge and adapt to consumer and market behaviors. Sipos (2025) highlights that the use of AI tools allows consumers to gain virtual experiences from the comfort of their own homes, supporting informed decision-making prior to final purchase. The findings of Bhagat, Chauhan, and Bhagat (2023) show that consumers report higher satisfaction with online purchases from retailers that employ AI tools. Trust and consumer awareness play a crucial role in the online environment; accordingly, companies' adoption of AI platforms and tools has significantly influenced increased consumer trust and purchase intention (Bhagat, Chauhan, & Bhagat, 2023). The importance of emotions in digital campaigns was emphasized by Damasio (1994), who confirmed that emotions play a crucial role in the decision-making process (Novaković et al., 2020). The use of generative AI offers numerous opportunities for brands to enhance personalization strategies, improve the effectiveness of marketing campaigns, and achieve deeper connections with consumers. Augmented reality (AR) and virtual reality (VR) open new possibilities for creating emotionally engaging experiences. In this context, Zeng, Wang, and Zhou (2023) confirm that augmented and virtual reality have a strong impact on consumers' emotional brand experiences. In addition to content generation and the provision of personalized product recommendations and educational tutorials, artificial intelligence has enhanced the customer experience and increased consumer engagement (Mirosavljević & Milovanović, 2022). The findings of Ruiz, Calderón, Venecia, Santodomingo, and Forero (2025) point to emerging trends in marketing and advertising personalization, including e-commerce, chatbots, big data, and augmented reality. AI-based personalization strategies deliver highly relevant content to consumers, increase engagement and conversion rates, and improve the productivity and efficiency of marketing ecosystems. The use of chatbots and virtual assistants has enabled continuous interaction with consumers (Mirosavljević & Milovanović, 2022) (Milovanović & Novaković, 2025a). Furthermore, the integration of AI with augmented reality (AR) and virtual reality (VR) is transforming the way brands communicate and interact with consumers, laying the foundation for a new era of digital marketing grounded in artificial intelligence, intelligent automation, and real-time personalization (Milovanović & Novaković, 2025b). Consumer interaction with AI tools (chatbots and virtual assistants) that provide personalized product and service recommendations, information, and support during online shopping significantly enhances the customer experience (Perić, Milovanović, & Čudić, 2025). Message relevance is increased through targeted advertising algorithms, while brand visibility is enhanced by adapting search-related content through advertising. By conducting detailed analyses of consumer activities and behavior, AI enables the development of advanced loyalty programs and the effective management of customer relationships (CRM). In addition, considerable attention is devoted to strengthening emotional connections with consumers through the use of AI tools to understand user attitudes, monitor the emotional impact of campaigns, and adapt messages based on these insights to activate emotional triggers (Perić, Milovanović, & Čudić, 2025). The

use of AI in digital campaigns aims to adjust AI responses in a way that consumers perceive interactions as more "human-like" and feel that brands understand their needs. To achieve this, brands have access to several technologies, including affective computing (systems capable of detecting and interpreting emotions), natural language processing (NLP) (identifying whether a message is positive, negative, ironic, etc.), computer vision (analysis of facial expressions, body posture, and micro-movements), and speech emotion recognition (identifying emotions from voice signals). Emotional consumer engagement is particularly important as it increases trust and loyalty. From a customer experience perspective, emotional connection is often more influential than rational benefits, as it reduces user frustration (e.g., when AI detects frustration, it can adjust its tone and offer support before the user disengages) and personalizes the experience by adapting communication styles to users' emotional preferences. However, several risks and dilemmas emerge, particularly those related to authenticity (AI does not experience genuine emotions, raising questions about whether "empathy" is sincere or merely simulated), privacy (ethical concerns and personal data protection), and manipulation (if AI detects vulnerability, it may be used to exert emotional pressure in marketing or political contexts) (Luttrell & Teeny, 2025). In this context, the development of critical thinking and the transparent articulation of viewpoints become increasingly important. Christian Rebernik emphasizes that critical thinking is based on the application of five specific skills (Figure 1): information analysis, evaluation of information sources, inference (drawing conclusions based on verified information), self-regulation (examining one's own reasoning processes), and explanation (the transparent presentation of one's standpoint).

Figure 1. Critical thinking skills

Source: Authors' illustration based on: Christian Rebernik, https://www.linkedin.com/posts/crebernik_most-people-think-critical-thinking-means-activity-7360626126089527297-olvb/

Although AI has transformed marketing strategies through content automation, personalization, and emotional targeting, AI tools lack contextual sensitivity and emotional depth, which underscores the fundamental need to establish balance in AI development and to use AI as a complement rather than a replacement for core human attributes (Perić, Milovanović, & Čudić, 2025).

The role of influencers in the digital environment

In the era of digital transformation, the integration and interconnection of digital technologies, artificial intelligence, digital advertising, and influencers are indisputable. As an integral component of digital marketing strategies, influencers play a key role in shaping consumer behavior. AI tools significantly contribute to enhancing

influencer effectiveness by enabling personalized content creation (Kralj & Mamula Nikolić, 2024). The impact of artificial intelligence is further reflected in the increasing use of AI tools by brands, both in selecting individuals for influencer campaigns and in monitoring campaign performance (Liu, 2021). By employing advanced digital AI technologies and tools, influencers create authentic content and establish stronger connections with their audiences, thereby influencing purchase decision-making. Venciute, Mackeviciene, Kuslys, and Correia (2023) conclude that content generated by influencers on social media has a significant impact on consumer behavior, noting that 70% of teenage YouTube followers trust influencers' opinions more than those of traditional celebrities, while 40% of millennials report feeling better understood by their favorite YouTube influencer than by their friends. Based on an analysis of 52 scientific articles, Munaro, Barcelos, and Maffezzolli (2024) confirm the influence of influencers on followers' attitudes, sustainable behavior, and purchase intention through factors such as credibility, perceived expertise, environmental orientation, and the type of message appeal. A new trend within the influencer ecosystem is the emergence of AI-generated virtual influencers, which offer several advantages, including the absence of aging, reduced risk of scandals that could harm brand reputation, and the ability to communicate in multiple languages (Kralj & Mamula Nikolić, 2024). Conversely, another emerging trend is "de-influencing," which aims to promote more transparent and authentic brand communication (Plazibat & Marunica, 2024).

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) consists of four main variables: attitude, subjective norms, perceived behavioral control, and purchase intention, and explains the causal relationships between different beliefs and behaviors. TPB posits that beliefs form the basis of the constructs of attitudes, subjective norms, and perceived behavioral control, which influence intention, while intention directly affects behavior (Roy, Arafin, & Ahmed, 2025) (Ajzen, 1991). In scholarly literature, TPB has been widely applied to predict and assess consumer preferences in online markets (Ajzen, 1991) (Hanaysha, 2022) (Rangsorn & Khan-Am, 2024). Attitude represents a key factor in consumer perception and can be described as a consumer's subjective evaluation of specific events or behaviors that directly influences behavior. Within the TPB framework, attitude refers to consumers' evaluations of behavior based on their underlying beliefs (Ajzen, 1991). A large body of research considers attitude to be a fundamental determinant of consumers' behavioral intentions (Ghufran & Ahmad, 2025) (Arachchi & Samarasinghe, 2024) and a crucial factor in decision-making processes (Fazio, Ledbetter, & Towles-Schwen, 2000). In this context, several studies have confirmed that, when AI platforms are used for online shopping, there is a significant relationship between consumer attitudes and purchase intention (Bhagat, Chauhan, & Bhagat, 2023) (Ghufran & Ahmad, 2025) (Patel, et al., 2023). Within TPB, subjective norms are defined as consumers' responses to social influences exerted by family, friends, and society, which affect purchase intention (Ajzen, 1991). In the context of online shopping and the use of AI-based platforms, empirical evidence indicates a significant association between subjective norms and consumers' purchase intentions (Ru, Kowang, Long, Fun, & Fei, 2021). Perceived behavioral control (PBC) can be explained as an individual's belief in their own ability to cope with and overcome a particular

challenge. According to TPB, PBC is defined as a consumer's subjective assessment of the ease or difficulty of performing a specific activity. In the purchasing context, PBC reflects an individual's perception of their capacity to control their behavior. In digital environments and online shopping contexts, PBC has been shown to exert a significant influence on consumers' purchase intentions (Rehman, Bhatti, Mohamed, & Ayoup, 2019). Intention is considered the strongest predictor of behavior, as it reflects an individual's readiness and decision to perform a behavior and serves as its direct antecedent. However, previous research (Fishbein & Ajzen, 1975) indicates that intention may also be influenced by various factors, including individual differences, variations in target characteristics, the nature of the planned behavior, and situational conditions under which the behavior occurs. Roy, Arafin and Ahmed (2025) examine the impact of motivational factors on university students' online purchase intentions by employing AI-based environments, the TPB, and the TAM, supplemented with two additional variables. The results indicate that attitude, subjective norms, perceived ease of use, perceived usefulness, self-efficacy, and perceived value are significantly correlated with undergraduate students' online purchase intentions on AI-based platforms. In contrast, perceived behavioral control is not significantly associated with purchase intention. Findings derived from artificial neural network (ANN) analysis further reveal that perceived ease of use exerts the strongest influence on students' online purchase intention (97.21%), while attitude (63.05%), subjective norms (50.58%), and perceived behavioral control (22.22%) rank as the three least influential predictors.

METHODOLOGY

Data were collected through an online questionnaire administered in Serbia and Bosnia and Herzegovina during the period from July to September 2025. The survey included items related to the core variables of the Theory of Planned Behavior (attitudes, subjective norms, perceived behavioral control, and behavioral intention), along with an additional variable measuring respondents' satisfaction with AI-driven personalization in digital marketing. All questionnaire items were measured using a five-point Likert scale, where 1 indicates "strongly disagree" and 5 indicates "strongly agree." The research model includes the TPB variables: attitudes (ATT), subjective norms (SN), perceived behavioral control (PBC), and behavioral intention (INT), as well as respondents' satisfaction (SAT), and is presented in Figure 2.

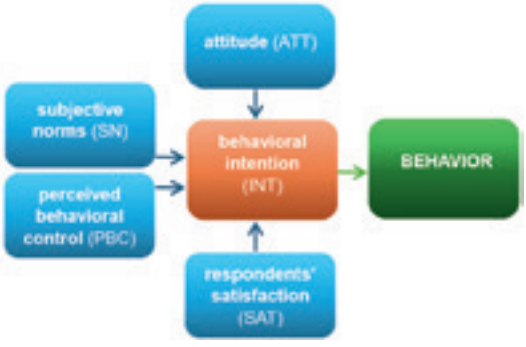

Figure 2. Research model
Source: Authors' illustration

The aim of this study is to analyze the impact of AI-driven personalization on consumer satisfaction in digital marketing by applying an extended Theory of Planned Behavior (TPB). Based on the research objective, the following hypotheses are proposed:

H_0: Consumer attitudes, subjective norms, perceived behavioral control, and consumer satisfaction do not have a statistically significant effect on behavioral intention in the context of AI-personalized digital advertising.

H1: Consumer attitudes, subjective norms, and perceived behavioral control toward AI-driven personalization have a positive effect on behavioral intention.

H2: Consumer satisfaction has a positive effect on behavioral intention in digital advertising.

H3: Consumer education has a positive effect on behavioral intention and respondent satisfaction in digital advertising.

The results of the study reflect consumers' perceptions in Serbia and Bosnia and Herzegovina regarding the use of AI tools in digital marketing content personalization and their influence on behavioral intention and respondent satisfaction.

RESULTS

The study was conducted in 2025 on a sample of 205 respondents (N = 205) from Serbia (n = 104) and Bosnia and Herzegovina (n = 101). Regarding the gender structure of the sample, 40.5% of respondents were male and 59.5% were female. In terms of educational attainment, 55 respondents reported having completed secondary education, 84 held undergraduate degrees, and 63 reported holding a master's or PhD degree. The majority of respondents were employed (73.2%), while 22% were students.To assess the internal consistency of the instrument based on the SERVQUAL model, Cronbach's alpha coefficients were calculated for each dimension. According to Nunnally and Bernstein (1994), a Cronbach's alpha value above 0.70 is considered acceptable for exploratory research, while values above 0.90 indicate excellent internal reliability. Cronbach's alpha values between 0.60 and 0.80 are acceptable in empirical research.

Due to low reliability of several attitude items (ATT3, ATT4, ATT5, and ATT6), the attitude construct (ATT) was reduced to two items. The results show that the Pearson correlation between the two items is r = .601, while the Spearman-Brown reliability coefficient is rSB = .751, indicating good reliability of the two-item scale. In addition, the Guttman split-half coefficient (.747) confirms a similar level of internal consistency. The item–total correlation is 0.601, which is considered satisfactory. These findings are consistent with Eisinga et al. (2013), who argue that the Spearman-Brown coefficient is the most appropriate reliability statistic for two-item scales. Bisby et al. (2022) similarly employed a two-item scale with both Cronbach's alpha and Spearman-Brown coefficients (Patient Health Questionnaire –2; $\alpha = 0.79$; Spearman-Brown = 0.79). With regard to perceived behavioral control, one item (PBC6) was removed during the measurement process, after which Cronbach's alpha reached a marginally acceptable value of 0.695, in line with the criteria proposed by Wim et al. (2008). The results presented in Table 1 demonstrate the internal consistency of the measured variables.

Table 1. Internal consistency of variables

Reliability Statistics	Cronbach's Alpha	N of Items
attitudes (ATT)	.747	2
subjective norms (SN)	.826	7
perceived behavioral control (PBC)	.695	5
intention (INT)	.878	7
satisfaction (SAT)	.900	7

Source: Authors' calculation

The testing of the hypothetical framework was conducted using regression analysis within the SPSS software package. In addition, ANOVA, independent-samples t-tests, and Pearson correlation analysis were employed.

To test the first hypothesis, which states that "consumer attitudes, subjective norms, and perceived behavioral control toward AI-driven personalization have a positive effect on behavioral intention in the context of AI-personalized digital advertising," a statistical regression analysis was performed.

Table 2. Respondents' attitudes toward AI personalization and behavioral intention

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.515[a]	.265	.262	.70729	.265	72.252	1	200	.000
ANOVA	Sum of Squares	df	Mean Square	F	Sig.			
Regression	36.145	1	36.145	72.252	.000[b]			
Residual	100.052	200	.500					
Total	136.198	201						

Source: Authors' calculation

The results of the regression analysis indicate a moderate positive relationship between respondents' attitudes toward AI personalization and their behavioral intention ($R = .515$). Based on the data presented in Table 2, the regression model is statistically significant, ($F(1, 200) = 72.25$, $p < .001$), indicating that respondents' attitudes have a significant effect on consumer intention. The model explains 26.5% of the variance in the dependent variable ($R^2 = .265$; Adjusted $R^2 = .262$), suggesting a moderate level of predictive power. Pearson correlation analysis further confirms a moderate, positive, and statistically significant relationship between attitudes and respondents' intention ($r = .515$, $p < .001$), indicating that higher levels of positive attitudes are associated with a greater intention to use AI-based services.

Table 3. Subjective norms toward AI personalization and respondents' behavioral intention

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.634[a]	.402	.399	.63982	.402	133.702	1	199	.000
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**			
Regression	54.733	1	54.733	133.702	.000[b]			
Residual	81.464	199	.409					
Total	136.198	200						

Source: Authors' calculation

The results of the regression analysis (R = .634) indicate a strong positive relationship between subjective norms and consumers' behavioral intention (Table 3). The F-test, ($F(1, 199) = 133.70$, $p < .001$, confirms that subjective norms have a statistically significant effect on behavioral intention. The coefficients of determination ($R^2 = .402$; Adjusted $R^2 = .399$) show that the model explains 40.2% of the variance in behavioral intention.

Pearson correlation analysis further reveals a strong, positive, and statistically significant relationship between subjective norms and respondents' intention ($r = .634$, $p < .001$). These findings suggest that higher levels of perceived social approval and expectations of significant others substantially influence respondents' intention to use AI-personalized services.

Table 4. Perceived behavioral control toward AI personalization and respondents' behavioral intention

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.277[a]	.077	.072	.79294	.077	16.615	1	200	.000
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**			
Regression	10.447	1	10.447	16.615	.000[b]			
Residual	125.751	200	.629					
Total	136.198	201						

Source: Authors' calculation

The results of the analysis indicate a weak but positive relationship between perceived behavioral control and consumers' behavioral intention (R = .277), suggesting that perceived behavioral control has a statistically significant, albeit weak, effect on behavioral intention ($F(1, 200) = 16.62$, $p < .001$) (Table 4). Although the model is statistically significant, it demonstrates limited predictive power, explaining only 7.7% of the variance in the dependent variable ($R^2 = .077$; Adjusted $R^2 = .072$).

According to Ozili (2023), in social science research, a coefficient of determination (R^2) ranging between 0.10 and 0.50 may be considered acceptable when predictors are statistically significant. The author argues that the primary objective of most social

science models is not to predict human behavior but to assess whether specific predictors exert a statistically significant influence on the dependent variable. However, very low coefficients of determination (R^2) between 0.00 and 0.09 are generally considered unacceptable in social science research and models yielding such results should be treated with caution or rejected (Ozili, 2023).

Although the coefficient of determination (R^2) in the present study is relatively low (e.g., $R^2 = .07$ for PBC), similar findings have been reported in previous research. In this context, Jonell et al. (2016) found that the level of concern was weak but statistically significant and positively associated with the recognition of eco-labels on seafood products ($R^2 = .06$, $p < .01$).

Pearson correlation analysis further indicates a weak but statistically significant positive relationship between perceived behavioral control and respondents' behavioral intention ($r = .277$, $p < .001$). Nevertheless, the influence of perceived behavioral control is considerably weaker compared to that of attitudes and subjective norms. Based on the obtained statistical results, Hypothesis H1 is supported.

The second hypothesis, which states that "consumer satisfaction has a positive effect on behavioral intention in digital advertising," was tested using regression analysis.

Table 5. Respondents' satisfaction and behavioral intention

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.712[a]	.506	.504	.58121	.506	204.133	1	199	.000
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**			
Regression	68.956	1	68.956	204.133	.000[b]			
Residual	67.222	199	.338					
Total	136.179	200						

Source: Authors' calculation

A strong positive relationship between satisfaction and behavioral intention ($R = .712$) indicates that higher levels of satisfaction increase the likelihood of respondents' positive behavioral intention. The results show that consumer satisfaction is a strong and statistically significant predictor of respondents' behavioral intention ($F(1, 199) = 204.133$, $p < .001$). The linear regression model explains 50.6% of the variance in behavioral intention ($R^2 = .506$). The findings confirm Hypothesis H2 (Table 5). In addition to examining the effects of TPB variables on behavioral intention, the study also analyzed the influence of TPB variables on respondents' satisfaction. The results of the regression analysis indicate a strong positive relationship between respondents' attitudes toward AI-driven personalization and satisfaction ($R = .667$). The model explains 44.4% of the variance in the dependent variable ($R^2 = .444$; Adjusted $R^2 = .442$), indicating high predictive power of the attitude construct. The F-test ($F(1, 202) = 161.55$, $p < .001$) confirms that respondents' attitudes have a statistically significant effect on consumer satisfaction. With respect to subjective norms, the results show a moderate positive relationship between subjective norms (SN) and consumer

satisfaction (R = .590), with the model explaining 34.8% of the variance in the dependent variable (R^2 = .348; Adjusted R^2 = .345). The F-test (F(1, 201) = 107.41, p < .001) confirms that subjective norms exert a statistically significant influence on consumer satisfaction. Perceived behavioral control (PBC) exhibits a weak but statistically significant effect on respondents' satisfaction (R = .284, R^2 = .081, p < .001), as confirmed by the F-test (F(1, 202) = 17.77, p < .001).

To test the third hypothesis, which states that "consumer education has a positive effect on behavioral intention and respondent satisfaction in digital advertising," a one-way ANOVA was conducted.

Table 6. Respondents' level of education and behavioral intention

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.915	2	1.457	2.176	.116
Within Groups	133.283	199	.670		
Total	136.198	201			

Source: Authors' calculation

The results of the one-way ANOVA indicate that respondents' level of education does not have a statistically significant effect on behavioral intention (F(2, 199) = 2.176, p = .116). These findings suggest that there are no statistically significant differences in behavioral intention among respondents with different levels of education (Table 6). With regard to satisfaction, the ANOVA results show that respondents' education levels do not exert a statistically significant effect on their satisfaction (F(3, 199) = 0.645, p = .587). The Tukey HSD post hoc test (p > .05) further confirms that education is not a factor that significantly alters respondents' satisfaction perceptions. The results of the statistical analysis indicate that Hypothesis H3 is not supported, suggesting that other factors may exert a stronger influence. In response to the question regarding the frequency of use of AI-personalized services, 50.2% of respondents reported using such services daily, 27.3% weekly, 18.0% rarely, and only 4.4% never (Figure 3). ANOVA results further indicate that the frequency of respondents' use of

Figure 3. Frequency of use of AI-personalized services

Source: Authors' calculation

AI services does not have a statistically significant effect on behavioral intention ($F(3, 198) = 0.293$, $p = .830$).

Regarding technical competence in using AI tools, the largest proportion of respondents (37.1%) reported having basic skills (using simple AI tools with guidance), while 34.1% indicated good competence (independently using several different AI tools). A total of 19.5% of respondents reported very good competence (proficient in using advanced AI tools), whereas 9.3% reported having very limited or no competence. These results are presented in Figure 4. The results of the ANOVA analysis indicate that respondents' technical competence in using AI tools does not have a statistically significant effect on behavioral intention related to the use of AI services ($F(4, 197) = 1.383$, $p = .241$).

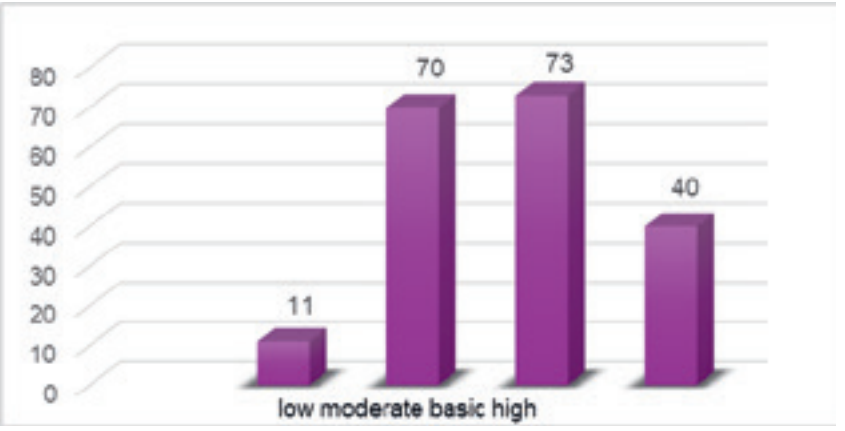

Figure 4. Respondents' technical competence in using AI tools

Source: Authors' calculation

In response to the question regarding negative experiences with AI recommendations, 48 respondents reported having such experiences, while 154 respondents reported no negative experiences. Levene's test confirmed the homogeneity of variances between respondents who reported negative experiences and those who did not ($F = 1.186$, $p = .277$). The results of the independent-samples t-test ($t = 0.312$, $df = 200$, $p = .755$) indicate that there is no statistically significant difference in behavioral intention between respondents who have experienced negative AI recommendations and those who have not. Furthermore, the findings confirm that respondents' experience with AI recommendations does not have a statistically significant effect on satisfaction ($t(202) = 0.064$, $p = .949$).

When considering respondents' country of residence, the independent-samples t-test reveals a statistically significant difference in satisfaction between respondents from Serbia and Bosnia and Herzegovina ($t(202) = 2.404$, $p = .017$). Respondents from Serbia report a higher mean level of satisfaction ($M = 3.35$, $SD = 0.81$) compared to respondents from Bosnia and Herzegovina ($M = 3.07$, $SD = 0.82$).

DISCUSSION

The results of the study indicate that AI-driven personalization in digital advertising has a significant impact on the formation of consumer intentions and satisfaction, thereby confirming the applicability of the extended Theory of Planned Behavior (TPB) in a digital environment. The findings demonstrate that positive consumer attitudes toward AI personalization enhance both behavioral intention and satisfaction, which is consistent with prior research. This implies that brands should offer transparent and value-adding AI solutions that facilitate information search and decision-making processes. Subjective norms also play a significant role in shaping behavioral intentions, as consumers increasingly rely on recommendations from influencers, online communities, and trends on social media platforms. The positive effect of consumer attitudes toward AI-driven personalization on both behavioral intention and satisfaction was confirmed. This finding is consistent with the results reported by Bhagat, Chauhan, and Bhagat (2023) and Ghufran and Ahmad (2025), who indicate that users who perceive AI as a useful, relevant, and trustworthy technology exhibit a greater propensity to purchase. In the context of digital marketing, positive attitudes are primarily formed when personalized content aligns with individual needs and reduces effort in the information search and decision-making process. From a practical perspective, this implies that brands should invest in transparent, intuitive, and non-intrusive AI solutions that deliver genuine value to consumers rather than mere automation devoid of substantive benefits.

A statistically significant relationship between subjective norms and behavioral intention was also confirmed, suggesting that social pressures, the opinions of relevant stakeholders, and prevailing trends influence how consumers accept AI-driven personalization. This effect is particularly pronounced in digital environments, where consumers increasingly rely on influencer recommendations, community feedback, and content disseminated through social media platforms. This finding is consistent with the studies of Ru et al. (2021) and Munaro, Barcelos, and Maffezzolli (2024), which emphasize that the digital social environment shapes norms and influences perceptions of the legitimacy of specific technologies and practices (Homayoun et al., 2024).

Perceived behavioral control (PBC) exerts a strong effect on consumers' readiness to adopt AI-driven personalization. When users feel a sense of control over their data and over how AI systems operate, their trust increases, as does their willingness to use such technologies. Consumer satisfaction has also emerged as an important additional predictor of behavioral intention, as it reflects the extent to which AI successfully recognizes consumer needs and contributes to a positive user experience. At the same time, the level of education does not exert a significant influence on either intention or satisfaction, suggesting that AI-driven personalization has become widely accepted and intuitive to use.

The findings further demonstrate that perceived behavioral control (PBC) has a significant effect on consumers' intention to adopt AI-driven personalization. This result is particularly important, as it indicates that consumers feel more secure when they believe they can manage their interactions with artificial intelligence, whether through control over personal data, the ability to choose the level of personalization, or transparent explanations of algorithmic processes. In line with Ajzen (1991), a higher sense of personal capability and control increases the likelihood that individuals will

engage in the intended behavior. This provides an additional argument for companies to design user experiences and communication strategies that strengthen consumers' sense of autonomy. Moreover, the results show that respondent satisfaction is a significant predictor of behavioral intention, confirming its importance as an additional variable that extends the original TPB model. High satisfaction with personalization indicates that AI effectively identifies and addresses consumer needs by delivering relevant recommendations, reducing cognitive effort, and enhancing the positive emotional experience of interacting with a brand. These findings align with prior research emphasizing the central role of emotions and user experience in decision-making processes (Damasio, 1994) (Zeng, Wang, & Zhou, 2023).

The finding that education does not have a statistically significant effect on behavioral intention or consumer satisfaction may indicate that AI-driven personalization is perceived as intuitive and easy to use, regardless of educational level. This suggests that the application of AI tools in digital marketing has surpassed the "technological barrier" and become accessible to a broader population. Such a result may be attributed to the increasing presence of generative AI tools in everyday life, the emergence of AI natives, and the normalization of AI assistant usage in online environments. Overall, the findings indicate that AI-driven personalization can substantially contribute to consumer loyalty, but only if it is implemented in a balanced manner and in accordance with ethical standards, privacy protection, and transparency. The integration of technological sophistication with human values such as empathy, trust, and clarity of communication represents a key foundation for building long-term relationships between brands and consumers.

CONCLUSION

The conducted research confirms that the integration of innovation and technology with emotional branding is crucial for building competitiveness. Technologies such as artificial intelligence, AR/VR solutions, and advanced analytical models enable brands to personalize experiences, accelerate production cycles, and create stronger emotional connections with consumers. These findings are consistent with contemporary perspectives in the fields of branding, consumer behavior, and digital transformation. Nevertheless, authenticity, transparency, and a consistent brand identity remain essential prerequisites for sustaining long-term brand value.

In this context, the research results clearly demonstrate that the successful implementation of AI-driven personalization requires a balance between technological innovation and the preservation of ethical principles, particularly regarding data privacy and consumer trust. This confirms that the future development of emotional branding in digital environments will depend not only on advanced algorithms, but also on brands' ability to create meaningful, responsible, and value-aligned consumer experiences.

Research limitations should be acknowledged. Although the sample size was sufficient for basic statistical analyses, the geographical limitation to two countries and the use of a non-probabilistic sampling method (online survey) restrict the broader generalizability of the findings. Future studies may address these limitations by including larger and more representative samples.

Recommendations for future research include longitudinal analyses and the ex-

amination of immersive technologies, such as the long-term effects of AR/VR technologies on consumer loyalty, particularly among digital generations. Further research should also investigate whether algorithmically generated content influences brand creative identity and consumers' emotional attachment, as well as analyze the extent to which AI-based personalization affects consumer trust and perceived risk.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

ECONOMIC AND DEMOGRAPHIC IMPACTS ON THE PENSION INSURANCE SYSTEM IN THE REPUBLIC OF CROATIA - PROJECTIONS OF THE SUSTAINABILITY OF THE SYSTEM

Maja Vretenar Cobović | Assistant Professor, University of Slavonski Brod, Department of Social Sciences and Humanities/Section of Economics, Slavonski Brod, Croatia, mvcobovic@unisb.hr; ORCID ID: 0000-0002-7225-147X

Abstract: *The pension system in the Republic of Croatia, whose stability directly depends on economic and demographic trends, faces long-standing challenges. The first forms of pension insurance in Croatia were based on informal forms of the so-called old-age insurance, while formal forms developed in the 19th century. After the crisis of the socialist period and the acquisition of independence, Croatia implemented a comprehensive pension reform in two phases. In the first phase, which began in 1999, the aim was to rationalize the existing intergenerational solidarity pension system and make it sustainable. After the first, in 2002, a second pension insurance reform was implemented, which constructed the second and third pension pillars and established capitalized pension savings.*

Despite the reforms implemented, the system still faces significant difficulties in its efficient functioning. This paper focuses on the development and analysis of scenarios for the development of the Croatian pension insurance system from 2021 to 2051, using available projections of demographic, administrative and economic indicators. The aim is to identify key variables important for the sustainability of the system, to identify advantages and disadvantages in its development and to propose specific measures and activities for further development of the system. The above recommendations aim to improve the economic and social effects of pension insurance and ensure its long-term sustainability. Various scientific methods were applied in the research, including analysis, comparison, induction, deduction, description and classification, as well as statistical and mathematical methods for detailed analysis of variables.

Keywords: *pension system, demographic and economic indicators, sustainability of the pension system, future development scenario, Republic of Croatia*

JEL classification: *H55, J11, J26*

INTRODUCTION

The pension system is an essential element of social security for every individual and society. According to (Puljiz, 2005) it represents „a set of legal norms, financial and institutional arrangements that regulate insurance against the risks of old age and disability." Therefore, its primary function is to ensure the financial and social security of an individual after the end of his working life or in the event of disability.

The way the pension system is financed directly affects the standard of living of pensioners and their financial and social security. Therefore, the level of rights that can be achieved in pension insurance directly depends on the sources of funds and financing possibilities. Since the pension system provides for the most significant social risks that can happen to everyone, the importance of its stability is of great importance for the population of a particular country (Vretenar Cobović & Cobović, 2016). In addition, this system is necessary for the balanced functioning of the entire society and the maintenance of social cohesion, i.e. the connection of individuals and groups within the social whole.

EVOLUTION AND IMPORTANCE OF PENSION SYSTEMS: A COMPREHENSIVE LITERATURE REVIEW

The beginnings of pension insurance in Croatia were based on informal forms of old-age insurance, whose carriers were agricultural household cooperatives. These cooperatives, the foundations of which were laid with the establishment of the Posavina Krajina in Slavonia in 1702, represented the first steps towards organized care for the elderly (Puljiz, 2008).

The government at the time allocated land to cooperatives with the obligation to perform military service. The influence of agriculture within these cooperatives was significant, and its basic function was the production of plant and livestock products to meet the nutritional needs of cooperative members, as well as daily financial assistance based on the income generated from sales.

The development of formal pension systems in our region became visible during the 19th century, primarily through pensions intended for soldiers and civil servants, and through the establishment of brotherhood funds. The legal regulation of the system followed in 1922 in Yugoslavia, with the adoption of the Workers' Insurance Act, which regulated workers' pension insurance (Puljiz, 2008). After World War II, other forms of social insurance were systematically introduced, with the gradual decentralization of the pension system. However, the crisis of the pension system, already present at the end of the socialist period, further deepened after Croatia gained independence and during the Homeland War. This situation prompted the necessity of reform, which began in the late 1990s and was completed in 2002.

Since the pension system reform implies partly replacing the intergenerational solidarity system with a funded system, it is important to determine under what circumstances a funded system brings a positive difference compared to the existing intergenerational system. Numerous authors critically analyze different models, highlighting their advantages and disadvantages.

(Jonhson, Conrad, & Thomson, 1989) emphasize that the goods and services consumed by retirees always come from the current production of the currently employed population, regardless of whether pensions are financed from taxes or indi-

vidual savings. (Brittan, 1996) complements this idea by arguing that workers pay taxes and contributions precisely to pay pensions and that all pensions are provided from current national income. (Blake, 1996) goes a step further, considering that all pension systems, whether funded or not, are inherently intergenerational, since each new generation works for the previous one. (Bohn, 2001) emphasizes the importance of distributing overall risks between the working population and retirees when designing pension reform. He believes that optimal pension policy should strive for a more even distribution of financial risks between generations. (Barr, 2002) emphasizes the key difference between risk and uncertainty in the pension system. While risk can be quantified, uncertainty, such as macroeconomic shocks, demographic changes or political instability, is not measurable. It also identifies three specific risks (management, investment and market risk) that threaten the stability of the system.

(Barr & Rutkowski, 2005) state the key prerequisites for the successful introduction of a mandatory funded system: a sufficiently developed financial market, adequate public and private administrative capacities with effective supervision, and the existence of a strategy for fiscally sustainable transition costs. (Jackson, 2009) highlight the macroeconomic advantages of a funded system, such as reducing the long-term fiscal burden of an aging population and encouraging adequate levels of savings and investment for the future.

On the other hand, (Diaz-Gimenez & Diaz-Saavedra, 2024) discuss the failure to adapt to long-term demographic trends as a key cause of the unsustainability of pensions in Europe, and analyze the financial and political costs of pension reforms. (Quinby & Wettstein, 2024) explore the possibilities for older workers to remain in the labor market for as long as possible, which is crucial for addressing the demographic challenges of pension systems. (Grujić & Vretenar Cobović, 2024) explore pension systems and individual fluctuations within the system with an emphasis on the pension system of Bosnia and Herzegovina. (Caloia, Mastrogiacomo, & Simonetti, 2025) deal with the interaction between household savings and shocks affecting the second pension pillar, which is important for understanding overall financial security.

Finally, (Kune, 2006) raises a fundamental question about viewing pension systems as mechanisms for transferring resources. Regardless of the model, the primary interest of both systems (intergenerational and funded) is how pension rights are secured, and only secondarily how they are financed.

However, due to the crisis of public pension systems, which are mainly based on intergenerational solidarity, Croatia has implemented significant reforms to adapt to the changed economic and social conditions. The causes of the crisis were multiple, and most often they were caused by the increased share of older people and the decline in the birth rate, which resulted in a generational imbalance. In addition to demographic changes, the crisis of the pension system in Croatia was also significantly influenced by increased unemployment and changes in the structure of work. This led to a reduced inflow of contributions from insured persons and a growing deficit in pension funds, which the state had to cover. Due to the difficult situation, in the mid-1990s, preparations for a pension reform began, in which the World Bank played a key role. It proposed a system that would transfer the burden of financing pensions to the insured, thereby reducing the pressure of pension funds on public finances (Puljiz, 2007).

The first phase of the pension reform began in early 1999. Its aim was to ratio-

nalize and ensure the sustainability of the existing intergenerational solidarity pension system. The so-called parametric pension reform was implemented, in accordance with the 1998 Pension Insurance Act, whereby Croatia sought to reduce pension costs and adjust them to economic opportunities. These changes quickly contributed to better financial sustainability of the system. However, despite positive trends, the parametric reform also resulted in a relative decline in pensions for retired insured persons after 1999, which required further reforms.

The second phase of the pension reform was implemented in 2002. It created the second and third pension pillars and established a system of defined contributions and capitalized pension savings. The goal of this phase was to increase domestic savings, strengthen the capital market and stimulate overall economic growth. This reform brought about a significant change in the structure of the pension system, the solutions of which are still applied today.

In accordance with the implemented reforms, the current pension system in Croatia is based on a mixed financing model, with several pension pillars. The first pillar is mandatory pension insurance based on intergenerational solidarity, and is financed by contributions from insured persons, which employers pay at a rate of 20% of the employee's gross salary. Pension insurance within the second pillar is mandatory for insured persons who are insured under the Pension Insurance Act, and the holders of this insurance are mandatory pension funds. The contribution rate paid into mandatory pension funds is 5% of the insured person's gross salary. Accordingly, insured persons who were younger than 40 years of age in 2002 and are insured in both pillars of pension insurance, allocate 15% of contributions for the first pillar and 5% of contributions for the second pillar of pension insurance. The third pillar is voluntary pension insurance based on individual capitalized savings, intended for those who want to additionally insure themselves against the risks of old age, disability and death.

Despite the reforms implemented, the current pension insurance system in Croatia continues to face significant difficulties that hinder its effective functioning. In line with previous research, the aim of this paper is to present a scenario for the development of pension insurance in Croatia in the period from 2021 to 2051, based on available projections of the development of demographic, administrative and economic indicators. Within the framework of the developed scenario, the trends of individual pension insurance variables important for the sustainability of the entire system will be analyzed.

RESEARCH METHODOLOGY

In accordance with the research subject and the set objectives, the work is based on the following research hypotheses:

H1 Growth in the employment rate and real gross wage positively correlates with improved fiscal sustainability of the pension system based on intergenerational solidarity in the Republic of Croatia, while positive real returns of pension funds significantly contribute to the financial sustainability of funded pension pillars

H2 Existing negative trends in key demographic and economic variables in the pension insurance system of the Republic of Croatia indicate the need for the implementation of additional reform measures and/or the development of alternative financing models in order to ensure the long-term sustainability and adequacy of pension rights.

When creating the future scenario for the development of pension insurance in Croatia, projections of demographic, administrative and economic trends prepared by competent international and domestic institutions (World Bank, Central Bureau of Statistics of the Republic of Croatia, Ministry of Finance of the Republic of Croatia, Croatian Chamber of Economy, etc.) were used. Projections of demographic trends are key for formulating macroeconomic policies of each country. They determine the current and future social and socio-economic development through the analysis of the number and composition of the population according to various demographic and economic characteristics. In Croatia, demographic aging (growth in the share of the population older than 65 years) has been the dominant demographic trend in recent decades. This trend will have an adverse effect on the future of the pension system, which is extremely dependent on demographic indicators.

Projections of the total population in Croatia are shown in Table 1.

Table 1: Population of Croatia by age group

Year	Population by age (in thousands)				Population by age (in %)			
	Total	0-14	15-64	65 and over	Total	0-14	15-64	65 and over
2021	3,871.8	552.5	2,450.1	869.2	100	14.27	63.28	22.45
2031	3,666.7	429.0	2,354.0	883.7	100	11.7	64.2	24.1
2041	3,477.8	369.1	2,167.8	940.9	100	10.6	62.3	27.1
2051	3,123.1	310.2	1,832.8	980.1	100	9.9	58.7	31.4

Source: Central Bureau of Statistics of the Republic of Croatia (https://dzs.gov.hr/), Eurostat (http://ec.europa.eu/eurostat)

The development of the pension system of the Republic of Croatia in the next 26 years will be significantly affected by the decrease in the total population, especially the decrease in the population aged 0 to 14 and 15 to 64, and the increase in the pensioner population, specifically the population aged 65 and over.

Within the framework of administrative projections, an important strategic document published by the European Commission in 2012 (White paper, An Agenda for Adequate, Safe and Sustainable Pension, 2012), which encourages EU member states to constantly increase the legal retirement age, is important. Based on this document, this age limit should be increased by five to seven years by 2060, due to the expected increase in human life expectancy.

Within the framework of economic developments, according to projections by the World Bank, the Ministry of Finance of the Republic of Croatia and the Croatian Chamber of Economy, a revival of economic activity is expected in the next twenty to thirty years, both in Europe and in Croatia. In the coming years, an annual real growth rate of gross wages of up to 3% is expected (World Bank (www.worldbank.org/en/country/croatia), (https://www.worldbank.org/en/country/croatia/overview), (chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://thedocs.worldbank.org/en/doc/d5f32ef28464d01f195827b7e020a3e8-0500022021/related/mpo-hrv.pdf); Croatian Chamber of Economy (https://www.hgk.hr/).

The real growth rate of gross wages will grow somewhat slower than the growth of gross domestic product, or productivity, and after a certain time, wage growth should move in line with GDP growth, whose annual real growth rate is also expected to range up to 3%. In addition, it is possible to expect real annual returns from mandatory pension funds of 3% to 4%, and real returns from voluntary pension funds of up to 1.5%, which will certainly have a positive effect on the overall level of pensions (Economic and Fiscal Policy Guidelines, 2021).

In order to present a scenario of the movement of the most important variables of the sustainability of the pension insurance system in Croatia from 2021 to 2051, it is necessary to define the starting assumptions. In accordance with the aforementioned projections, the demographic assumptions of the pension insurance development scenario are as follows:

1) The total population of Croatia in 2021 is 3,871,833 inhabitants. The population structure by age group is as follows (0 - 14 years 14.27%; 15 - 64 years 63.28%; 65 years and over 22.45%).

2) The total population of Croatia in 2051 is 3,123,155. The population structure by age group in 2051 is as follows (0 - 14 years 9.9%; 15 - 64 years 58.7%; 65 years and over 31.4%).

3) Life expectancy increases by two years every ten years within the observed period (White paper, An Agenda for Adequate, Safe and Sustainable Pension, 2012)

The administrative assumptions of the pension insurance development scenario are:

1) The retirement age will be increased to 72 years in 2051. In the period from 2021 to 2051, the retirement age will be increased by one year every 6 years.

2) All other pension regulations valid in 2021 apply until the end of the observed period.

The economic assumptions of the pension insurance development scenario are:

1) In the period from 2021 to 2051, the real growth rate of gross wages is 3% per year.

2) In the period from 2021 to 2051, real GDP growth is 3% per year.

3) The percentage of the employed population aged 15 to 64 (the share of employed persons in the working-age population) gradually increases from 41.33% in 2021 to 46.55% in 2031. From 2031, the percentage of the employed population gradually decreases to 42.94% in 2051, in line with economic trends forecasts (World Bank, Croatian Chamber of Commerce).

4) In the period from 2021 to 2031, the real return of mandatory pension funds is 3% per year, and after 2031, 4% per year, while the real annual return of voluntary pension funds in the period from 2021 to 2051 is 1.5%.

The following mathematical formulas were used to calculate pension insurance variables important for its sustainability:

Working age population = population aged 15-64 + working age population aged 65 and over (1)

The calculation of the working-age population is obtained by adding a certain percentage of the population aged 65 and over to the number of the population aged 15 to 64, because according to administrative assumptions, the age limit for retirement

increases by one year every 6 years in the period from 2021 to 2051. Based on this, the number of inhabitants aged 65 and over actually becomes the population aged 15 to 64 according to administrative assumptions, i.e. the working-age population.

Working age population = working age population x 0.61 (2)

The calculation of the working population was obtained based on the assumption that 61% of the working-age population is the working-age population. This percentage was accepted as an assumption based on the ratio of the working-age population to the working-age population in the period from 2010 to 2021. In this period, based on data from the Central Bureau of Statistics of the Republic of Croatia, the average share of the working-age population in relation to the working-age population was 61%.

Number of insured persons = working population x employment rate (3)

Number of pensioners = number of insured persons x (ratio of number of pensioners to insured persons based on previous years) x (% change in population growth of 65 and over compared to the previous year) x (% change in working-age population aged 65 and over conditioned by administrative assumption) (4)

Amount of monthly pension from the first pension pillar = (annual amount of contributions paid / number of pensioners) / 12 (5)

Amount of monthly pension from the 2nd pension pillar = (annual amount of contributions paid increased by the realized yield of MPFs / number of pensioners) / 12 (6)

Total annual payment in the first pillar = annual payment of pension contributions x total number of insured persons (7)

Pension fund assets = MPF assets of the previous year + total annual payment of pension contributions to the funds increased by the realized yield of MPFs – expenses for second-pillar pensions (8)

Pension insurance company assets = PIC assets of the previous year + expenses for second pillar pensions (9)

RESEARCH RESULTS AND DISCUSSION

As a result of the research, the following is a scenario of the movement of the most important variables of the sustainability of the pension insurance system in Croatia from 2021 to 2051.

Table 2 shows the working-age and active population, as well as the number of insured persons and pensioners calculated based on pre-set assumptions.

Table 2: Number of insured persons and pensioners (in thousands)

Year	Working age population	Working active population	Number of insured persons	Number of pensioners	Ratio insured persons / pensioners
2021	3,279	1,712	1,572	1,233	1.27
2031	2,996	1,695	1,591	1,379	**1.15**
2041	2,809	1,666	1,632	1,455	**1.12**
2051	2,895	1,729	1,532	1,322	**1.16**

Source: author's calculation

Unlike the number of working-age and active population (which will decline until 2041), the number of insured persons will gradually increase until 2041. After 2041, due to the retirement of people born before 1970 and the entry into the labor force of a smaller population aged 15 to 64, in accordance with demographic assumptions, the number of employees and the number of insured persons will decrease. It is assumed that the trend of decreasing the number of insured persons will continue after 2051, but with a lower intensity of the decrease. Similar trends are expected for the future number of pensioners in the Croatian pension system, in accordance with the assumptions of the pension insurance development scenario. After 2021, the number of pensioners will increase significantly due to the fulfillment of the conditions for old-age pension by the larger generations born in the 1950s and 1960s. This trend will continue until 2041, after which the number of new retirees will decrease, as fewer generations born in the 1970s will retire. It is assumed that the downward trend will continue after 2051.

Based on the above, it can be concluded that the number of pensioners will increase over the next twenty years, but at a lower intensity than in the previous period. Accordingly, if the economic trends assumed in the pension insurance development scenario are achieved in the coming period, the sustainability of the pension insurance system is not in question, although the ratio of insured persons to pensioners in the period from 2021 to 2041 will have downward trends despite the growth of economic activity. After 2051, this ratio will be somewhat more favorable.

Table 3 shows the future amount of monthly pension in both insurance pillars.

Table 3: Amount of monthly pension (in euros)

Year	Pension amount from the first pillar	Pension amount from the second pillar	Total
2021	395	91	486
2031	523	**165**	688
2041	711	**298**	1,009
2051	**667**	**432**	1,099

Source: author's calculation

For insured persons insured within both insurance pillars, pensions from the first part for each subsequent generation will depend less and less on the level of the insured person's salary, and solidarity and redistribution from insured persons with higher salaries to insured persons with lower salaries will be increasingly pronounced. According

to the calculation shown in the table, pensions from the first pillar will decrease after 2041, while in accordance with the projected growth in salaries and the growth in the real yield of pension funds, pensions from the second pillar will have a constant growth. Their growth intensity will not be great, but it is expected that pensions from the first and second pillars of insurance will be equalized by 2060, or more precisely, it is possible to expect higher pensions realized within the second pillar of insurance (capitalized savings) compared to pensions realized within the first pillar of insurance (intergenerational solidarity).

Table 4 shows the future amounts of total annual contributions paid within the three pillars of pension insurance.

Table 4: Amount of total annual contributions paid within the three pillars of pension insurance (in millions of euros)

Year	I pillar (total annual payment in million euros)	2nd pillar (total annual payment in million euros)	III pillar (total annual payment in million euros)
2021	3,352	993	84
2031	3,930	**1,320**	**119**
2041	4,876	**1,984**	**236**
2051	**3,606**	**2,372**	**261**

Source: author's calculation

Based on the defined demographic, administrative and economic assumptions within the pension insurance development scenario, and especially due to the increase in the employment rate and the growth of gross wages, it is possible to expect a trend of growth in the amount of total contributions paid into the second and third pillars of insurance, throughout the entire observed period. Although the intensity of this growth, as with the growth of pensions, is not great, growth can be expected after 2051.

Contributions paid into the first pillar of pension insurance will increase until 2041, after which they will record a downward trend due to the reduced number of insured persons. The downward trend in contributions paid into the first pillar of pension insurance will continue after 2051.

Table 5 shows the future value of the assets of mandatory pension funds and pension insurance company assets in the Republic of Croatia.

Table 5: Assets of mandatory pension funds and pension insurance companies (in millions of euros)

Year	Gross domestic product	Pension fund assets	Share in GDP (%)	Assets of pension insurance companies	Share in GDP (%)
2021	58,466	17,676	30.23	321	0.55
2031	99,534	**33,191**	33.35	**4,081**	4.10
2041	179,770	**47,348**	26.33	**12,191**	6.78
2051	324,685	**64,489**	19.86	**28,993**	8.93

Source: author's calculation

The assets of mandatory pension funds in Croatia will have a constant growth trend based on the increase in paid contributions, real wage increases and the expected real returns from investing the funds' assets. The value of the assets of mandatory pension funds will have a higher growth intensity until 2041, after which the growth rate of the assets of these funds will be lower, because an increasing number of second-pillar insured persons will exercise the right to a pension and their pension savings will be transferred from pension funds to pension insurance companies that will pay pensions. Accordingly, in the period after 2041, the assets of pension insurance companies will grow significantly.

Based on the presented scenario for the development of the pension insurance system in the Republic of Croatia in the period from 2021 to 2051, based on the set demographic, administrative and economic assumptions, it is possible to draw certain conclusions. The analyzed variables of the sustainability of the pension insurance system (future number of insured persons, number of retirees, amount of pension, pension contributions and assets of pension funds) show mainly positive trends within the capitalized second and third pillars of pension insurance, which makes it possible to expect the sustainability of this system within the observed period. By ranking these indicators, it is possible to see that the employment rate and the real gross wage rate significantly affect trends in this system, while the capitalized pension pillars are additionally affected by the real returns of pension funds. The employment rate and the growth of the real gross wage rate affect contributions in all three pillars of insurance, while the increase in the returns of mandatory pension funds also affects the assets of the funds themselves.

Based on the above, it is possible to confirm the research hypothesis H1, since the growth of the employment rate and real gross wage positively correlates with the improvement of the fiscal sustainability of the pension system based on intergenerational solidarity in the Republic of Croatia, while positive real returns of pension funds significantly contribute to the financial sustainability of funded pension pillars.

If the set demographic, administrative and economic assumptions are realized, the growth in the number of insured persons, the growth in the expected amount of paid contributions, the growth in pensions and the growth in pension fund assets within the second pillar of insurance will certainly result in the sustainability of capitalized savings and its greater impact on the entire system compared to the first pillar of pension insurance, which shows negative trends in certain researched variables. In addition, the expected increase in the number of insured persons and paid contributions within the third (voluntary pillar of insurance) will increase the long-term sustainability of this system and create additional security for future retirees. Accordingly, it is possible to confirm the second research hypothesis H2, because the existing negative trends in key demographic and economic variables in the pension insurance system of the Republic of Croatia indicate the need for the implementation of additional reform measures and/or the development of alternative financing models in order to ensure the long-term sustainability and adequacy of pension rights.

CONCLUSION

The stability and sustainability of the pension system represent one of the most serious socio-economic challenges facing the Republic of Croatia. The analysis of the

pension insurance development scenario for the period from 2021 to 2051, based on key demographic, administrative and economic indicators, reveals a complex picture with positive and negative trends in key variables. The most obvious and worrying finding is that adverse demographic trends will have a dominant impact on the future of the pension system. Even with the assumed growth in economic activity, the reduction in the working population after 2041 will lead to a decline in the number of insured persons. This will consequently result in lower contribution payments and, more importantly, lower pensions than expected, especially within the first pillar of mandatory pension insurance.

It is important to emphasize that there were certain methodological limitations in this research. The main challenge lay in the inconsistency and diversity of data on the number of pensioners, average pensions and contributions to the first and second pension pillars, available from various official sources such as the Croatian Pension Insurance Institute (CPII), the Central Register of Insured Persons (CRIP) and the Central Bureau of Statistics (CBS). This inconsistency significantly hindered precise calculations within the developed pension system scenario, highlighting the need for better coordination and standardization of data collection among relevant institutions.

In order to at least partially mitigate the negative trends identified in the presented scenario, it is necessary to upgrade the existing models and develop a new, comprehensive model of financing the pension system. Positive developments in variables within the second and third pillars of pension insurance, assuming economic growth, clearly indicate the need for further stimulation of these forms of savings. However, in addition to economic factors, it is crucial to take into account the influence of non-economic factors, primarily the attitudes and trust of stakeholders in the system. The insufficient presence of investments in voluntary pension funds in the Republic of Croatia is a clear indicator of the lack of trust and awareness, which requires more active measures to stimulate financial literacy and long-term savings.

The development of innovative savings models is crucial for additional collection of pension contributions, optimization of the amount and duration of pension fund payments, and ensuring successful management of pension fund assets. Ultimately, all this should lead to greater user trust in the entire pension system. These proposals represent a good basis for future research that can significantly contribute to the development of a more resilient and fairer pension system in the Republic of Croatia. The goal should be to create a model that enables greater fairness with regard to the invested funds in relation to the final realized pension amount after legally acquired retirement conditions, which also ensures a more balanced development of the entire society.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

OPTIMISATION OF RESTAURANT OPERATIONS THROUGH THE USE OF AI TECHNOLOGY: A CASE STUDY OF THE GASTROPOINT RESTAURANT

Sanja Dalton | Docent, Metropolitan University, Belgrade, Serbia, sanja.dalton@metropolitan.ac.rs; ORCID: 0009-0004-2163-232X

Abstract: *This paper analyses the potential for improving restaurant operations through the implementation of AI technology based on a case study of the restaurant Gastro Point. The purpose of this paper is to analyse the operations before and after the implementation of Artificial Intelligence (AI). Therefore, the aim is to prove that the application of AI enables business improvement through automation, data analysis, trend prediction, and enhancement of the customer experience. Both qualitative and quantitative methods were used to analyse key parameters. The data were collected by semi-structured interviews with the restaurant staff and a few restaurant guests. The research results show that the introduction of AI in the restaurant contributed to an increase in the average daily number of guests, the average order value, the number of regular customers, and the average rating on Google/Trip Advisor. The results also indicate that the implementation of AI contributed to a reduction in food waste, waiting time for orders, and the number of monthly customer complaints.*

Keywords: *artificial Intelligence (AI), hospitality industry automation, optimisation of restaurant operations*

JEL classification: *M00, Z3*

INTRODUCTION

In modern hospitality, the introduction of digital technologies has become a key component of successful business operations. Among them, AI stands out as one of the most powerful tools for enhancing customer experience, optimising business processes, and strengthening a restaurant's competitiveness (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013). Restaurants that have implemented AI technologies have seen significant progress in various aspects of their operations - from personalised service and faster response to customer needs, to more efficient inventory management and better staff organisation. By using AI systems to analyse consumer behaviour and monitor guest preferences, it is possible to create a unique, tailored experience for each visitor (Deloitte, 2005). The results speak for themselves: an increase in the number of regular customers,

higher customer satisfaction, and a greater likelihood of guests recommending the restaurant to others. Automated recommendation systems, chatbots for quick reservations, digital menus that adapt in real time, and intelligent analysis of customer feedback - these are all concrete ways AI contributes to better service and increased revenue. Implementing AI technology not only improves operational efficiency but also transforms the way a restaurant communicates with its guests, turning everyday visits into personalised and memorable experiences. At a time when competition in the hospitality industry is constantly increasing, restaurants are seeking innovative ways to improve service quality, optimise business processes, and build stronger relationships with guests. One of the most advanced approaches that is increasingly being adopted is the integration of AI into daily operations. In the specific case of the restaurant Gastro Point, there are hypotheses that the implementation of AI technology will bring as follows:

H_1 –faster and more accurate orders
H_2 – more efficient inventory and staff management
H_3 – a higher number of returning customer
H_4 – reduced wait time, and
H_5 – overall improvement in customer satisfaction.

LITERATURE OVERVIEW

Artificial Intelligence in Business

Technological innovations are a key driver of economic growth and competitive advantage, enabling organisations to respond more effectively to market changes and customer needs (Porter & Heppelmann, 2014). As a rapidly growing field in modern technology, AI is widely applied across various industries, including hospitality. According to (Brynjolfsson & McAfee, 2014), AI has launched a new industrial revolution that enables companies to automate and optimise many operations. The integration of AI allows for a shift from simple automation of routine tasks to more complex adaptive and cognitive automation of business processes (Dalsaniya & Patel, 2022). Hence, AI enables businesses to improve efficiency, accuracy in data analysis, forecasting, logistics, customer relationship management (CRM), and project management (Investopedia, 2023). AI in business process management represents a new class of information systems that enable more adaptive, proactive, and explainable business processes (Dumas, et al., 2022). In predictive business process management, AI enhances processes through predictive approaches (Abassi, et al., 2024). Also, according to some leading authors in this field, firms are using AI primarily to improve efficiency through automation, enhance decision-making, and provide better customer experiences (Davenport & Ronanki, 2018). The adoption of AI in business is influenced by technological readiness, organisational support, and perceived benefits (Chatterje, Rana, Dwivedi, & Baabdullah, 2021)

In their research, (Lemon & Verhoef, 2016) argue that AI enables hyper-personalisation, allowing companies to tailor experiences and interactions to individual customer preferences in real-time. Therefore, a successful service automation depends on balancing technical functionality with the user experience, supported by ongoing research and adaptation to customer needs (Wu, Sorokina, & Putra, 2023). This leads to statement that artificial intelligence empowers entrepreneurs to deliver highly personalised experiences by analysing guests' preferences and behaviours, ultimately

increasing customer satisfaction and loyalty (Ivanov & Webster, 2017). Automation through AI doesn't necessarily eliminate jobs, but it changes the nature of work and reallocates human efforts toward more strategic tasks (Bessen, 2019).

Application of AI in Hospitality

The future of AI in the hospitality industry is promising, especially with advancements in technologies such as service robots, automated payment systems, and AI-powered guest solutions. (Mihaila & Toma, 2021) state that it will become increasingly easy for restaurants to implement technology-based competitive strategies. AI technologies, such as service robots and smart assistants, help restaurants reduce operational costs while improving service speed and accuracy (Sorour, 2023). According to (Ivanov & Webster, 2017), technologies such as chatbots and predictive analytics for shift optimisation have already become standard in the industry. AI-powered chatbots and virtual assistants are improving customer service by offering instant 24/7 support and reducing response times (Columbus, 2020). Sentiment analysis and opinion mining powered by AI allow restaurant managers to monitor and improve service quality through real-time feedback interpretation (Meharaliyev, Chang Chu Chang, & Kirilenko, 2021). Machine learning models can predict customer needs and tailor recommendations, helping businesses upsell and cross-sell more effectively (Shah & Kumar, 2024). Some researchers have introduced a new classification of AI in hospitality, distinguishing between mechanical AI, thinking AI, sensing AI, and service AI (Pan & Fu,, 2024). These systems can significantly enhance operational efficiency in restaurants and improve guest satisfaction since AI enables personalised guest experiences by analysing past guest behaviour and preferences, significantly increasing customer satisfaction and loyalty. Besides, AI tools help reduce the load on overburdened teams and address efficiency challenges by taking over mundane, repetitive, and time-consuming tasks (Kumawat, Datta, Prentice, & Leung, 2025). Some authors explored how artificial intelligence impacts work in the hospitality industry. Based on their research, AI brings changes to internal operations, partner relations, organisational networking, and customer services. Their study highlights AI's great potential for personalisation, process optimisation, and customer relationship improvement (Bulchard-Gidumal, Secin, O"Connor, & Buhalis, 2023)

Digital transformation is no longer optional but essential for tourism and hospitality businesses (Gretzel, Koo, & Law, 2020). The integration of new technologies is transforming communication methods in hospitality and reshaping service offerings (Ivanov & Webster, 2017). Besides, technological innovation enables entrepreneurs in hospitality to increase efficiency, improve the customer experience, and become more competitive (Buhalis & Law, 2008). AI technologies allow restaurateurs to deliver real-time personalised services, enhancing guest satisfaction and loyalty. The application of artificial intelligence in hospitality can significantly reduce operational costs and optimise processes (Ivanov & Webster, 2017). AI has the potential to transform the hospitality industry through predictive analytics, chatbots, and robotic process automation (Lu, Cai, & Gursoy, 2019). However, although AI offers numerous benefits, there are serious concerns regarding its ethical use, potential replacement of human staff with AI-powered tools, customer and employee discomfort, and overall trust in AI (Gursoy & Cai, 2024).

Cost-Effectiveness of AI Implementation in the Restaurant Industry

The financial aspects of implementing AI in the hospitality industry - such as return on investment (ROI) and reduction of operational costs - are crucial for long-term success. (Yang & Li, 2018) explore how AI can reduce operating costs in restaurants and increase revenue through better demand forecasting and resource optimisation. According to their research, entrepreneurs who utilise AI to improve procurement processes, inventory management, and consumption prediction report cost reductions of 10 - 15%. Several case studies explore specific applications of AI in restaurants. (Cheng, Xie, & Hu, 2019) provide concrete examples of how demand forecasting AI systems can help optimise inventory and reduce costs. Their study showed that AI implementation in Beijing-based restaurants led to a 28% reduction in food waste and a 12% increase in profitability within the first six months.

(Gretzel, Sigala, Xiang, & Koo, 2020) note that AI enables personalised recommendations, better customer data analysis, and resource optimisation, all of which contribute to cost savings and increased revenue. (Kadagidze & Ugrelidze, 2023) emphasise in their research that "AI has a significant impact on operational efficiency, cost savings, and service quality," highlighting how AI technology contributes to reducing operational expenses and increasing revenue in hospitality businesses. (Bisoi, Roy, & Samal, 2020) state that "smart" restaurateurs are increasingly adopting integrated hospitality management systems that apply predictive analytics for pricing and service promotions, which leads to more efficient revenue management and lower costs. (Karagiannis, 2024) analyses quantitative indicators of ROI in AI, noting that "AI enables revenue growth through personalised services and dynamic pricing, while simultaneously reducing costs through process automation and inventory optimization." (Saydam. & Koseoglu, 2022) indicate that "AI significantly impacts operational efficiency and service improvements in hospitality, leading to higher profitability," underlining the necessity of integrating AI into business strategies.

METHODOLOGY

Sample and Instrument

This study was conducted as single-case research focusing on one full-service restaurant that has integrated AI technologies into its operations. According to some authors, a single case study can be a very powerful example (Sigelcow, 2007). The restaurant, located in an urban area, employs AI tools such as an automated reservation system, a recommendation engine based on customer preferences, and AI-assisted kitchen management.

The sample included 12 participants selected through purposive sampling to ensure coherent and reliable data (Ahmad & Wilkins, 2024). Participants consisted of the restaurant manager, two chefs, three waitstaff, one IT technician responsible for AI system maintenance, and five regular customers who have interacted with the AI tools (Table 1). Their roles provided diverse perspectives on the implementation and impact of AI in daily operations and customer experience.

Table 1. Single-case research sample

Respondents	No.	%
Restaurant manager	1	8.33
Chef	2	16.67
Waitstaff	3	25
IT technician	1	8,33
Customers	5	41.67
Total:	**12**	**100**

Source: Prepared by the author based on research data

Data were collected using semi-structured interviews, supported by observation and document analysis. (Megaldi & Berler, 2020) argue that semi-structured interview enables a researcher to go deep for a discovery. The interview guide was designed to explore themes such as perceived usefulness of AI systems, ease of integration, impact on service quality, impact on kitchen management, changes in workflow, and customer satisfaction. Interviews lasted between 30 and 60 minutes and were audio-recorded with participants' consent. To ensure credibility and trustworthiness, the interview questions were reviewed by two experts in hospitality and information technology. A pilot interview was conducted with a restaurant worker from a different establishment to refine the questions. Triangulation was applied by comparing interview data with observational notes and internal documents (e.g., feedback reports and usage logs), enhancing the validity of the findings.

EMPIRICAL EVIDENCE

Results and Discussion

Gastro Point is a modern restaurant that combines fast service with high-quality food. It was established in 2020 and quickly gained popularity among younger people and business professionals. The owner aimed to improve business operations and decided to implement AI solutions. The goal was to increase efficiency, reduce resource waste, and boost guest loyalty.

The Problems that were initially identified were:

1. Inefficient staff planning during peak hours - unpredictable fluctuations in guest numbers often led to either overworked or underutilised staff.
2. Food waste due to poor demand forecasting - incorrect estimates resulted in surplus perishable items.
3. Low guest retention - lack of personalised experiences and loyalty programs.
4. No digital engagement with guests - limited analytics and weak interaction outside the restaurant.

Therefore, the restaurant management was exploring ways to automate routine tasks, personalise offers, optimise the supply chain, enhance customer service and monitor customer satisfaction. By introducing AI technology, it would become possible to make faster and more accurate business decisions, increase productivity, and reduce costs.

RESULTS AND DISCUSSION

To evaluate the actual effects of AI implementation, key business performance indicators of the restaurant were measured over two periods: (Table 1, Graph 1)

- *Period 1 (Before AI):* January – March 2024
- *Period 2 (After AI):* April – June 2024

Table 2. Results: The key indicators

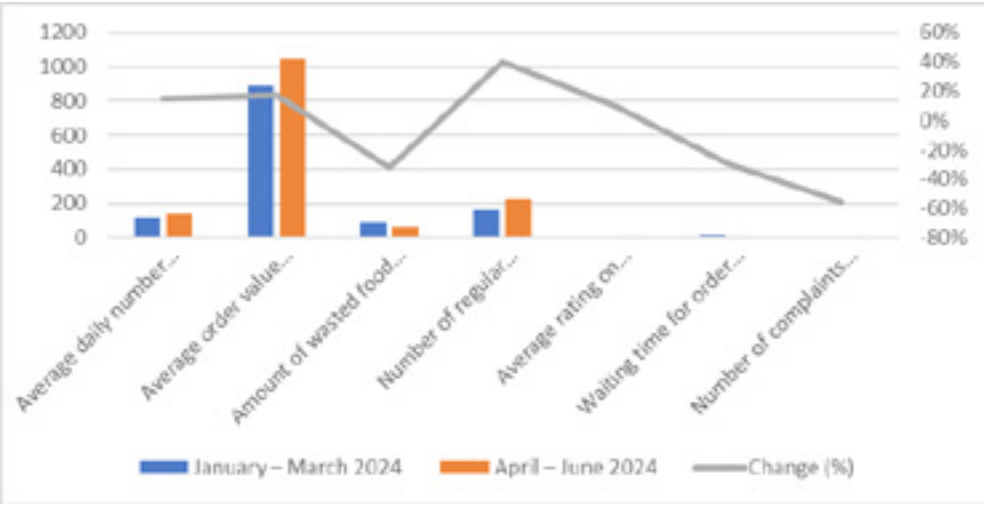
Indicator	January – March 2024	April – June 2024	Change (%)
Average daily number of guests	120	138	+15%
Average order value (RSD)	890	1.045	+17.4%
Amount of wasted food (kg/month)	92	62	-32.6%
Number of regular guests (monthly)	160	224	+40%
Average rating on Google/TripAdvisor	4.2	4.6	+9.5%
Waiting time for order (minutes)	17	12	-29.4%
Number of complaints per month	9	4	-55.5%

Source: Prepared by the author based on research data

Based on the analysis of the main KPIs measured after the introduction of AI technology, the following improvements were observed:

1. *Efficiency:* The use of AI contributed to reduced waiting times and a lower number of complaints, thanks to better organisation of the kitchen and staff; 2. *Resource utilization:* AI helped improve demand forecasting, which significantly reduced food waste; 3. *Revenue:* The application of AI led to an increase in both order value and the number of guests, positively impacting total revenue; 4. *Customer satisfaction:* All improvements driven by AI implementation resulted in higher ratings on online platforms and an increased number of returning guests, which further strengthens overall revenue.

Chart 1: The key indicators



Source: Prepared by the author based on research data

A more detailed analysis of the measured KPIs follows below:

i. Increased staff efficiency

By using AI for guest number prediction and shift optimisation, the number of shifts was reduced by 12.5% while working hours per shift were reduced by 6.25%. This enabled the restaurant owner to organise work hours more efficiently and reduce unnecessary overtime costs (Table 3).

Table 3. Number of shifts per month (before and after AI implementation)

Period	Before AI Implementation	After AI Implementation	Change (%)
Number of shifts (monthly)	240	210	-12.5%
Average working hours (per shift)	8	7.5	-6.25%

Source: Prepared by the author based on research data

Additionally, employees reported improved job satisfaction due to more predictable schedules and a better work-life balance. The reduction in labour-related expenses also allowed the management to reallocate part of the budget to staff training and customer service improvements, further enhancing the overall dining experience.

ii. Reduction of labour costs

The reduction in the number of shifts and improved staff allocation contributed to a 16.9% decrease in labour costs. This was the result of better planning enabled by the AI system, which optimised employee scheduling (Table 4)

Table 4: Labour costs (monthly)

Period	Before AI Implementation	After AI Implementation	Change (%)
Labour cost (RSD)	650,000	540,000	-16.9%

Source: Prepared by the author based on research data

In addition to financial savings, the restaurant also experienced increased operational efficiency, as tasks were more evenly distributed and peak hours were better staffed. This led to shorter wait times for customers and improved service quality. Over time, these improvements positively impacted customer satisfaction and repeat visit rates, contributing to overall business growth.

iii. Guest satisfaction and loyalty

The implementation of a personalised approach (through AI systems for loyalty and recommendations) has increased the number of regular guests by 40% and the frequency of their visits by 32%, indicating a growing level of loyalty and satisfaction (Table 5). The rise in online ratings and the number of returning guests confirms the success of the personalised approach.

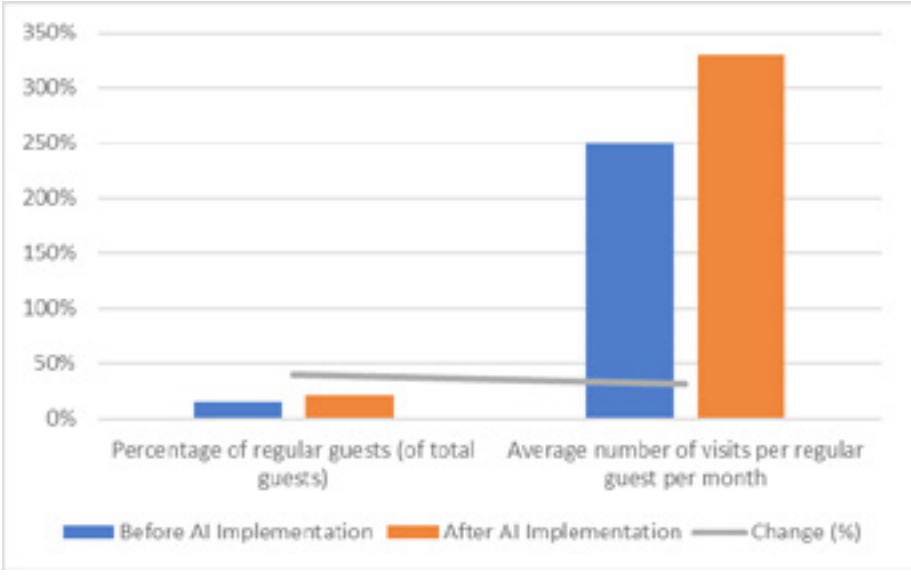
Table 5: Percentage of regular guests and frequency of their visits

Period	Before AI Implementation	After AI Implementation	Change (%)
Percentage of regular guests (of total guests)	15%	21%	+40%
Average number of visits per regular guest per month	2.5	3.3	+32%

Source: Prepared by the author based on research data

Besides, the rise in online ratings and the number of returning guests confirms the success of the personalised approach. Positive reviews frequently mentioned the relevance of personalised offers, faster service, and tailored menu suggestions, all made possible by the AI system's ability to analyse individual preferences and previous orders.

Chart 2: Regular guests and their visits



Source: Prepared by the author based on research data

Furthermore, the AI-driven loyalty program incentivised repeat visits by offering dynamic rewards based on guest behaviour, which further strengthened the emotional connection between customers and the brand. This approach not only improved customer retention but also increased the average spending per visit, as guests were more likely to respond to targeted promotions. Overall, the integration of personalisation through AI tools has proven to be a key factor in building a more engaged and satisfied customer base, contributing directly to long-term revenue growth and competitive differentiation.

iv. Revenue increase

Quantitative data confirm that the application of AI technology at Gastro Point

restaurant has a significant positive impact on business operations. In addition to a clear improvement in customer experience, cost savings and increased revenue strengthens the restaurant's competitive position in the long term. An increase in daily revenue by 16.8% indicates that personalised offers, better shift optimisation, and demand forecasting have led to a higher number of guests and an increased average order value (Table 6).

Table 6: Average Daily Revenue

Period	Before AI	After AI	Change (%)
Average daily revenue (RSD)	107,000	125,000	+16.8%

Source: Prepared by the author based on research data

The use of AI allowed the restaurant to anticipate customer preferences and peak times more accurately, enabling targeted promotions that encouraged upselling and cross-selling. For example, customers who previously ordered vegetarian dishes received personalised recommendations for newly added plant-based meals, which boosted overall sales. Additionally, improved scheduling ensured that staff were more available during busy hours, reducing wait times and increasing table turnover rates without compromising service quality. This combination of enhanced customer experience and operational efficiency created a favourable environment for both first-time and returning guests to spend more during their visits. As a result, the restaurant not only improved its short-term revenue but also laid the groundwork for sustainable growth driven by data-informed decision-making.

v. Increase in Reservations via Digital Channels

By introducing AI into the reservation process - through personalised offers, better promotion, and user recommendations - the number of online reservations increased by 52.4%. Customers were able to more easily access and book their spots via the app, which reduced pressure on phone lines and allowed for easier management of the restaurant's capacity.

Table 7: Number of reservations through apps and online systems

Period	Before AI Implementation	After AI Implementation	Change (%)
Number of Monthly Reservations	210	320	+52.4%

Source: Prepared by the author based on research data

Customers were able to more easily access and book their spots via the app, which reduced pressure on phone lines and allowed for easier management of the restaurant's capacity. The AI system also enabled dynamic adjustments in reservation availability based on real-time data, minimising overbooking and optimising table utilisation. Additionally, personalised notifications and reminders helped reduce no-shows, ensuring a more reliable flow of guests. This digital transformation not only improved operational efficiency but also enhanced the overall customer experience by providing convenience and tailored communication, leading to increased customer loyalty and higher repeat business.

vi. Interaction with guests through digital channels

The introduction of AI-powered digital channels, such as chatbots and interactive digital menus, significantly enhanced the restaurant's communication with its guests. Prior to implementation, there were no digital interactions recorded, but after deployment, the number of monthly interactions increased rapidly to 750. This growth reflects both the guests' growing comfort with using digital tools and the effectiveness of the AI systems in engaging customers.

Table 8: Average number of interactions (chatbot and digital menu)

Period	Before AI Implementation	After AI Implementation	Change (%)
Number of monthly interactions (chatbot, digital menu)	0	750	N/A

Source: Prepared by the author based on research data

The chatbot provided instant responses to common queries, including menu details, reservation status, and special promotions, reducing the workload on staff and improving response times. Meanwhile, the digital menu offered personalised recommendations based on customer preferences and previous orders, creating a more interactive and engaging dining experience. Together, these channels not only streamlined communication but also contributed to higher customer satisfaction and loyalty by providing convenient, accessible, and timely support.

vii. Increased Efficiency in Payment Processing

The use of AI systems for payment automation (including integration with digital measurement) enabled faster order payments and reduced waiting time for bills. This decreased the average payment time per table by 40%, improving efficiency and reducing congestion at the restaurant exit.

Table 9: Average payment time per table (in minutes).

Period	Before AI Implementation	After AI Implementation	Change (%)
Average payment time (minutes)	10	6	-40%

Source: Prepared by the author based on research data

The use of AI systems for payment automation (including integration with digital measurement) enabled faster order payments and reduced waiting time for bills. This decreased the average payment time per table by 40%, improving efficiency and reducing congestion at the restaurant exit. Additionally, the streamlined payment process enhanced the overall customer experience by minimising one of the most common pain points during dining. With faster table turnover, the restaurant was able to accommodate more guests during peak hours, directly contributing to increased daily revenue. The AI system also facilitated accurate real-time tracking of sales and inventory, allowing management to make data-driven decisions promptly. Moreover, automated payment processing reduced human errors and the need for manual reconciliation, saving valuable staff time and lowering operational costs.

viii. Procurement Costs and Inventory Optimisation

The AI system for demand prediction and inventory analysis enabled procurement optimisation, reducing unnecessary costs. Predictive models helped better manage procurement volumes, lowering inventory costs by 10.8%.

Table 9: Average monthly procurement cost (before and after AI implementation)

Period	Before AI Implementation	After AI Implementation	Change (%)
Procurement cost (RSD)	1,200,000	1,070,000	-10.8%

Source: Prepared by the author based on research data

The AI system for demand prediction and inventory analysis enabled procurement optimisation, reducing unnecessary costs. Predictive models helped better manage procurement volumes, lowering inventory costs by 10.8%. By accurately forecasting ingredient usage based on historical sales data and upcoming reservation trends, the restaurant minimised food waste and avoided overstocking perishable items. This led to fresher ingredients being used in meal preparation, which enhanced food quality and customer satisfaction. Furthermore, the streamlined procurement process improved supplier relationships by enabling timely orders and reducing last-minute purchases at higher costs. Overall, the integration of AI into inventory management contributed to a more sustainable and cost-effective operation, supporting both financial goals and environmental responsibility.

CONCLUSION

The application of AI in small businesses, such as the Gastro Point restaurant, demonstrates that AI is not reserved solely for large systems. In the specific case of the restaurant Gastro Point, the implementation of AI technology has brought a number of significant benefits - from faster and more accurate ordering processes, to personalised menu recommendations, guest feedback analysis, and more efficient inventory and staff management. The following results achieved after four months of AI implementation confirms the postulated hypotheses: 1) 32% reduction in food waste; 2) 40% increase in the number of regular customers; 3) reduced operational costs and improved staff organisation; 4) optimised staff scheduling - fewer overtime hours and better task distribution; 5) Improved online restaurant rating (from 4.2 to 4.6); 6) Increased average order value – due to personalised recommendations. The results have become evident in a short period of time: increased foot traffic and a higher number of returning customers, reduced wait times, and an overall improvement in customer satisfaction. AI tools have enabled the restaurant to better understand the habits and expectations of its guests and, in turn, to deliver a service that exceeds those expectations. This example demonstrates how the smart integration of technology not only transforms the way a restaurant operates, but also elevates the entire customer experience to a higher level. The use of AI in hospitality is rapidly developing, as restaurants increasingly recognise the benefits AI can bring in terms of improved service, personalised customer experiences, inventory optimisation, and reduced operational costs. The limitations of this study lie in the fact that it was conducted on a single restaurant, taking into account a small set of variables for testing. Accordingly, future research should include a larger sample and test a greater number of comparative variables.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

UNRAVELING CORRUPTION IN THE WESTERN BALKANS: A COMPARATIVE ANALYSIS OF BOSNIA AND HERZEGOVINA'S INSTITUTIONAL AND ECONOMIC DYNAMICS

Selma Delalić Professor at the Department of International Relations and European Studies International Burch University, Bosnia and Herzegovina, selma.delalic@ibu.edu.ba; ORCID ID: 0000-0003-2341-3425

Senka Sojkić PhD, Department of International Relations and European Studies International Burch University, Sarajevo, Bosnia and Herzegovina, senka.sojkic@stu.ibu.edu.ba; ORCID ID: 0009-0007-8140-7070

Vaso Mijanović PhD Candidate, Department of International Relations and European Studies International Burch University, Sarajevo, Bosnia and Herzegovina, vaso.mijanovic@stu.ibu.edu.ba; ORCID ID: 0000-0002-0256-4569

Abstract: *This article critically examines the multidimensional phenomenon of corruption in Bosnia and Herzegovina and its broader implications for the Western Balkans. Drawing on historical antecedents and contemporary empirical evidence, the study analyzes corruption's entrenched nature across political, economic, and cultural dimensions. A mixed-methods approach, integrating qualitative literature review with quantitative surveys and statistical analyses, elucidates the interplay between institutional deficiencies, economic variables, and cultural factors in shaping corruption perceptions. Empirical findings reveal significant correlations between corruption indices, governance shortcomings, judicial inefficiencies, and socio-economic disparities, underscoring the persistent challenge of corruption in post-conflict societies. Moreover, the article explores the transformative potential of EU integration as a catalyst for institutional reform and enhanced accountability. The research offers a comprehensive framework for understanding and mitigating corruption, providing valuable insights for policymakers and scholars dedicated to promoting transparency and sustainable development in the region. By situating Bosnia and Herzegovina within a comparative regional and European context, the study contributes to the broader literature on governance reform by demonstrating how structural fragility, limited political will, and public distrust collectively hinder the effectiveness of anti-corruption initiatives in transitional states.*

Keywords: *corruption, Bosnia and Herzegovina, Western Balkan countries, European Union*

JEL classification: *D73, N10, N40*

INTRODUCTION - HISTORICAL BACKGROUND

Corruption is widely acknowledged as a complex and multidimensional phenomenon with deep-rooted causes and far-reaching consequences. It has persisted as a social reality since the emergence of organized human societies and has been a subject of scholarly inquiry for centuries. Renowned corruption expert Robert Klitgaard asserts that "corruption is as old as organized human life, and indeed perhaps as old as government itself" . Historical records indicate that corruption was prevalent among ancient civilizations, including the Sumerians, Egyptians, Indians, Greeks, and Romans. One of the earliest and most comprehensive discussions on the subject is found in the *Arthashastra*, a seminal Sanskrit treatise from the 4th century BCE, attributed to Kautilya, also known as Chanakya, who served as a minister in the court of the Indian ruler Chandragupta Maurya. The *Arthashastra* stands as a foundational work on governance, devoting significant attention to the nature and implications of corruption. Recognizing its inevitability within administrative structures, Kautilya famously remarked, "Just as it is impossible not to taste honey or poison that one may find at the tip of one's tongue, so it is impossible for a government servant not to eat up at least a bit of the King's revenue" . This acknowledgment underscores the persistent and systemic nature of corruption, a challenge that has transcended time and geography.

In ancient times, corruption was*, inter alia,* perceived as an act of "gifting the sovereign," reflecting its early normalization within governance and societal structures. Like all social phenomena, corruption has undergone significant evolution and transformation over the centuries. However, the practice of "greasing the wheels" was as pervasive in antiquity and the Middle Ages as it remains today. During the medieval period, awareness of corruption expanded globally, progressively infiltrating political and economic spheres. By the 19th century, its recognition had intensified, driven by factors such as the expansion of international trade, the evolution of political structures, weak legal frameworks, market monopolization, cultural heterogeneity, and deficiencies in education . Since the late 1990s, a period often referred to as the "eruption of corruption," the issue has gained increasing prominence in global discourse and scholarly research. This surge in academic attention stems largely from a heightened awareness of corruption's detrimental impact on the democratic functioning of states, societies, and economies. A defining moment in the contemporary study of corruption was World Bank President James Wolfensohn's 1996 speech, linking famously corruption to a cancer that threatens economic growth, development, and poverty alleviation. In this context, Adjor and Kebalo observe, "Before 1996, both the World Bank and the IMF were aware that corruption sanded the wheels of development, but the issue itself was never explicitly brought up" . The *Financial Times,* in its December 1995 issue, even designated that year as "the year of corruption," underscoring the intensifying global concern over the phenomenon.

It is essential to underscore that corruption is not inherently tied to any particular political system, social order, level of governance, or cultural framework. No society - regardless of its degree of development, governance structure, or institutional framework, whether public or private, governmental or non-governmental - is impervious to this pervasive phenomenon . Nevertheless, there are significant differences in the scope, nature, typology, and dynamics of corruption between developed and underdeveloped countries. In less developed nations, corruption permeates nearly all aspects

of social and political life, including the judiciary, healthcare, education, military, and industry. In contrast, while corruption exists in developed countries, it is generally less pervasive and manifests in different forms. In other words, in failed, transitional, and undemocratic states characterized by weak and dysfunctional political and economic institutions, systemic safeguards against corruption are largely absent, inevitably fostering kleptocracy. Such environments often enable the massive accumulation of wealth by a small elite closely tied to the ruling structures .

Given its pervasive and destabilizing nature, corruption remains one of the most pressing challenges in contemporary governance, necessitating sustained interdisciplinary research and comprehensive policy interventions to mitigate its effects and uphold democratic institutions, economic stability, state security, and social equity . Keeping that in mind, the research aims to provide answer to the following research question: *How do institutional fragmentation and governance effectiveness jointly shape corruption perception in post-conflict Bosnia and Herzegovina compared to other Western Balkan countries?*

METHODOLOGY AND HYPOTHESES

The methodology adopted in this study follows a mixed-methods approach, integrating both qualitative and quantitative research techniques to ensure a comprehensive and rigorous analysis. A triangulation strategy is employed, incorporating multiple data sources and methodological perspectives to enhance the validity and reliability of the findings. Specifically, the study utilizes qualitative methods (secondary data) alongside quantitative methods (primary data) to provide a multidimensional examination of corruption in Bosnia and Herzegovina (BiH) within the broader context of the Western Balkans.

The qualitative component is grounded in an in-depth analysis of relevant scholarly literature, historical records, and expert assessments on corruption. This analytical framework facilitates a nuanced understanding of the root causes, mechanisms, and consequences of corruption, drawing comparisons with regional trends. By correlating corruption perception with economic, social, and judicial indicators, the study employs statistical comparisons and graphical representations to elucidate key patterns and relationships. Furthermore, the qualitative research synthesizes theoretical insights with secondary data-driven analysis, offering a holistic perspective on the structural, macroeconomic, and cultural determinants of corruption and their broader governance and policy implications.

To complement the secondary data analysis, a survey-based methodology was employed to collect primary data from a representative sample of 440 respondents across BiH. The survey comprised 16 closed-ended questions, including dichotomous (yes/no) (Table 1) and multiple-choice formats, designed to capture public perceptions, personal experiences, and attitudes toward corruption. The collected data underwent statistical analysis, utilizing descriptive statistics to identify prevailing trends and variations in corruption perception. The findings were subsequently visualized through graphical representations to facilitate interpretability and comparative analysis.

Table 1: Closed-ended questions

	Yes	No
Q3 - Have you ever witnessed acts of corruption within BiH?	63%	37%
Q4 - If the answer to the previous question is YES, did you report it to the competent authorities or to any of the non-governmental organizations?	12.5%	87.5%
Q5 - Would you personally participate in acts of corruption if given the opportunity?	21.5%	78.5%
Q6 - Do you think that corruption is more prevalent in BiH than in other Western Balkan countries?	74.9%	25.1%
Q7 - Do you think that moving towards Euro-Atlantic integration will reduce corruption in BiH?	50.1%	49.9%
Q8 - Do you think that corruption has become a part of culture in BiH?	91.3%	8.7%
Q9 - Do you think that there has been progress in BiH in the last 20 years in combating corruption?	14.5%	85.5%
Q10 - Are you optimistic about the future?	43.4%	65.6%

Source: Authors

The study tests several hypotheses related to corruption perception and its correlations with multiple variables:

H1: Corruption is more prevalent in BiH compared to other Western Balkan countries.

H2: Economic factors, such as income level, unemployment, and GDP, significantly influence corruption perception.

H3: Weak governance and judicial inefficiency contribute to high corruption perception in BiH.

H4: Corruption is perceived as part of the cultural and social fabric in BiH.

H5: The transition toward EU membership is expected to reduce corruption, but the public remains sceptical.

H6: The education system plays a crucial role in combating corruption.

LITERATURE REVIEW

Corruption is a multidimensional and highly complex phenomenon with far-reaching implications across various sectors of society and the state, including politics, economics, and social structures. As an issue deeply embedded within institutional frameworks and cultural norms, corruption has been the subject of extensive interdisciplinary analysis, encompassing fields such as law, economics, and political science. This literature review seeks to synthesize existing research on corruption through a novel, integrative approach. By examining this pervasive social phenomenon through legal, political, economic, and cultural lenses, the review combines theoretical insights with data-driven analysis to offer a comprehensive understanding of corruption's determinants and its broader implications for governance and policy. Additionally, it identifies critical gaps in the literature, highlighting avenues for future research.

Definition of Corruption

The challenge of defining corruption arises from its multidimensional nature and diverse manifestations across various contexts. Its study spans multiple fields, includ-

ing law, public policy, and economics-each offering distinct analytical perspectives. This complexity aligns with the academic consensus that corruption is a socially constructed phenomenon, subject to contextual variations. In other words, the meaning of corruption is contingent upon the contextual framework in which it is examined . A widely accepted general definition characterizes organizational corruption as the misuse of power or entrusted authority for self-serving purposes. Some scholars conceptualize corruption as a violation of public interest or impartiality norms , while others define it as the moral incapacity of individuals to act in the common good without self-interest.

At its broadest, corruption is defined as the abuse of entrusted power for private gain, encompassing a range of practices such as bribery, nepotism, embezzlement, and fraud . More precisely, it involves the exploitation of official authority by public officials to advance personal interests. According to Aidt, corruption fundamentally constitutes "the unauthorized commodification of one's entrusted power" . Importantly, the benefits derived from corrupt practices are not limited to financial or material gains. Rather, they often extend to non-monetary advantages, including preferential employment opportunities, privileged access to education and healthcare, expedited bureaucratic procedures, and, in some cases, coercive exchanges of a sexual nature.

Corruption Measurements

Measuring corruption is inherently complex, prompting the use of multiple methodological approaches. Corruption can be assessed through **objective** and **subjective** measures. Objective measures rely on verifiable data such as formal complaints, audit reports, corruption convictions and comparative analyses of infrastructure. However, their validity is limited given the fact that corruption often thrives where enforcement is weak and reporting is discouraged . Paradoxically, jurisdictions with strong anti-corruption frameworks may record higher corruption rates due to more intensive enforcement rather than greater underlying corruption, often capturing minor infractions that go unreported elsewhere. Subjective measures, on the other hand, including perception-based indices such as the Corruption Perceptions Index (CPI), draw on surveys of perceptions and experiences and are widely used, yet they face criticism for bias and methodological weaknesses. Key challenges in corruption measurement include perception distortions, measurement error, and utility concerns. .

To address the limitations of purely objective or subjective measures one can utilize aggregate (composite or second-generation) indicators of corruption. Widely used examples include CPI, Business Environment and Enterprise Performance Survey, and the World Governance Indicators. By combining objective and subjective data, these measures reduce biases and measurement errors while improving cross-country comparability and offering a more comprehensive view of corruption dynamics. Nevertheless, a persistent gap remains between the conceptualization and measurement of corruption, reflecting tensions between policymakers' practical needs and academic analytical goals. Closing this gap is crucial, as more accurate measurement underpins robust empirical analysis and the design of effective anti-corruption policies .

Causes of Corruption

Corruption is a complex, multidimensional phenomenon driven by interrelated political, economic, institutional, and cultural factors, including government structure,

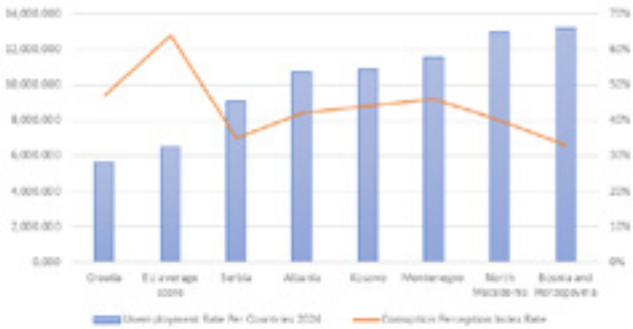
institutional quality, economic freedom, wages, press freedom, cultural norms, and natural resource endowments . In sectors such as construction and public administration corruption is induced by a combination of personal motives, such as financial need or greed, and broader systemic factors, including concentrated power, unclear responsibilities, weak ethical standards, inadequate enforcement mechanisms, and ineffective incentive and pay structures . Addressing corruption therefore requires a holistic approach that aligns incentives, accountability, and ethical standards. Reflecting on this complexity, Siregar classifies the root causes of corruption into three interconnected dimensions: macroeconomic, structural, and cultural.

The following sections examine each category's role in sustaining corruption, with particular emphasis on a correlation analysis between the CPI in Western Balkan countries and the EU average across the identified variables. By positioning BiH within regional and European contexts, this analysis seeks to empirically test the proposed hypotheses.

Macroeconomic Variables

Extensive research highlights a cyclical relationship between corruption and unemployment. Corruption increases unemployment - especially among young and educated workers - by encouraging nepotism, favoritism, bribery, and cronyism in hiring . Inversely, sustained unemployment can reinforce corrupt practices, although some high-unemployment countries, such as BiH and North Macedonia, exhibit only moderate corruption perception levels (see Figure 1). While democratic institutions can constrain corruption, their effectiveness is often weakened by widespread joblessness.

Figure 1: Correlation between corruption perception index and unemployment rate

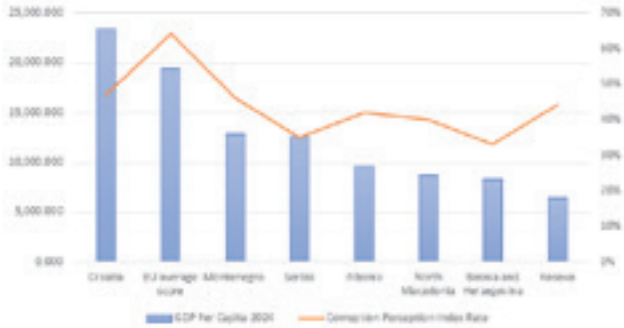


Source: Authors' calculations based on the IMF, World Economic Outlook, and Montenegro Employment Service database (February-2025).

The intersection between corruption and economic development is well established in the scholarly literature. Extensive research shows that higher corruption levels are associated with lower GDP per capita and slower economic growth, while sustained economic development tends to reduce corruption . Wealthier countries typically benefit from stronger institutions, effective rule of law, and greater transparency, which constrain corrupt practices. In contrast, highly corrupt states often suffer from weak governance, reduced foreign investment, and poor economic management, resulting in lower GDP per capita. Although higher income levels generally correlate

with lower corruption perception, Figure 2 indicates persistently high corruption across the Western Balkans, including in relatively wealthier economies. Countries with lower GDP per capita - such as Kosovo, Albania, BiH, and North Macedonia - also exhibit high corruption perception, suggesting a close link between economic fragility and governance deficits. While correlation does not imply causation, strong institutions, transparent governance, and sound economic policies remain central to both economic prosperity and corruption control.

Figure 2: Correlation between corruption perception index and gross domestic product per capita



Source: Authors' calculations based on the IMF and the World Economic Outlook database (Feb-2025).

Income level is often viewed as a key economic determinant of corruption, yet its effects remain contested. Some studies find a negative relationship, showing that rising incomes reduce corruption, while others identify a positive association in which higher incomes coincide with increased corruption . A third view argues that no causal link exists between income and corruption . As illustrated in Figure 3, economic well-being and governance quality appear loosely connected: wealthier regions with higher minimum wages tend to show lower corruption perception. In contrast, Balkan countries - particularly Kosovo, North Macedonia, BiH, and Albania - combine low wages with high corruption perception, while Serbia and Montenegro occupy mid-range positions on both dimensions. Although the relationship is not linear, the overall pattern suggests that lower wages are generally associated with higher perceived corruption.

Figure 3: Correlation between corruption perception index rate and minimum wage

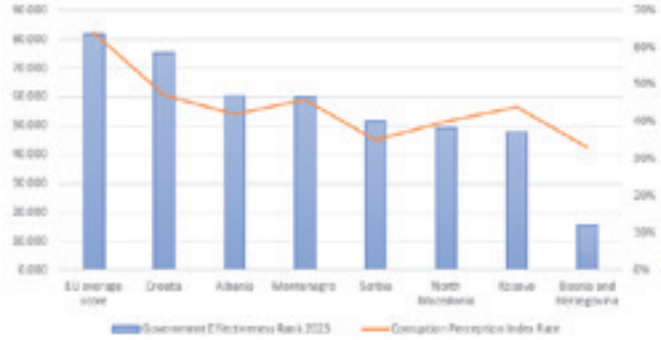
Source: Authors' calculations based on the Wage Indicator database, (2024).

Structural Variables

The relationship between government size and corruption is theoretically and empirically indeterminate. While some evidence links larger governments to lower corruption in advanced democracies, meta-analytical findings show that, once publication bias is addressed, government size has at most a weak or insignificant effect, with institutional quality, regulatory design, and administrative fragmentation playing a more decisive role . Moreover, the economic gains from corruption-reduction efforts are context-dependent, with larger governments and developing economies deriving comparatively fewer benefits .

As shown in Figure 4, BiH records the lowest level of government effectiveness and among the weakest CPI scores, reflecting severe governance deficiencies and elevated perceived corruption. A strong negative association between government effectiveness and corruption perception is evident, particularly in BiH, Kosovo, and Albania. Countries characterized by weaker public administration, limited policy credibility, politicized civil services, and low institutional autonomy systematically exhibit lower CPI scores, underscoring the central role of institutional capacity in shaping corruption perceptions.

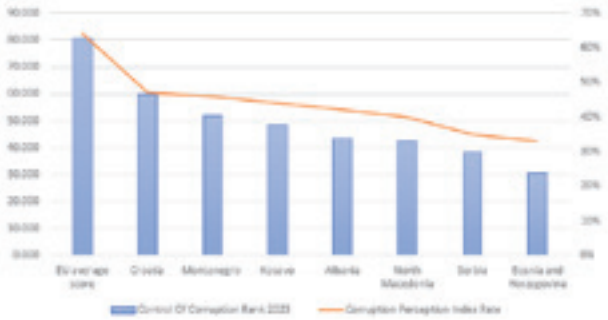
Figure 4: Correlation between corruption perception index rate and government effectiveness rank



Source: Authors' calculations based on the Worldwide Governance Indicators (WGI), World Bank, Development Economics & Natural Governance Institute (NRGI) database (2025).

In addition, academic writings consistently show that corruption undermines both economic performance and government efficiency, while effective corruption control enhances citizen engagement in anti-corruption efforts . Control of corruption therefore constitutes a core indicator of institutional capacity, capturing the extent to which public authorities restrain rent-seeking and private capture.

Figure 5: Correlation between corruption perception index rate and control of corruption rank

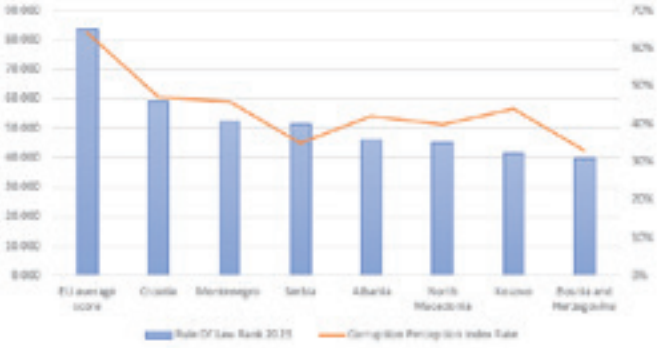


Source: Authors' calculations based on the Worldwide Governance Indicators (WGI), World Bank, and Development Economics & Natural Governance Institute (NRGI) database (2024).

As illustrated in Figure 5, countries with weaker corruption control - most notably BiH and Serbia - exhibit higher levels of perceived corruption, whereas the EU average reflects strong institutional safeguards and correspondingly lower corruption perception. This pattern underscores a robust inverse relationship between the effectiveness of anti-corruption mechanisms and corruption perception, highlighting persistent governance deficits in countries with weak institutional frameworks. Therefore, reforms to reduce corruption should focus on minimizing material benefits from payoffs and may require changes in constitutional structure and state-market relationships.

Moreover, corruption fundamentally undermines the rule of law, democratic governance, and economic development, with weak legal institutions closely associated with higher inequality and elevated corruption perception . As illustrated in Figure 6, countries with stronger rule-of-law frameworks, such as the EU average and Croatia, exhibit lower perceived corruption, whereas BiH, Albania, and Kosovo display persistently weak performance. In settings where domestic legal constraints are insufficient and elites impede reform, external enforcement and conditionality, particularly through EU accession processes and supranational judicial mechanisms, become critical drivers of anti-corruption and institutional accountability .

Figure 6: Correlation between corruption perception index rate and rule of law rank



Source: Authors' calculations based on the Worldwide Governance Indicators (WGI), World Bank, and Development Economics & Natural Governance Institute (NRGI) database (2024).

The general trend across government effectiveness, control of corruption, rule-of-law indicators, and higher institutional quality is consistently associated with lower corruption perception. The persistent underperformance of BiH, Kosovo, and Albania underscores the need for comprehensive anti-corruption strategies that integrate institutional and legal reform, economic restructuring, and trust-building measures.

Cultural Variables

The relationship between education and corruption is complex and context dependent. While a substantial body of research associates higher levels of tertiary education and literacy with lower corruption - through enhanced civic engagement, social cohesion, and institutional accountability - other studies caution that education may, under certain political and institutional conditions, facilitate corrupt behavior . Moreover, the relationship is bidirectional: corruption itself undermines access to education, particularly at the secondary level, thereby reinforcing inequality and institutional weakness.

Tertiary education and social progress are generally linked to lower corruption through enhanced civic awareness and accountability, yet their effectiveness is mediated by cultural norms and institutional contexts . Consequently, education alone is insufficient to reduce corruption, as political stability, economic structure, and institutional strength remain decisive in shaping corruption levels and public trust in governance.

Figure 7: Correlation between corruption perception index and tertiary education attainment rate

Source: Authors' calculations based on the International Education Database (2024).

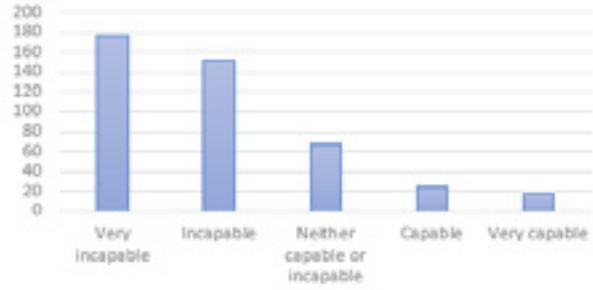
Figure 7 indicates a positive association between tertiary educational attainment and lower perceived corruption, with countries exhibiting higher education levels generally recording higher CPI scores. States with comparatively low tertiary education rates, such as BiH, Kosovo, and North Macedonia, also display lower CPI values, reflecting elevated corruption perception. Albania represents a partial deviation from this pattern, suggesting that governance reforms or economic dynamics may mediate the education/corruption relationship, thereby underscoring the importance of holistic anti-corruption strategies that integrate educational, institutional, and cultural dimensions.

RESULTS AND DISCUSSION

Bosnia and Herzegovina operates under a highly complex political and administrative system established by the Washington Agreement (1994) and the Dayton Peace Agreement (1995). The state consists of two entities - the Federation of BiH and Republika Srpska - along with the Brčko District, with the Federation further divided into ten cantons, resulting in an exceptionally fragmented governance structure comprising 14 governments, nearly 200 ministers, and over 700 parliamentarians. In the post-Dayton period, BiH has undergone continuous reform and democratization efforts aimed at consolidating democratic institutions and advancing integration into the European political system. Despite the formal requirement to adopt EU standards, BiH's political elites have persistently resisted substantive structural reforms, rendering international intervention a prerequisite for meaningful change. This reliance on external enforcement has eroded public trust in domestic institutions, reinforcing perceptions of ineffective law enforcement and entrenched systemic corruption.

Corruption constitutes one of the most serious structural challenges in post-conflict BiH, severely constraining economic development and impeding progress toward European Union integration. Pervasive across key sectors, including healthcare, education, the judiciary, and public administration, it reflects the combined effects of post-communist transition, unresolved war legacies, and persistent institutional fragility. The overwhelming public sentiment, as illustrated in Figure 8, suggests a strong lack of trust in BiH authorities to effectively tackle corruption. The small proportion of respondents who believe in the authorities' capability indicates a potential crisis in public confidence and governance. Despite the formal adoption of anti-corruption legislation, enforcement in BiH remains ineffective due to entrenched linkages between political and criminal actors, fragmented legal frameworks, and persistent political interference . While prosecutorial bodies have pursued several high-profile cases, chronically low conviction rates underscore systemic enforcement failures and the limited capacity of existing institutions to curb corruption.

Figure 8: Perceived capability of BiH authorities, including law enforcement, in preventing corruption



Source: Authors

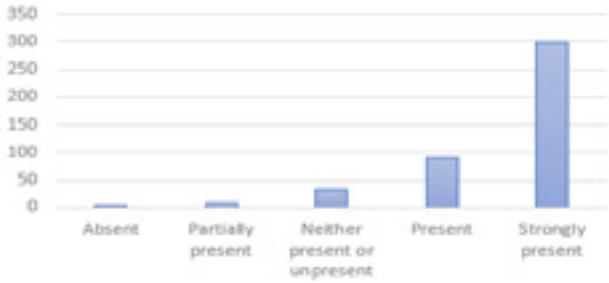
While Sarajevo Canton remains the sole jurisdiction in BiH with effectively enforced whistleblower protection, conflict-of-interest rules, and asset disclosure, the limited success of international anti-corruption efforts underscores that durable reform

depends on dismantling entrenched political-criminal networks alongside legal and institutional strengthening.

Perception of Corruption in Judiciary and Law Enforcement

Entrenched patron-client networks have penetrated core state institutions, including judiciary, law enforcement, and anti-corruption bodies, severely undermining their independence and professional capacity. According to the European Commission, *"the poor functioning of the judicial system continued to undermine citizens' rights and the fight against corruption"* . Effective anti-corruption strategies, therefore, require targeted, sector-specific risk assessments alongside comprehensive institutional reform and sustained political commitment, particularly within judicial and law enforcement structures . Corruption, compounded by insufficient political will to confront it, has become a central barrier to EU accession, as several member states condition further enlargement progress on credible and sustained anti-corruption commitments.

Figure 9: Perception of corruption present in BiH judiciary system



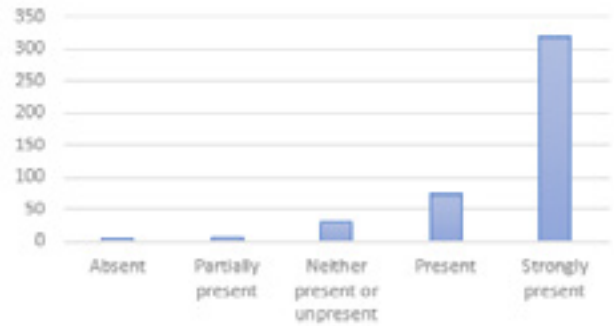
Source: Authors

The data presented in Figure 9 indicates an overwhelmingly negative public perception of the judiciary in BiH, with the vast majority of respondents perceiving corruption as either present or pervasive. The marginal share of respondents who view corruption as absent or limited points to a profound deficit of public trust in the judicial system.

Law enforcement agencies in BiH perform slightly better, as the security sector remains highly fragmented, politicized, and characterized by overlapping mandates and weak inter-agency coordination. This institutional fragmentation has substantially undermined anti-corruption enforcement, rendering the Agency for Prevention of Corruption and Coordination of the Fight against Corruption largely ineffective. As the European Commission observes, *"the law enforcement sector in the country continues to be politicized, poorly coordinated, and dysfunctional"* . Despite a comparatively comprehensive legislative framework, BiH suffers from fragmented criminal laws across entities and divergent cantonal anti-corruption strategies, which generate systemic inefficiencies. Weak operational cooperation and limited intelligence sharing among law enforcement agencies further undermine investigative effectiveness, reinforcing the European Commission's assessment that *"the professionalism, integrity, and accountability of law enforcement agencies need to be significantly improved"*.

The persistent lack of political will in BiH has resulted in rare prosecutions and lenient sentencing for corruption offenses, allowing endemic corruption within law enforcement to continue undermining democratic institutions and the rule of law, thereby necessitating systemic reform, strengthened accountability, and decisive action against entrenched corruption networks .

Figure 10: Perception of corruption present in BiH law enforcement agencies



Source: Authors

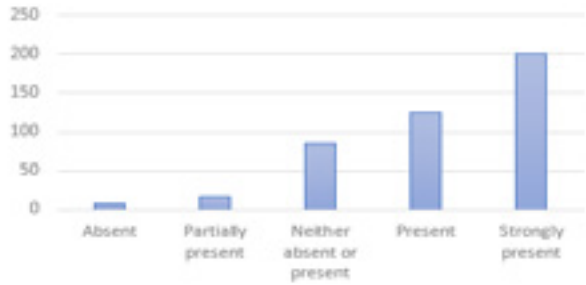
Figure 10 reveals a markedly negative public perception of corruption within BiH's law enforcement agencies, with most respondents indicating that corruption is either present or pervasive. This pattern closely mirrors perceptions of the judiciary, pointing to a broader deficit of public trust in core state institutions and reinforcing concerns about systemic corruption.

A comparative reading of Figures 9 and 10 shows that judiciary and law enforcement are widely perceived as deeply corrupt, reflecting acute public dissatisfaction and a profound crisis of institutional legitimacy. Sustained political interference, weak accountability, selective enforcement, and recurrent high-profile scandals reinforce perceptions of impunity, entrench corruption institutionally, and obstruct meaningful reform, with serious consequences for the rule of law, democratic governance, investment, and public safety.

Challenges in Education System

Corruption in the education sector - manifesting through nepotism, bribery, and plagiarism - undermines access, quality, and institutional integrity in BiH, mirroring broader global patterns . Empirical evidence shows that such practices depress enrolment and educational quality, disproportionately harming socioeconomically vulnerable groups and reinforcing inequality and poverty traps. Furthermore, corruption in higher education poses a particularly serious threat to social values and institutional credibility, having evolved into normalized networks of transactional exchange rather than isolated misconduct. This systemic corruption undermines social mobility by entrenching a dual system in which academic advancement is increasingly shaped by patronage and financial influence, disproportionately disadvantaging economically marginalized students while privileging the well-connected ones.

Figure 11: Perception of corruption present in BiH education system



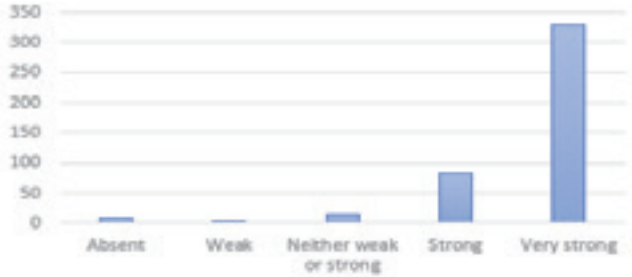
Source: Authors

Public perceptions of corruption in the education sector broadly mirror those of the judiciary and law enforcement, though with greater uncertainty, as reflected in the higher share of respondents selecting neutral responses (Figure 11). While corruption is still widely perceived as present - most notably in the "strongly present" category - it appears less institutionalized than in core enforcement institutions. Nonetheless, entrenched corruption in education undermines meritocracy, perpetuates inequality, and erodes public trust, underscoring the need for systemic reform, strengthened accountability, and a renewed commitment to academic integrity.

Yes/No Questions Analysis

Analysis of the survey's binary (Yes/No) responses reveals the depth of corruption's entrenchment in BiH: nearly two-thirds of respondents (63%) reported having personally witnessed corrupt practices, underscoring their systemic visibility. Despite this prevalence, only 12.5% reported such incidents, reflecting deep institutional distrust, fear of retaliation, or perceptions of futility. Although most respondents normatively reject corruption, the finding that over one-fifth (21.5%) would engage in corrupt behavior if given the opportunity points to its growing cultural normalization and perceived instrumental necessity within society. In this context, 74.9% of respondents perceive corruption in BiH as more pervasive than in other Western Balkan countries, reflecting profound institutional distrust and reinforcing perceptions of ineffective governance (Figure 12). These findings underscore the urgency of systemic reforms aimed at strengthening institutional integrity, restoring public confidence, and dismantling entrenched corruption networks.

Figure 12: Tenacity of Corruption in BiH



Source: Authors

Moreover, survey responses reveal deep ambivalence toward Euro-Atlantic integration as an effective anti-corruption mechanism: while 50.1% of respondents expect European oversight to improve governance, an almost equal share doubts the capacity of external influence to generate substantive change. Pessimism is pervasive, with over 90% viewing corruption as culturally and structurally embedded and only 14.5% perceiving meaningful progress over the past two decades. Although a minority (43.4%) remains cautiously hopeful, the prevailing sentiment points to corruption as both systemic and institutionalized, a conclusion reinforced by the empirical indicators presented in Figure 13.

Figure 13: BiH Governance Indicators (2013-2023)

Source: World Bank database (2024).

Rather than achieving progress, BiH has experienced a marked regression in anti-corruption performance over the past decade (2013–2023), increasingly lagging behind other Western Balkan countries. As regional disparities widen, these trends underscore the deeply entrenched nature of corruption, widespread public cynicism, and diminishing confidence in reform efforts. The persistence of this decline highlights the urgent need for comprehensive structural and institutional reform, accompanied by renewed political commitment to restoring public trust and advancing credible anti-corruption measures.

CONCLUSION

The empirical findings of this study provide robust statistical support for the research hypotheses, demonstrating that corruption is not merely episodic but structurally embedded within the systems of governance, the economy, and broader social relations in Bosnia and Herzegovina. As Hulsey observes, "powerful patronage networks have infiltrated and consolidated their control of state institutions" , suggesting not only extensive influence but, in some instances, the effective capture of key state apparatuses, including the judiciary, law enforcement agencies, and even formally designated anti-corruption bodies. Compounding this problem is the persistent absence of an independent, effective, and credible framework for oversight, supervision, and prosecution, which systematically enables elected officials to evade accountability for corrupt conduct. This institutional fragility perpetuates a culture of impunity and reinforces the self-reproducing nature of corruption within the political system.

As Harvard Law Professor Lessig persuasively argues, corruption is not only the result of bad individuals, but of institutions and incentive structures that make corrupt outcomes normal and lawful . In this vein, the present research highlights the urgent necessity of comprehensive institutional reform, strengthened legal enforcement, and sustained public awareness initiatives to address corruption in a meaningful and durable manner. Consistent with these conclusions, the European Commission emphasizes that "Bosnia and Herzegovina should make serious efforts to strengthen cooperation between law enforcement agencies, take a more strategic and proactive approach to the fight against corruption, and improve the institutional and legislative framework throughout the country" . Accordingly, policymakers should accord priority to anti-corruption strategies that reinforce enforcement capacities, ensure effective protection for whistleblowers, streamline reporting mechanisms, and uphold a coherent and robust legal framework. Moreover, the implementation of targeted unemployment benefits and policies aimed at reducing income inequality may help disrupt the mutually reinforcing relationship between corruption and unemployment, thereby fostering a more equitable, transparent, and resilient economic system.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

TRADE IN THE ERA OF DIGITALIZATION AND MARKETING: E-COMMERCE AS A CHALLENGE TO THE TRADITIONAL RETAIL MODEL

Mirjana Milovanović | Associate Professor, Higher Education Institution Banja Luka College, Banja Luka, Banja Luka, Bosnia and Herzegovina, mirjana.milovanovic@blc.edu.ba; ORCID ID: 0000-0003-3746-5517

Kristina Romanić | Higher Education Institution Banja Luka College, Banja Luka, Banja Luka, Bosnia and Herzegovina, kristina.romanic@blc.edu.ba

Vesna Novaković | Associate Professor, Pan-European University Apeiron, Banja Luka, Banja Luka, Bosnia and Herzegovina, vesna.p.novakovic@apeiron-edu.eu; ORCID ID: 0000-0002-9495-7940

Sanel Jakupović | Full Professor, Pan-European University Apeiron, Banja Luka, Banja Luka, Bosnia and Herzegovina, sanel.e.jakupovic@apeiron-edu.eu; ORCID ID 0000-0001-5940-6126

HANDLING EDITOR[1]: **Vlatka Bilas,** Full Professor, University of Zagreb, Faculty of Economics, Croatia, vbilas@efzg.hr; ORCID ID: 0000-0002-9021-6651

Abstract: *Traditional retail models, based on the physical presence of sellers and customers, have dominated commerce for decades. These models enabled direct communication, product inspection, and purchasing decisions shaped by personal impressions, while relationships between buyers and sellers were built on trust and face-to-face interaction. However, rapid technological advancements, the widespread use of the Internet, and the proliferation of smartphones have driven significant digitalization in the retail sector, leading to the emergence of e-commerce as a major sales channel. E-commerce offers consumers greater accessibility to products and services, lower prices, faster product comparisons, and a broader selection on a global scale. Simultaneously, traditional models are evolving to integrate digital elements such as online platforms, delivery and pick-up services, loyalty programs, and personalized communication via email, social media, and chatbots. This article aims to provide a comparative analysis of traditional and online sales, with a specific focus on consumer behavior in Bosnia and Herzegovina (BiH) and the European Union (EU). The analysis examines similarities and differences in purchasing habits, levels of digital literacy, consumer preferences, and challenges, with an emphasis on perceptions of security, pricing, service quality, and customer support. Survey results, conducted simultaneously in BiH and the EU with samples of 100 respondents each, indicate that e-com-*

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merce is not universally superior; its effectiveness depends on factors such as digital literacy, market maturity, and consumer habits. Physical stores (traditional/classical) retain relevance but require adaptation to digital-age demands. The optimal strategy lies in hybrid models that combine the speed and convenience of e-commerce with the trust and personal engagement of traditional shopping. This research provides a foundation for future studies on consumer behavior in digital contexts and offers guidance for businesses seeking to refine sales strategies in response to technological and societal change.

Keywords: *e-commerce, traditional retail, consumer behavior, digitalization*

JEL classification: *M31, D12, O33, L81*

INTRODUCTION

In the contemporary era, characterized by digitalization and rapid technological progress, retail is undergoing profound transformation. Traditional retail based on the physical presence of consumers in a sales location, remains an important distribution channel, offering customers direct contact with products, assistance from trained staff, and a unique shopping experience. The purpose of retail is to ensure that products are available to consumers at the right place, at the right time, in the right quantity, and at an appropriate or acceptable price . Simultaneously, electronic commerce (e-commerce) offers fast access to a wide range of products, 24/7 availability of information, flexible payment models, and personalized offerings. The research problem arises from shifting consumer habits, with buyers increasingly combining online and offline shopping, and from the need for retail chains to adapt to changing market conditions. While e-commerce in developed markets continues to record steady growth, in some regions such as Bosnia and Herzegovina, traditional retail still dominates due to limited digital infrastructure, lower trust in online payments, and underdeveloped logistics. These differences highlight the importance of understanding consumer behavior within specific socio-economic contexts. The motivation for conducting this research lies in the need to identify key factors influencing consumers' decisions to shop online or in physical stores (traditional/ classic), as well as to determine to what extent integrated sales models (omnichannel) represent an optimal response to the demands of the modern marketplace. A particular focus is placed on comparing consumer behavior in BiH and the EU, in order to identify similarities, differences, and development potential for both sales models. The objectives of this research are to analyze consumers' perceptions and experiences with both traditional and online shopping, to compare consumer habits and preferences between the markets of Bosnia and Herzegovina and the European Union, and to identify the key advantages, limitations, and challenges associated with each sales model. Furthermore, the study seeks to examine the potential for implementing integrated sales strategies aimed at enhancing customer experience and fostering greater consumer loyalty.

The paper presents three research hypotheses.

Hypothesis 1: Consumers perceive e-commerce as more convenient and efficient than traditional retail, primarily due to time savings, wider selection, and greater information availability.

Hypothesis 2: Physical stores continue to play a significant role in the consumer experience due to trust, the ability to physically inspect products, and personal interaction.

Hypothesis 3: Integrated sales models (omnichannel), which combine online and offline retail, represent the most effective response to the needs of the modern consumer.

Also, this research provides a basis for a deeper understanding of the dynamics of contemporary retail and offers guidance for businesses on how to adapt their strategies to evolving consumer preferences.

Traditional retail

Commerce is one of the oldest economic activities and a key component of marketing channels, evolving from exchange in early communities to the developed market economies of the 19th century. It connects producers and consumers, ensuring that products are available in the right place, at the right time, in the right quantity, and at an acceptable price. Retail enterprises, as primary actors in the exchange process, also conduct essential marketing activities. After World War II, Europe experienced a strengthening of the role of retailers, the growth of large retail chains, market consolidation, and the technical superiority of large systems. From the 1990s onwards, the development of electronic retail accelerated, becoming an important segment of the global market. By the mid1990s, a large number of traditional retail companies had entered e-commerce activities. In this period, the electronic trading of information-based content, goods, and services emerged as a driver of e-market development, which today constitutes an important segment of global retail operations . Physical stores offer several notable advantages, including a personalized shopping experience characterized by the ability to physically inspect and try products, direct staff assistance through professional advice and immediate responses to customer inquiries, and an atmosphere shaped by store design, ambiance, and brand identity. Additionally, they facilitate social interaction by enabling contact with other customers and staff . However, these benefits are accompanied by certain limitations, such as high operating costs, geographical constraints, fixed working hours, and restricted display and storage capacity.

Consumer behavior in traditional/classic stores

Consumer behavior is an interdisciplinary field that examines what, why, how, where, and when people purchase, as well as their post-purchase experiences. In consumer behavior research, quantitative disciplines such as mathematics, statistics, and operations research make significant contributions . The evolution of marketing in the 1950s positioned the consumer at the center of business strategy, with purchasing behavior influenced by economic, sociological, and cultural factors . Consumer behavior is stimulated and motivated by numerous internal and external factors: economic, sociological, cultural, and others (Figure 1). Despite significant progress in consumer research over the past two decades, much remains unexplored. In developed market

economies, consumers constitute the focal point of a company's overall business activities.

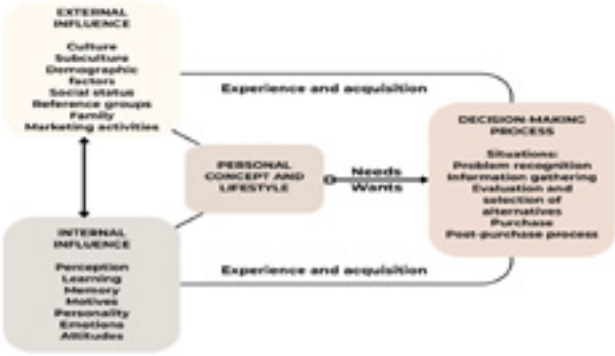

Figure 1. Model of consumer behavior

Source: Adapted by the author from Hawkins, I.D., Mothersbaugh, L.D., & Best, J.R. (2007). Consumer Behavior-Building Marketing Strategy. McGraw-Hill, New York, p. 26.

According to the cited authors, consumers can be broadly categorized into two main types: final consumers, who purchase goods and services for personal or household use, and business consumers, who acquire products for further production, business operations, or resale. Their purchase decisions are influenced by multiple factors, including the physical environment, such as store layout, scents, music, and lighting; the social environment, encompassing the presence of family members, friends, or staff; temporal factors, such as the time of day, season, and the amount of time available for shopping; as well as task-specific and unplanned situations, including urgent purchases or special occasions. Consumer involvement increases proportionally to the importance of the purchase, perceived risk, symbolic meaning, and emotional satisfaction provided by the product. Highly involved consumers analyze the offer in detail and demand high-quality information . As regards customer loyalty to physical stores, loyalty depends on product assortment, pricing, merchandising, convenience, personalization, and problem resolution. Ambient elements such as colors, scents, music, temperature, and lighting influence shopping enjoyment, repeat visits, spending levels, and time spent in-store. The emotional aspect and human interaction become key advantages over online retail. Loyalty programs, exclusive promotions, and live events further strengthen customer relationships.

The 20th century witnessed three major revolutions in retail:

1. The introduction of self-service stores in the United States in the 1920s, and later in Europe after World War II (1950s).

2. A strategic shift from focusing on products to focusing on the consumer, their lifestyle, and how the product is used and perceived.

3. The development of the internet and the emergence of electronic commerce

Electronic commerce

E-commerce seeks to leverage economic efficiencies, reduce errors and cycle times, offer highly customized products and services to meet customer needs, and enhance consumer interaction-all at relatively low costs. The number of transactions

conducted online continues to rise. The greatest challenge for online retailers lies in ensuring consumer security and safeguarding the privacy of personal data provided on the internet . Digitalization has compelled traditional retail chains to combine online and offline strategies through an omnichannel approach. Physical stores retain their significance as spaces for experiential shopping, while the integration of digital technologies fosters stronger consumer relationships. Digitalization does not eliminate traditional retail but adapts it to modern trends, thereby increasing its chances for survival and growth in competitive markets. Electronic commerce (e-commerce) encompasses the buying, selling, marketing, and servicing of products and services via the internet and other networks, including electronic funds transfer, supply chain management, e-marketing, and automated systems . The first form of e-commerce appeared in the late 1970s through Electronic Data Interchange (EDI), while modern e-commerce is associated with 1995 and the launch of Amazon.com. Jeff Bezos began Amazon as an online bookstore, later expanding its assortment, warehousing, and logistics, thus laying the foundations for global digital commerce . The unstoppable technological forces behind e-commerce are the internet and its most widespread service-the World Wide Web (WWW). Without these two technologies, e-commerce as we know it today would not be possible . Today, in addition to Amazon, significant platforms include eBay, AliExpress, Zalando, and ASOS. The advantages of e-commerce include ubiquity, global reach, interactivity, personalization, a broader product range, lower prices, and business process automation. Challenges include payment security, delivery issues, lack of physical contact with the product, limited interpersonal interaction, and the environmental impact of packaging and transportation.

Types of E-commerce:

- B2C - business-to-consumer (the most common model)
- B2B - transactions between companies
- C2C - consumer-to-consumer sales via online platforms
- P2P - direct exchange of files and resources among users
- M-commerce - transactions via mobile devices (Table 1).

Table 1. Types of e-commerce and examples

TYPES OF E-COMMERCE	EXAMPLE
B2C – Business to Consumer	Amazon, Zalando, ASOS, eKupi
B2B – Business to Business	Amazon Business, Thomassent, ETC Sarajevo
C2C – Consumer to Consumer	eBay, Facebook Marketplace, OLX
P2P – Peer to Peer	Airbnb, Uber, BlaBlaCar, Glovo, Donesi
M-Commerce – Mobile Commerce	Apps: Shein, Wish, OLX, Korpa

Source: Adapted by the author from Unković, M., Milosavljević, M., & Stanišić, N. (2010). Savremeno berzansko i elektronsko poslovanje. Univerzitet Singidunum, Belgrade, p. 182.

Online consumer behavior is characterized by a search for better prices, convenience, and fast delivery, as well as greater access to information and reliance on reviews and social media. Key loyalty drivers include personalized offers, payment security, website usability, and quality customer support. The number of digital consumers varies by country. According to certain data, Asia accounts for approximately 55% of all internet users, while Europe and the Americas together account for over 20% . The significance of e-commerce lies in its ability to expand market reach, reduce costs, and enable sales anytime, anywhere. Retail chains leverage e-commerce to showcase extensive product assortments, offer price comparisons, and provide exclusive online products. Personalized recommendations, SEO, email marketing, and social media make e-commerce a powerful marketing channel. During crises, such as the COVID-19 pandemic, e-commerce has proven more resilient than traditional retail, increasingly becoming a key to success in modern business. Digital transformation in retail integrates technology into business processes to enhance customer experience, efficiency, and growth. It enables retailers to remain competitive in a dynamic market, quickly adapt to changes, and meet modern consumer expectations.

Emerging technologies shaping retail

- Artificial Intelligence (AI) and Machine Learning: AI enables deep personalization of offers through the analysis of purchasing habits, process optimization, product recommendations, and automated marketing campaigns. Machine learning detects patterns in user behavior, enhances customer experience, and predicts demand. Netflix is a prime example of advanced application of these technologies in content recommendations. The advent of the internet has fostered the development of AI, which now powers many online tools such as search algorithms, recommendation systems, and website builders
- Virtual Assistants (Chatbots): Chatbots interact with customers 24/7, answering questions and providing support at lower costs, thereby increasing satisfaction and service speed.
- Augmented Reality (AR) and Virtual Reality (VR): AR enables virtual product trials (e.g., furniture, cosmetics), reducing returns and increasing purchase confidence. IKEA Place, for example, has reduced product returns by 30%. VR creates fully simulated environments, such as virtual stores and fashion shows
- Mobile Commerce (M-commerce): Shopping and payments via mobile devices using mobile internet, applications, and digital wallets (Apple Pay, Google Wallet, PayPal) allow transactions anytime and anywhere.
- Subscription Models: Customers pay for regular delivery of products or services, boosting loyalty. The COVID-19 pandemic further popularized this model.
- Click and Collect: This omnichannel strategy combines online ordering with in-store pickup, merging the convenience of e-commerce with the tangibility of physical locations.
- Livestream Shopping: Live video-based selling, often in collaboration with influencers, enables interactive real-time promotion and purchasing. Origi-

nating in Asia in 2017, it has since expanded globally.
- Voice Commerce: Purchasing via voice commands through assistants like Alexa or Google Home relies on NLP and AI for personalized recommendations. While still in early stages, it has significant growth potential.

The future of retail and marketing

Retail and marketing are rapidly shifting from physical formats and traditional advertising to digital platforms, automation, and personalization. AI will play a central role in tailoring offers, predictive analytics, and advertising optimization . Physical stores will not disappear; rather, they will become spaces for experiential brand engagement and personalized service. Marketing will increasingly focus on content marketing and value creation for the consumer, while social media and influencers will remain dominant channels. Personalization will be at the core of strategy-every advertisement, email, or post will be tailored to the user. Companies that invest in technology, customer experience, and sustainability will not only survive but lead the market.

Online shopping offers convenience, variety, and flexibility. In the future, retail will increasingly rely on AI to improve efficiency and customize offerings. Best practices include personalization, segmentation, chatbot and virtual assistant integration, predictive analytics, UI content creation and curation, advertising optimization, social media management, search ad optimization, and customer relationship management.

METHODOLOGY AND RESEARCH OBJECTIVES

In the contemporary era of digitalization and rapid technological advancement, consumer purchasing behavior has undergone significant transformation. Traditional retail, which entails physically visiting a store, is increasingly challenged by the growing prevalence of e-commerce. Online shopping provides quick access to products, information availability, and flexibility, whereas classical/traditional retail continues to offer the benefits of direct product contact and personal interaction with the salesperson. The aim of this research is to examine consumer behavior in BiH and the EU when choosing between classical (offline) and online shopping. The focus is placed on identifying the factors that influence decision-making, as well as analyzing the experiences and preferences of customers in both forms of retail. By comparing the results between BiH and the EU, the study seeks to identify similarities and differences in consumer behavior, the degree of trust in digital platforms, and the reasons for choosing one purchasing model over another. This approach contributes to a deeper understanding of the impact of economic, cultural, and technological factors on consumer decisions, while also enabling the assessment of the challenges and opportunities that e-commerce presents in diverse socio-economic contexts. To collect data relevant for understanding consumer behavior in the modern digitalized environment, a quantitative study was conducted via an online survey. The research focused on analyzing consumers' perceptions, habits, and preferences when choosing between classical/traditional (offline) and online shopping, as well as identifying the key factors that influence such decisions.

The questionnaire contained a combination of various questions, divided into several thematic units:
- Demographic data
- Purchasing habits

- Online shopping
- The impact of digital marketing on purchasing decisions
- Classical/traditional shopping
- Personalization and customer experience
- Retail digitalization

The main objective of the research is to conduct a comparative analysis between the markets of BiH and the EU, with the intention of identifying differences and similarities in consumer behavior regarding e-commerce and traditional retail. In accordance with the established hypotheses, the research is guided by the following research questions (RQ):

1. Is e-commerce superior to traditional retail?
2. Do physical stores have a future in the digital era?
3. How can the retail sector optimally combine both approaches to meet the needs of the modern consumer?

The independent variables in this study are respondents' gender, age, and for the EU sample-location, while the dependent variables are the opinions, attitudes, and perceptions of respondents regarding classical/traditional and online shopping.The survey targeted participants of varying ages (18-55 and above) and both genders, residing in BiH and in the EU. A total of 200 respondents participated in the study. The research was conducted from April 25 to May 25, 2025, using an electronic questionnaire designed on the Google Forms platform. The sample was obtained by distributing the survey via social media and through direct invitations to potential participants. This survey was anonymous, and participation was voluntary. The analyzed responses included 100 respondents from BiH, and 100 respondents from the EU countries. While the sample cannot fully represent the entire population, its size and structure allow for a basic comparative analysis between the two regional contexts. Also, given the spatial limitations of this article, only selected segments of the research will be presented graphically.

Survey participants' demographic characteristics

The consumer survey in BiH included 100 individuals of varying demographic backgrounds. Regarding gender, 74 respondents were women (74%) and 26 were men (26%). In terms of age, the distribution was as follows: 6% under 18 years of age, 70% aged 18-24, 12% aged 25-34, 5% aged 35-44, 4% aged 45-54, and 3% aged 55 or older. The EU consumer survey also covered 100 respondents of diverse demographic profiles: 68% women and 32% men. The age breakdown was: 0% under 18, 49% aged 18-24, 29% aged 25-34, 10% aged 35-44, 6% aged 45-54, and 6% aged 55 or older. The EU survey also recorded respondents' countries of residence: Slovenia (41%), Croatia (20%), Portugal (13%), Austria (12%), Germany (8%), Poland (1%), the Netherlands (1%), Italy (1%), Hungary (1%), Spain (1%), and Sweden (1%).

Analysis of purchasing habits and preferences between BiH and the EU

Consumer purchasing habits in BIH and the EU reveal notable differences as well as certain similarities, particularly in the transition from traditional to online shopping. When it comes to preferred shopping channels, the majority of respondents from BiH still favor traditional stores, with 66% predominantly shopping in physical locations (classical/traditional stores).

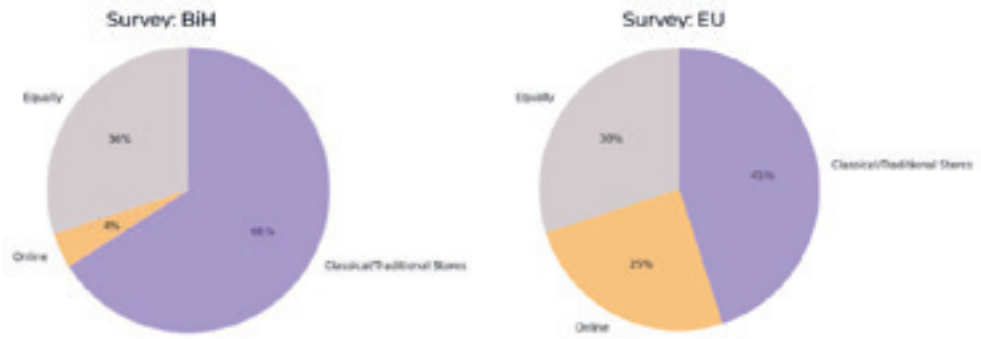

Chart 1. Analysis of consumer purchase locations in BiH and the EU

Source: Author's own research results

In the EU, 45% of respondents reported shopping primarily in physical stores, suggesting greater openness to modern purchasing formats. In contrast, only 4% of respondents in BiH identified online shopping as their primary purchasing method, compared to 25% in the EU. Notably, 30% of respondents in both samples reported shopping equally online and offline, indicating the gradual adoption of hybrid purchasing patterns (Chart 1).

Table 2 present the products most frequently purchased in traditional/classical stores and online in BiH and the EU). In traditional stores, both BiH and EU consumers primarily purchase food and beverages (97% in BiH, 95% in the EU), followed by clothing and footwear (80% in BiH, 56% in the EU). Cosmetics rank third, with 70% in BiH and 57% in the EU. Electronics, furniture, and other products are bought less frequently in stores, with the EU showing slightly higher figures for electronics and furniture than BiH.

Table 2. Products most frequently purchased in traditional/classical stores

PRODUCT CATEGORY	BiH	EU
Food and Beverages	97%	95%
Clothing and Footwear	80%	56%
Cosmetics	70%	57%
Electronics	21%	34%
Furniture	20%	30%
Other	12%	6%

Source: Author's own research results

In the context of online shopping, clothing and footwear represent the predominant product categories in both regions, accounting for 72% of purchases in BiH and 71% in the EU. Electronics are the second most purchased online category, especially

in the EU (44%) compared to BiH (21%). Cosmetics, furniture, and food and beverages follow, with "other" products being more common in the EU online market (23%) than in BiH (14%) (Table 3).

Table 3. Products most frequently purchased online

PRODUCT CATEGORY	BIH	EU
Food and Beverages	5%	4%
Clothing and Footwear	72%	71%
Cosmetics	17%	28%
Electronics	21%	44%
Furniture	6%	10%
Other	14%	23%

Source: Author's own research results

The analysis of the data demonstrates that the possibility of physically inspecting products constitutes the primary factor motivating consumers in both observed regions to shop in traditional stores (88% in BiH and 79% in the EU). This finding supports the argument that direct tactile and visual interaction with products enhances perceptions of quality and reduces perceived risk in the purchasing process. In BiH, additional significant determinants include a greater sense of security (57%) and habit (52%), indicating more conservative consumption patterns and a relatively higher degree of distrust toward digital channels. Conversely, in the EU, after physical inspection, faster and easier product collection (55%) and habit (50%) are emphasized, while consumer security plays a markedly smaller role (24%), suggesting a higher level of institutional trust and more developed consumer protection mechanisms. Lower prices occupy the lowest position in both cases (9% in BiH and 7% in the EU), which confirms that traditional shopping is not primarily motivated by economic considerations but rather by trust, habit, and the experiential dimension of the purchasing process (Table 4).

The reasons for engaging in online shopping reflect distinct consumer priorities. In BiH, the greater variety of products (48%) represents the dominant motivation, reflecting the perception of limited choice within traditional retail channels and highlighting the role of digital markets in overcoming physical constraints. This is followed by 24/7 availability of shopping (46%) and home delivery (43%), underscoring the growing importance of flexibility and convenience. In the EU the leading factor is continuous availability of shopping opportunities (69%), followed by time savings (58%), indicating that online shopping is more strongly perceived as a mechanism for optimizing both work and leisure time. Furthermore, in the EU, home delivery (57%) and easier product search (56%) emerge as highly relevant, while the greater variety of products (55%), which is the most important driver in BiH, ranks only fifth. This suggests that EU consumers take product variety largely for granted, whereas in BiH

Table 4. Reasons for choosing classic/traditional stores

Country		BiH	EU
Reasons for Choosing Classic/Traditional Stores	1	Possibility of physical product inspection (88%)	Possibility of physical product inspection (79%)
	2	Greater safety and security (57%)	Easier and faster product collection (55%)
	3	Easier and faster product collection (55%)	Habit (50%)
	4	Habit (52%)	Greater safety and security (24%)
	5	Lower prices (9%)	Lower prices (7%)

Source: Author's own research results

it remains a central perceived benefit. Consequently, while online shopping in BiH primarily satisfies the need for broader product availability, in the EU the emphasis lies on temporal flexibility and efficiency (Table 5).

Table 5. Reasons for choosing online shopping

Country		BiH	EU
Reasons for Choosing Online Shopping	1	Wider selection of products (48%)	Shopping available 24/7 (69%)
	2	Shopping available 24/7 (46%)	Time savings (58%)
	3	Home delivery (43%)	Home delivery (57%)
	4	Time savings (40%)	Easier product search (56%)
	5	Easier product search (40%)	Wider selection of products (55%)
	6	Other reasons (4%)	Other reasons (2%)

Source: Author's own research results

Empirical evidence from the study suggests that the frequency of online purchases provides additional insight into these differences. In BiH, 50% of respondents shop online infrequently, and 6% never do so; only 3% make weekly purchases. In contrast, in the EU, 27% shop online infrequently, 2% never shop online, while the majority purchase several times per month (29%) or once a month (32%). Monthly spending patterns also differ: in BiH, 47% spend less than 100 BAM, and 13% do not shop online at all. In the EU, 34% spend less than €50, and 18% spend between €100-125 monthly, with only 5% never shopping online.

The results demonstrate that, in both Bosnia and Herzegovina and the European Union, the predominant challenge encountered by consumers pertains to the complexity of product returns (49% in BiH and 41% in the EU). This suggests that the absence of standardized and user-friendly return policies continues to undermine consumer confidence in online shopping. In BiH, the second most prevalent issue is the inaccuracy of product descriptions (46%), followed by payment security concerns (37%) and unreliable delivery (31%), highlighting systemic weaknesses in digital retail infrastructure and persistent consumer skepticism regarding transaction safety. In the EU, by contrast, payment security (41%) is perceived as equally problematic as product returns, while the inaccuracy of product descriptions (34%) and delivery unreliability (25%) are less pronounced compared to BiH. This divergence indicates that although EU consumers also face challenges, these are generally less acute, reflecting higher levels of institutional regulation, more advanced logistics systems, and broader implementation of consumer protection standards. Finally, a notable proportion of consumers in both regions reported no significant challenges (13% in BiH and 22% in the EU), which reinforces the notion that the maturity of digital commerce and consumer familiarity with online transactions are more advanced in the EU than in BiH (Table 6).

Table 6. Key challenges encountered in online shopping

Country		BIH	EU
Key Challenges Encountered in Online Shopping	1	Complicated product returns (49%)	Complicated product returns (41%)
	2	Inaccurate product descriptions (46%)	Payment security (41%)
	3	Payment security (37%)	Inaccurate product descriptions (34%)
	4	Unreliable delivery (31%)	Unreliable delivery (25%)
	5	None (13%)	None (22%)

Source: Author's own research results

Delivery reliability is generally higher in the EU: 45% of respondents report rarely experiencing issues, and 34% only occasionally, compared to BiH where 27% frequently face problems and 47% occasionally do so. EU consumers more frequently use and positively rate advanced technologies such as chatbots, AI recommendations, AR, and VR. These technologies remain less prevalent in BiH. Social media plays a significant role in purchasing decisions, with Instagram, TikTok, and YouTube identified as the most influential platforms in both regions. BiH consumers more often rely on printed leaflets and catalogs, whereas EU consumers predominantly use digital channels. Promotional campaigns influence purchase decisions in both groups, but more strongly in BiH.

BiH respondents more frequently report operational issues, poor product quality, and a lack of vendor response, while EU respondents encounter more sophisticated scams but also report quicker problem resolution and refunds. EU respondents gener-

ally perceive a higher level of retail digitalization and are more open to transitioning to online shopping, while BiH respondents demonstrate greater caution, lower trust, and a stronger preference for hybrid models.

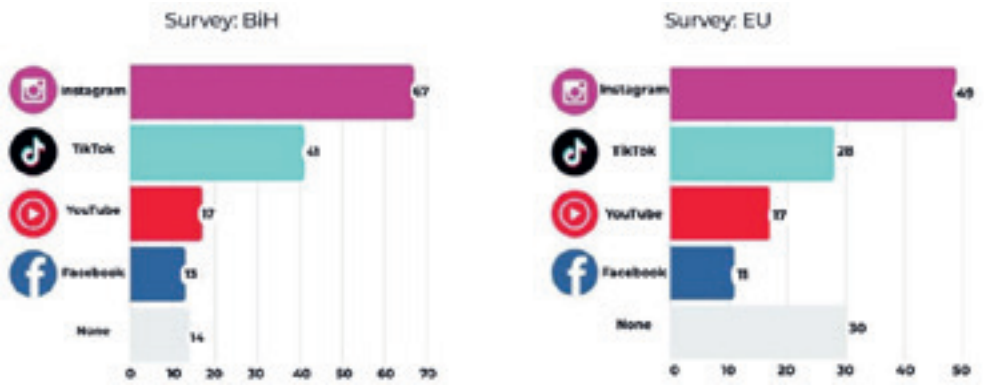

Chart 2. Social media platforms with the greatest influence on consumer purchase decisions

Source: Author's own research results

The chart 2 illustrates the social media platforms that exert the highest influence on consumer purchase decisions. In BiH, Instagram emerges as the dominant platform, influencing 67% of respondents, followed by TikTok with 41%. Other platforms, such as YouTube (17%) and Facebook (13%), have significantly less impact on purchase decisions. Interestingly, 14% of respondents indicated that social media platforms do not influence their purchase decisions at all. In the EU, the influence of social media is more evenly distributed. Instagram still leads with 49%, followed by TikTok (28%), while YouTube (17%) and Facebook (11%) remain secondary. However, a considerably higher proportion of EU respondents (30%) reported that social media does not affect their purchasing behavior, indicating a relatively greater consumer independence from digital influence compared to BiH. These findings highlight that, although Instagram dominates both markets, consumers in BiH are generally more susceptible to social media influence than their EU counterparts, suggesting the potential for more effective marketing campaigns on social platforms in emerging markets.

In BiH, half of the respondents (50%) reported that traditional retail outlets are moderately developed in terms of digitalization. However, a significant 35% indicated that digitalization is insufficiently developed, while only 6% described it as highly developed. Additionally, 9% of participants stated that they were uncertain about the level of digitalization. In contrast, the EU shows a markedly higher degree of technological advancement. A substantial 64% of respondents assessed digitalization as moderately developed, while 23% reported highly developed digital practices. Only 2% considered digitalization insufficient, and 11% were uncertain about the current state. These findings highlight a digital gap between BiH and the EU. While moderate development dominates in both regions, the EU demonstrates a significantly higher proportion of highly digitalized retail outlets and fewer respondents reporting insufficient implementation. This suggests that retail businesses in BiH face more challenges in adopting advanced digital tools compared to their EU counterparts, indicating a potential area for policy improvement and investment (Chart 3).

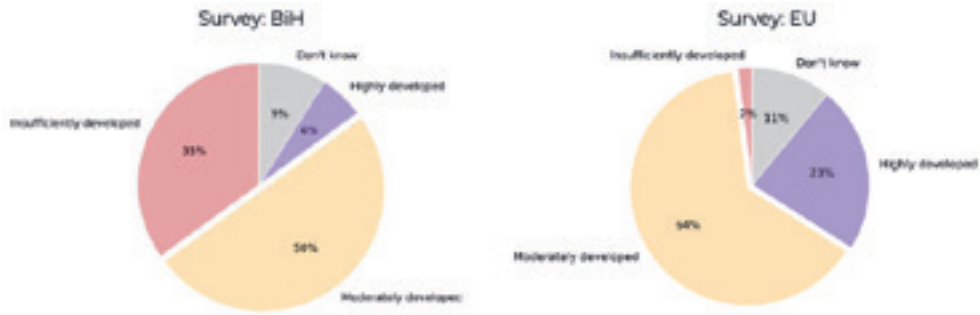

Chart 3. The level of digitalization of traditional retail outlets

Source: Author's own research results

According to the data presented in chart 4, which illustrates the anticipated future trends in online shopping in BiH and the EU, the majority of respondents in BiH (56%) expect a greater integration of online and traditional retail channels, indicating a growing emphasis on omnichannel strategies in the domestic market. Personalization is also recognized as a significant trend, with 37% of participants expecting more personalized products and services, while 33% anticipate the adoption of advanced technologies such as artificial intelligence (AI), augmented reality (AR), and similar innovations. Notably, only 15% foresee a complete transition to online shopping, suggesting that traditional retail will continue to play a strong role in the foreseeable future.

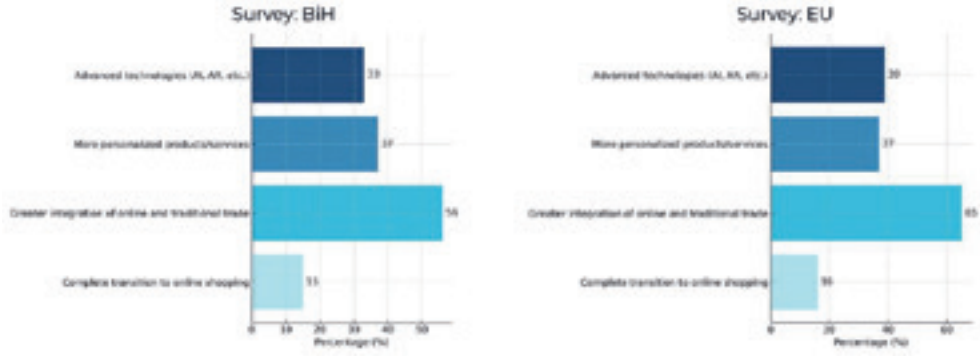

Chart 4. Anticipated future trends in online shopping

Source: Author's own research results

In the EU, expectations follow a similar pattern but with a slightly stronger inclination toward innovation. The highest proportion of respondents (65%) predict greater integration of online and traditional commerce, reflecting a mature approach to omnichannel retailing. The adoption of advanced technologies is anticipated by 39% of respondents, slightly higher than in BiH, while 37% expect an increase in personalized products and services. Similar to BiH, only 16% foresee a complete shift to online shopping.

These findings highlight a shared global trend toward omnichannel strategies and the integration of emerging technologies, while also indicating that traditional retail will remain relevant in both markets. However, the slightly higher emphasis on technological advancement in the EU suggests a faster pace of digital transformation compared to BiH.

Answers to research questions and hypothesis evaluation

Hypothesis 1: Consumers perceive e-commerce as more convenient and efficient compared to traditional retail, primarily due to time savings, a wider product range, and greater access to information.

The first hypothesis is partially confirmed by the research results. Findings indicate that e-commerce offers numerous advantages, particularly for consumers in the EU: a broader selection, easier access to information, and greater purchasing flexibility. However, in Bosnia and Herzegovina, online shopping is still in a developmental phase. While its benefits are recognized, a significant proportion of users express concerns regarding payment security and delivery reliability. Only 4% of BiH respondents shop exclusively online, compared to 25% in the EU.

Hypothesis 2: Physical stores continue to play a significant role in the consumer experience due to trust, the possibility of direct product inspection, and personal interaction.

The second hypothesis is confirmed by the research results. Respondents from both regions (BiH and EU) still show a strong preference for physical stores 66% in BiH and 45% in the EU primarily shop through traditional channels. The key advantages of physical stores include personalized experiences, the ability to directly examine products, the presence of knowledgeable staff, and the sense of trust associated with in-store purchases.

Hypothesis 3: Combined sales models (omnichannel), which integrate online and offline retail, represent the most effective response to the needs of modern consumers.

The third hypothesis is confirmed by the research results. Approximately 30% of respondents in both regions reported shopping equally online and in physical stores, indicating the growing popularity of a hybrid approach. Retail chains increasingly combine digital tools (loyalty programs, chatbots, click-and-collect services) with traditional sales channels, offering consumers greater flexibility and accommodating various purchasing behaviors.

RQ 1: Is e-commerce superior to traditional retail?

E-commerce offers numerous advantages in terms of accessibility, product range, and time efficiency. It is particularly recognized as more effective in the EU, where a larger proportion of consumers prefer online shopping. However, in BiH, traditional retail still dominates due to lower levels of trust in online payments, delivery challenges, and limited digital literacy.

Conclusion: E-commerce is not universally superior its dominance depends on market conditions, digital infrastructure, and consumer habits.

RQ 2: Do physical stores have a future in the digital era?

Yes, physical stores retain a crucial role in retail. Consumers value them for the ability to physically inspect products, the in-person shopping experience, assistance from staff, and the trust fostered through direct interaction. Many brick-and-mortar stores are adapting by incorporating digital elements such as mobile applications, loyalty programs, online ordering, and click-and-collect options.

Conclusion: Physical stores have a future, but only through transformation and adaptation to the digital expectations of modern consumers.

RQ 3: How can the retail sector optimally combine both approaches to meet the

needs of modern consumers?

The optimal solution is the omnichannel model, which merges online and offline sales channels. This includes allowing customers to browse products online and purchase in-store, offering click-and-collect services, implementing digital loyalty programs, and integrating customer support through chatbots and social media.

Conclusion: Hybrid models provide the best consumer experience, foster loyalty, and appeal to a broader range of purchasing preferences.

CONCLUSION

The thesis titled "Retail in the Era of Digitalization and Marketing: E-Commerce as a Challenge to the Traditional Retail Model" addresses the contemporary transformations in the retail sector driven by digitalization and the advancement of information technologies. Through theoretical analysis, global trend examination, and empirical research among consumers in Bosnia and Herzegovina and the European Union, the study offers a comprehensive insight into shifts in consumer behavior, the role of digital marketing, and the challenges faced by traditional retail.

The objective was to identify, through comparative analysis of traditional and electronic retail, the key advantages, disadvantages, and opportunities of both models, and to determine whether e-commerce poses a threat to traditional sales formats or can complement them. In this context, three research hypotheses and three research questions were formulated.

The answers to the research questions (RQ) further confirm that e-commerce is not a universally superior form of retail; its effectiveness depends on factors such as digital literacy, market maturity, and consumer habits. Physical stores have a future, but only if they adapt to the demands of the digital age. The optimal strategy for the retail sector lies in models that combine the strengths of both worlds-the convenience and speed of e-commerce with the trust and personal touch of traditional shopping.

In conclusion, digital transformation does not signify the end of traditional retail, but rather its evolution. Success in the modern retail environment depends on adaptability, innovation, and consumer-centric approaches. This research can serve as a basis for further studies on consumer behavior in the digital environment, as well as guidance for businesses seeking to enhance their sales strategies in line with technological and societal changes.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

BRIDGING THE GAP: THE ROLE OF SOFT SKILLS AND DIGITALIZATION IN CURRENT EMPLOYEE TRAINING AND DEVELOPMENT

Vasilii Ostin | Ing. (M.Sc. equiv.), B.A., Department of Business Administration and Management, Faculty of Economics, Technical University of Liberec, Liberec, Czech Republic, vasilii.ostin@tul.cz; ORCID ID: 0000-0001-8284-3148

Abstract: *This study investigates current trends in employee training and development within the automotive industry, with a special focus on the growing importance of soft skills and digitalization. The main objective is to identify the key factors influencing modern approaches to workforce development in this dynamic sector. To explore these evolving trends, the research adopted a mixed-method approach, combining both qualitative and quantitative data collection.*

As part of the qualitative phase, four semi-structured interviews were conducted with representatives from small, medium, and large automotive companies. These interviews offered in-depth insights into organizational strategies and challenges related to employee learning and growth. In addition, a questionnaire survey was carried out to gather employees' views, preferences, and expectations regarding training opportunities and professional development.

The findings from both methods present valuable recommendations for automotive enterprises seeking to improve or redesign their training programs. By addressing current workforce needs while also anticipating future industry demands, this research helps close the gap between theory and practice. Ultimately, the study offers a well-rounded and forward-looking perspective on the future of employee development in the automotive field.

Keywords: *learning, development, automotive, soft skills, digitalisation*

JEL classification: *M53, M15, O33*

INTRODUCTION

Today's automotive industry is going through a time of major change, driven by challenges and crises happening around the world (Hašková & Zatkalík, 2018). This is especially true in Europe, where even the most well-known car brands are being pushed to adapt quickly. From the fast pace of digitalization to evolving market trends, changing customer expectations, and how employees feel about their roles—there's

a lot shaping the future of the industry (Mazurchenko & Zelenka, 2022). That's why understanding how people grow and develop within this space—especially when it comes to human resources, is more important than ever (Modupe, 2023). It not only helps companies navigate these changes more effectively but also creates opportunities to improve how teams work and how businesses run overall (Brassey, 2019).

As automotive companies embrace new technologies and work toward more sustainable practices, one thing becomes clear: success depends on people (Kacprzak, Krol, & Wielewska, 2017). To keep up with rapid changes and deliver meaningful results, these companies need to not only attract fresh talent but also create an environment that encourages skilled employees to stay and grow (Chung & Huang, 2022). This shift in the industry calls for more than just innovation under the hood—it requires thoughtful, forward-looking approaches to developing talent (Phuyal, Bista, & Bista, 2020). Investing in employee growth through learning opportunities, upskilling, and career development isn't just beneficial—it's essential. These efforts help build a workforce that's adaptable, engaged, and ready to take on the challenges of a fast-evolving industry, ultimately strengthening the company from the inside out (Ayub & Kusumadewi, 2021).

The fast pace of technological change and new regulations is having a profound impact on the people working in the automotive industry. For decades, car manufacturing has been a cornerstone of employment in Europe—providing jobs to over 3.1 million people in manufacturing and another 3.6 million in sales and maintenance as of 2024. But today, the skills needed to thrive in this industry are shifting quickly (Weber, Leončikas, Hurley, & Dragos, 2025)

It's no longer just about technical know-how. There's a growing recognition that soft skills—like adaptability, communication, and teamwork—are just as important (Firmansyah & Soeharto, 2020). As the industry undergoes complex transformations, workers at every level are being called on to think critically, solve problems creatively, and collaborate across disciplines (Ostin, 2023). The future of skills captured this well, noting that continuous innovation and strong interpersonal abilities will be essential, no matter the role (Akla & Indradewa, 2022)

Apart from the development of job-specific professional skills, the growing importance of soft skills in today's industries is critical, including the automotive sector (Bošković, 2021). According to Holt (2018), soft skills within the automotive industry can be categorized into distinct groups to facilitate targeted development. The author identifies communication, teamwork, employee engagement, ethical decision-making, and problem-solving as the most crucial skills for modern enterprise (Holt, 2018). Based on these categories, employers can focus on key individual attributes and address potential challenges to enhance overall company performance and value (Deutscher & Braunstein, 2023).

The development of soft skills in today's digitalized society is particularly essential, given the wide range of interpersonal interactions involved in professional environments. Nevertheless, it can be argued that the digital nature of modern communication does not hinder the development of soft skills but rather enhances and supports their effectiveness (Bucchiarone, 2022). Various digital tools and technologies enable employees to improve their communication skills, increase their awareness of high-pressure situations, develop problem-solving abilities, and foster team collabora-

tion (Melnychenko , Lositska, & Bieliaieva, 2021). Based on the above-stated foundation and current literature review, it is possible to recognize the existing lack of research on the topic, concretely exploring automotive employee development with a primary focus on the soft skills and digital approach interconnection (Hašková & Zatkalík, 2018). As human capital becomes more valuable for contemporary businesses, its development becomes more reasonable for achieving company effectiveness and competitiveness in the market (Kacprzak, Krol, & Wielewska, 2017).

This research aims to explore how two important elements—employee soft skills and digital tools—can work together to boost efficiency in the automotive industry. It takes a closer look at how both employees and employers perceive these aspects, and how they come together in real workplace settings. By understanding how people interact with technology and with each other, this study hopes to shed light on how a balanced blend of human strengths and digital solutions can create a more effective and collaborative work environment.

METHODOLOGY

To achieve the objectives of the research and gain a deeper understanding of current trends in training and development within the automotive sector, the author adopted a mixed-methods approach. This included conducting semi-structured interviews and distributing a questionnaire survey. The semi-structured interviews proved especially valuable, as they allowed for a more detailed exploration of the unique characteristics of employee development practices within the Central European automotive industry. In total, four interviews were conducted with professionals working as learning and development managers. These conversations provided rich qualitative insights, highlighting specific strategies and challenges faced by companies in the region. To ensure confidentiality, each participating organization was anonymized and identified using generic labels (Company 1 to Company 4). All interviews took place during the year 2023, with each session lasting approximately one hour. The detailed background information about the companies involved is presented in Table 1.

Table 1. Detailed information about companies

Characteristics	Company 1	Company 2	Company 3	Company 4
Number of employees	8,000	2,000	70	60
Main sector	Manufacturing (Automotive)	Manufacturing (Automotive)	Services (Marketing)	Services (Learning and Development)
Interviewer	L&D manager	L&D manager	L&D manager	L&D manager
Planned budget for learning and development	Yes, central budget	Yes, central budget	Yes, central budget	Yes, central budget

Source: Author own elaboration

After the interviews, the author carefully analyzed and categorized the responses to identify common patterns and themes that align with the research goals. While the number of interviews was limited, the depth and relevance of the information gathered made a significant contribution to addressing the research questions. These findings

complement the quantitative data from the questionnaire and together form a strong basis for the conclusions presented in this study.

Building on the insights gained from the semi-structured interviews and the initial data analysis, the author proceeded with a questionnaire survey to further explore employee attitudes toward learning and development. This survey was conducted in May 2024 within a Czech-based automotive enterprise. Its main aim was to gather employees' views, intentions, and perceptions related to various aspects of workplace training and professional growth.

The questionnaire achieved a response rate of 62%, resulting in 68 completed responses. To measure opinions effectively, the survey used a 7-point Likert scale, which was chosen based on its proven reliability and suitability for this type of research, as supported by the literature (Korkut & Arslan, 2016). The collected responses were subjected to statistical analysis in order to uncover key trends and patterns connected to employee learning behaviors and development needs. This step added a valuable quantitative perspective to the study, complementing the qualitative results from the interviews. Together, the two methods provided a more comprehensive understanding of how learning and development are perceived and practiced within the selected company.

research results

The qualitative findings of this research provided important insights into how automotive companies perceive the evolving balance between technical and soft skills. A recurring theme across all interviews was the recognition that this balance is becoming increasingly crucial for organizational success. Company representatives consistently emphasized that while technical expertise remains essential, the role of soft skills has grown significantly in recent years.

Table 2. Thematic outcomes on soft skills and digitalization in employee training and development

Dimension	Findings from Interviews	Illustrative Examples (Companies)
Soft Skills – Current Focus	Strong and increasing emphasis on soft skills across all companies; included in most training programs.	Teamwork, communication, leadership, customer orientation (Company 1–4).
Soft Skills – Future Needs	Expected to dominate future competence frameworks; associated with adaptability and "human touch."	Lifelong learning, individualization of skills, change management (Company 1–4).
Digitalization – Current Practices	Digitalization already present in training programs; used both for technical and soft skills.	eLearning platforms, AI/VR training, chatbots, digital academies (Company 1–4).
Digitalization – Future Outlook	Seen as a strategic necessity; integration expected to expand further.	Microlearning, virtual reality simulations, self-learning digital tools (Company 1–3).

Source: Author own elaboration

One perspective stands out in particular—that of Company 1, where the learning and development manager holds responsibility for more than 8,000 employees. This representative explained that while the company's training strategy in the early 2000s was focused almost entirely on technical skills, the approach has shifted considerably

over the past decade. Since around 2015, there has been a sharp rise in the demand for soft skills, and today nearly two-thirds of all training activities are dedicated to areas such as teamwork, communication, negotiation, and customer-oriented thinking. This evolution reflects a wider recognition that even highly technical roles—such as those in engineering, IT, and production—now require employees to demonstrate strong interpersonal, collaborative, and problem-solving abilities in order to succeed.

Comparable patterns were also identified in Companies 2, 3, and 4. Their representatives described how they are actively working to design and implement training programs that encourage team spirit, strengthen communication, and support adaptability in the face of rapid industry change. Taken together, these findings highlight a clear and consistent message: technical expertise alone is no longer sufficient for meeting the challenges of today's automotive sector. Instead, companies increasingly view the development of soft skills as a vital part of preparing their workforce for both current demands and future transformations.

Beyond soft skills, all participating companies pointed to a rising need for training in digital technologies, with particular emphasis on artificial intelligence, virtual reality, and advanced e-learning platforms. The COVID-19 pandemic accelerated this transformation, yet many organizations are still in the process of developing comprehensive strategies to integrate digital tools effectively. For now, much of the momentum seems to come from employee interest and expectations rather than from fully established internal frameworks.

At the same time, digitalization is not limited to technical upskilling. Increasingly, companies are also using digital tools to strengthen soft skills. An innovative example comes from Company 2, which introduced virtual reality scenarios where employees practice interactions with virtual customers. These immersive simulations are designed to enhance communication and negotiation abilities, providing a creative and highly engaging approach to professional development.

Building on the insights gathered from company representatives, the research was extended with a quantitative approach to better understand how employees themselves perceive the changing landscape of learning and development—particularly in relation to digital tools. While the qualitative phase highlighted organizational strategies and priorities, this stage of the study aimed to capture the voices of those directly involved: the employees. The focus was on examining their perceptions of digital learning, as well as their readiness and willingness to adopt new technologies for self-directed development.

A specific area of interest was the "pre-training" phase—how employees prepare for learning opportunities and to what extent they are open to incorporating digital resources into their own development paths. Instead of simply assessing the structure of formal corporate training programs, the study sought to uncover individual learning behaviors. Key questions included whether employees use digital platforms on their own initiative and whether they feel confident in exploring new tools to support their growth.

The results were highly encouraging. Data showed that 57% of respondents regularly use digital tools on a daily basis to support their personal learning journeys, while another 26% reported using such tools weekly. Only 10% indicated that they rarely engage with digital solutions for self-development. These findings clearly sug-

gest that employees are not only open to digital learning but are already actively integrating it into their routines. This demonstrates a growing shift in mindset, where continuous learning is increasingly driven by individual initiative, supported by accessible and user-friendly digital resources.

For organizations, these results represent a valuable opportunity. By building on employees' existing engagement with technology, companies can design training programs that align corporate objectives with personal learning habits. In this way, the future of workforce development is likely to depend on bridging structured organizational strategies with self-directed learning behaviors—an area where digital tools are emerging as a powerful connector.

DISCUSSION AND CONCLUSION

The findings from both the literature review and the empirical study offer valuable insights into the increasingly important role that soft skills play in today's business landscape—particularly within the automotive industry. As companies continue to undergo rapid digital transformation, soft skills are emerging as a critical component in navigating these changes. In the context of digitalization and the adoption of new technologies, the learning and development environment is evolving at an accelerated pace. These shifts are not only redefining technical requirements but also placing greater emphasis on human-centered capabilities.

Based on the empirical data collected, it is increasingly clear that soft skills are no longer considered a secondary or optional element of employee development. In fact, they are emerging as a new standard and an essential part of professional growth. This marks a significant shift from earlier decades, when technical expertise was seen as the main driver of success and soft skills were often treated as complementary. Today, organizations across the automotive sector recognize that technical knowledge alone is not sufficient to deal with the growing complexity of modern workplaces. What is particularly interesting is that the demand for soft skills is not only being encouraged by employers but also strongly expressed by employees themselves. Workers are showing a greater awareness of the importance of personal qualities such as communication, empathy, adaptability, and teamwork, and they are increasingly asking for opportunities to develop them.

This change can be understood in the context of highly digitalized work environments. While digital tools and platforms make processes faster, more efficient, and often more cost-effective, they also carry the risk of reducing human interaction to brief, transactional exchanges. Daily communication may happen through emails, instant messaging, or automated systems, which, while practical, do not always create the space for deeper dialogue or the building of trust. As a result, many employees feel the need for more meaningful engagement with their colleagues and managers. They want to strengthen collaboration, share knowledge in a more personal way, and feel part of a community rather than just a process. This explains why training programs focused on soft skills such as leadership, negotiation, conflict resolution, and team building are receiving such strong interest from employees themselves.

At the same time, the relationship between digital tools and soft skills has also evolved. These two areas are no longer seen as separate or even as competing priorities. Instead, they are becoming increasingly interconnected and mutually reinforcing.

Digital tools are not only used to teach technical knowledge but also to create innovative and engaging opportunities for developing interpersonal abilities. For example, virtual reality environments allow employees to practice negotiation or customer interaction scenarios in a safe, simulated space. E-learning platforms provide interactive content that encourages reflection and peer-to-peer communication. Collaborative tools support teamwork by enabling shared problem-solving across distances. In these ways, technology becomes a driver of soft skill development rather than a barrier to it.

On the other side, soft skills also enhance the use of digital technologies. Employees who are adaptable, open to change, and comfortable with continuous learning are more likely to embrace new platforms, experiment with innovative tools, and integrate them successfully into their work routines. Skills such as critical thinking and problem-solving help workers evaluate digital solutions effectively and apply them in ways that truly improve performance. In this sense, soft skills and digitalization form a kind of partnership: one provides the human dimension, while the other offers the technical means.

This collaborative dynamic holds great potential for the future of training and development. By combining strong human qualities with effective digital tools, organizations can design programs that are both efficient and personally meaningful. Employees are not only trained to perform their tasks but also encouraged to grow as individuals and as members of a team. Such an integrated approach supports higher motivation, greater job satisfaction, and improved organizational performance. Ultimately, the evidence suggests that the future of workforce development lies not in choosing between technology and human skills, but in building bridges between them—creating a balanced and forward-looking model where each strengthens the other.

It is important to recognize, however, that this research provides only a snapshot of a much larger and more complex transformation: the ongoing evolution of learning and development in the digital era. As with any study, certain limitations should be acknowledged. The sample of interview participants was relatively small, which means that the qualitative findings, while insightful, cannot be assumed to represent the entire automotive sector. Further in-depth qualitative research would therefore be useful to confirm and expand upon the preliminary trends identified in this study. In addition, the quantitative survey was conducted within a single Central European country. While this offers valuable regional insight, it may also restrict the wider applicability of the results to other cultural and organizational contexts. To strengthen and generalize the conclusions, future research should aim to include a broader range of companies, industries, and cultural environments.

Despite these limitations, the study makes a meaningful contribution by highlighting how soft skills and digitalization are increasingly interconnected within modern learning and development practices. It shows that employees and organizations alike recognize the value of balancing human-centered competencies with technological innovations. Exploring this intersection more deeply could bring significant benefits, not only for academic theory but also for practical applications in the workplace. As the world of work continues to evolve—driven by rapid technological change, new business models, and shifting employee expectations—understanding how soft skills and digital tools reinforce one another will remain a vital area of study. Ultimately, this research serves as a starting point, offering insights that can inspire further inves-

tigation and support organizations in designing training strategies that prepare their workforce for the challenges and opportunities of the future.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

THE IMPACT OF COMMUNICATION SKILLS AND POLITENESS ON TOURIST SATISFACTION: EVIDENCE FROM BATAM ISLAND HOTELS

Afriana Lecturer, Social Sciences and Humanities, University of Putera Batam, Jalan R. Soeprapto, Muka Kuning, Kibing, Kec. Batu Aji, Batam, Riau Islands, 29434, Indonesia, PhD Candidate (Linguistics), Universiti Tun Hussein Onn Malaysia (UTHM), PPUK, Malaysia, afriana@puterabatam.ac.id; gl190012@student.uthm.edu.my; afrianaupb@gmail.com; ORCID ID: 0000-0001-9603-8983

Imran Aslan Prof.Dr., Health Management Department, Faculty of Health Science, Bingöl University, Selahaddin-i Eyyubi, Üniversite Caddesi No:1, 12000, Bingöl, Türkiye, imranaslan@gmail.com; iaslan@bingol.edu.tr; ORCID ID 0000-0001-5307-4474

Abstract: *Communication skills, particularly digital competencies and polite behaviour, play a crucial role in enhancing tourists' satisfaction and supporting tourism marketing, ultimately contributing to increased tourist arrivals and economic benefits. This study aimed to examine how tourists search for and select hotels, assess the level of politeness demonstrated by hotel staff, and evaluate the impact of communication skills and politeness on tourists' satisfaction. The research was conducted among hotel guests who stayed in hotels on Batam Island, Indonesia, and focused on five dimensions of communication: written, oral, listening, digital, and non-verbal communication, together with perceived politeness. Data were collected through an online survey of 285 tourists in 2023, using a purposive sampling method. Descriptive statistics, correlation analysis, and regression analysis were employed to analyse the data. The findings indicate that social media platforms and friends' recommendations were the most frequently used methods for finding hotels. When choosing a hotel, tourists placed greater importance on cost, room and bed specifications, and cleanliness. Additional factors influencing tourist satisfaction included hotel scenery, enjoyable experiences, and the establishment of trust, honesty, credibility, and positive interactions with hotel staff. The results reveal significant correlations between communication skills, politeness, and tourist satisfaction. Satisfaction was found to be strongly associated with linguistic politeness and digital communication skills, both of which emerged as strong predictors of hotel guests' satisfaction. Listening communication skills were also a significant predictor; however, they showed a negative relationship with satisfaction. These findings suggest that hospitality organisations should integrate digital communication and politeness training into staff development programmes and implement systematic feedback mechanisms to monitor service quality and guest satisfaction. Overall, this study*

provides practical insights that can assist hotel managers in developing effective marketing and service strategies to attract more tourists to Batam Island.

Keywords: *Batam Island, Communication Skills, Hospitality, Politeness Strategies, Satisfaction*

JEL classification: *M30, L83, Z32*

INTRODUCTION

Tourism plays a pivotal role in a country's development by enhancing tourist satisfaction, which subsequently drives tourism growth and boosts the economy. Therefore, an effective communication strategy between hotel guests and tourists is instrumental in increasing tourist arrivals (Achmad et al., 2023; Achmad et al., 2023b; Septiana & Hariyanti, 2023). The significance of external communication in the tourism and hospitality industry is heightened because it involves far more than the mere exchange of information. Language proficiency, digital information and communication skills are critical components that contribute to customer satisfaction. Communication strategies, interpersonal skills and professional attitudes are essential for enhancing tourists' enjoyment and overall satisfaction in the service sector. In addition, employees' politeness strategies significantly influence customers' perceptions of service quality (Lolli, 2013b; Zhang et al., 2021; Zhu et al., 2006).

As tourism continues to expand rapidly in Indonesia, hospitality professionals must develop effective communication skills to meet industry demands (Rahayu, 2019). Employees' external communication abilities and soft skills such as politeness play a pivotal role in ensuring tourist satisfaction, which is crucial for making guests feel valued and content (Cuic Tankovic et al., 2023). Multiculturalism is a key consideration in the tourism sector (Goby, 2007). Oral communication skills and cross-cultural linguistic politeness must align with the expectations of multicultural and international tourists in order to cater to their needs, as their satisfaction directly impacts hotel performance (Dunbar et al., 2006). Identifying the most effective aspects of customer communication styles is therefore, essential (Kang and Hyun, 2012). Hotel staff should modify their communication skills by employing either negative or positive politeness strategies based on the context, while tour guides must possess exceptional communication skills to satisfy international tourists (Gesimba et al., 2023; Kusumarini, 2021). Consequently, understanding and correctly applying politeness norms is vital for employees (Purnomo, 2014). The friendly, credible, trustworthy and competent behaviour of service employees significantly influences their interactions with customers. Moreover, qualities such as friendliness, responsiveness and enthusiasm positively impact customer satisfaction in the context of how service delivery and quality is perceived (Sundaram & Webster, 2000).

The advancement of digitalization in the tourism sector has led to digital reviews through visitor feedback for prominent tourist destinations becoming an invaluable tool for guiding tourists to their preferred locations (Alamsyah et al., 2024). Hotel staff must cultivate advanced digital skills to address tourists' requirements and enhance their satisfaction. Technical skills alone are insufficient to meet the diverse needs

and expectations of tourists. The performance of any hotel is significantly influenced by its employees' communication skills and politeness. Positive interactions between tourists and staff are essential for ensuring a pleasant and satisfying stay. Specific psychological factors, such as an individual's emotions, should be considered when communicating with hotel guests. Nonverbal communication elements, such as appropriate gestures, formal posture, professional attire and maintaining eye contact, are also critical during interactions. Evaluating the importance of communication skills from a traveller's perspective helps to analyse the influence these skills have on service perceptions. The ability to listen attentively and speak clearly is crucial for performing work-related tasks. Employees in direct contact with guests must be effective communicators in order to create a welcoming and positive environment.

Although there has been a lot of research on customer satisfaction and service quality in the hotel and tourism industry, there is still not much understanding of how different communication skills(written, oral, listening, digital, and non-verbal) —especially digital communication and politeness influence tourists satisfaction. Additionally, while politeness has been acknowledged as a soft skill in service encounters, its empirical relationship with guest satisfaction in the digital communication era remains insufficiently examined. Most studies focus on general service attributes in well-known destinations, overlooking emerging areas such as Batam Island in Indonesia. Furthermore, the empirical relationship between politeness and satisfaction in the digital era is under-researched, as is the link between interpersonal communication and organisational strategies. This study addresses these gaps by examining the relationship between communication skills, politeness and guest satisfaction in the hotel sector on Batam Island. Specifically, the study aims to: (1) ways of finding a hotel and reasons for choosing a hotel (2) analyse communication between staff and tourists; (3) assess staff politeness; (4) evaluate the impact of communication and politeness on satisfaction; and (5) identify key communication predictors of the guest satisfaction. The study makes a theoretical contribution by bringing together different aspects of communication in the field of hospitality research and by highlighting new factors that can influence customer satisfaction. It provides hotel managers with practical, data-driven recommendations for improving guest experience. These recommendations focus on targeted communication and politeness strategies, especially in digital contexts.

THEORETICAL BACKGROUND

Communication, as a vital marketing tool in the tourism sector, is not only about what is said but also how it is expressed. Non-verbal communication (body movements, gestures etc.) and digital communication methods complement oral communication. Wesley et al. (2017) emphasized that communication is a critical skill in tourism. The ability to communicate effectively and engagingly significantly impacts guests' level of enjoyment. As for hotel employees, polite and effective communication with guests, colleagues and managers is essential for a smooth implementation of daily tasks (Carlisle et al., 2021; Dunbar et al., 2006). A lack of communication skills with external customers can significantly hinder the tourism industry, where clear and expressive interaction between hotel staff and customers is essential for smooth and effective engagement (Lolli, 2013; Cuic Tankovic et al., 2023, 2023; Nikolich & Sparks, 1995). In the hotel industry, workers' skills are intangible yet integral aspects of service

delivery and interpersonal relationships with customers, directly influencing service satisfaction (Nikolich & Sparks, 1995).

Key elements of communication include, speaking appropriately, clearly and meaningfully, presenting ideas in a structured manner, active listening, selecting the most suitable communication methods, organizing messages, assessing, understanding and providing well-supported information, as well as using correct grammar, pronunciation and non-verbal cues such as gestures, posture and eye contact (Cuic Tankovic et al., 2023; Carlisle et al., 2021; Dunbar et al., 2006). Communication that contains elements of attentiveness, friendliness, persuasiveness, openness and a relaxed atmosphere enhances customer-oriented employee service that results in positive and productive relationships between hotels' employees and external customers. This approach positively influences long-term customer relationships and enhances financial performance. Non-verbal communication at service counters also complements verbal communication skills, making it an essential attribute in today's competitive tourism sector (Dunbar et al., 2006; Paksoy et al., 2017; Sundaram & Webster, 2000; Zerfass et al., 2017; Wang et al., 2009). Advanced communication skills include argumentation, audience analysis, valuing diverse cultural perspectives, identifying key issues, reasoning effectively and understanding others to manage conflicts. Conversations, traditionally viewed as conflict-free, are most effective when all parties can meet each other's needs and interests (Dunbar et al., 2006; Jones, 1994). Acknowledging customers, greeting them with a smile, and speaking in a sincere and friendly tone help service providers make customers feel valued and appreciated (Kang & Hyun, 2012). Non-verbal communication, including appropriate gestures, formal attire and maintaining eye contact, plays a significant role in interactions with guests (Ferrari, 2014; Waldeck et al., 2012).

Yule (1996) defined politeness as "*a system of interpersonal relations that reduces the possibility of conflict and confrontation present in every human interaction, thereby facilitating engagement*". Politeness strategies involve communication skills that facilitate the exchange of thoughts, ideas and messages to provide clear information and instructions (Chairat, 2016; Ryabova, 2015). Linguistic skills can be categorized into relational/interpersonal communication, mediated/intergroup communication, communication of enthusiasm, creativity, entrepreneurship, non-verbal communication and speaking/listening (Chairat, 2016; Ryabova, 2015). Linguistic style significantly influences the satisfaction of national and international tourists (Almasoodi & Rahman, 2022). Attributes such as attentiveness, politeness, openness and relaxation are beneficial for customer orientation, whereas argumentative tones, harsh refusals or excessive apologies for mistakes negatively impact customer-oriented service (Kang & Hyun, 2012). Verbal and non-verbal messages should align with politeness strategies as a hallmark of hospitality. Business interactions necessitate politeness through two-way communication channels to ensure clarity and avoid miscommunication. Additionally, adjustments in speech speed or volume can enhance understanding (Nikolich & Sparks, 1995).

Written communication skills

Writing, whether in the form of a text or a letter, plays a crucial role in effective communication. In the hotel industry, writing skills are primarily used for email cor-

respondence, note-taking during telephone conversations and drafting messages for customers. A strong command of grammar and vocabulary, especially in a foreign language, is essential for clear and logical communication. Key components of writing skills include academic writing, revising and editing, critical reading, and presenting data. The ability to present data accurately and in a verifiable manner is an integral aspect of professional communication. As technology evolves, virtual communication channels, such as social networking sites, blogs, texting and instant messaging, have become vital tools in the hospitality industry. Formal and well-crafted writing is necessary to avoid confusion and maintain guest satisfaction. A lack of adequate writing and reading skills can lead to significant misunderstandings and diminish the overall guest experience (Lolli, 2013b; Pankaew et al., 2021). In addition, the ability to tailor writing for diverse customer needs and adapt to various formats is a critical skill for hotel staff. Hotels can ensure higher levels of guest satisfaction and professionalism by employing formal and effective written communication.

H_1: *Written communication skills are the predictors of the satisfaction of hotel guests.*

Non-verbal communication skills scales

Non-verbal communication in the service industry includes kinetic, physical and non-verbal expressions, such as body movements, kinesiology, smiling, facial expressions, relaxed demeanour, open attitude, eye contact, nodding and other similar gestures (Sundaram & Webster, 2000). Non-verbal communication skills that are either consciously or unconsciously integrated into dialogue do convey social messages known as non-verbal cues. These cues are instrumental in building involvement, closeness, intimacy, and even dominance. Remarkably, they account for nearly 70% of all communication, thus, underscoring their significance. Non-verbal communication is as impactful as verbal communication and influences employee-customer interactions, while accounting for nearly half of the variability in interpersonal communication responses (Barnum & Wolniansky, 1989; Sundaram & Webster, 2000).

Staff must be mindful of various aspects, including tone of voice, speech speed, vocal intensity, proxemics (relative distance and stance during interactions), and physical appearance. Building intimacy through politeness and friendliness involves specific non-verbal actions, such as leaning forward, maintaining an open posture, frequent eye contact, mild humour and relaxed smiles. These behaviours shape the receiver's perception of the communicator's authority, conviction, politeness and warmth. For example, likeability, credibility and satisfaction are strongly associated with eye contact. Verbal and non-verbal indicators can effectively convey interpersonal warmth. An employee's smile or sustained eye contact can reassure hotel guests by conveying emotions like concern, kindness and compassion. Greetings accompanied by a firm handshake, nod or eye contact enhances customers' perception of honesty, trustworthiness, friendliness and courtesy. Moreover, the strategic use of touch in service delivery can make clients feel more approachable and empathetic. However, leaning backward, adopting a closed posture, or avoiding eye contact can be perceived as unfriendly and emotionally distant, which potentially leads to customer dissatisfaction. Behaviours such as finger-pointing, closed postures or sparse/intense eye contact can communicate carelessness, authority or superiority, which could alienate customers and harm

their experience (Siddiq et al., 2016; Sundaram & Webster, 2000). This study explored various facets of non-verbal communication, including maintaining eye contact during interactions, using appropriate gestures, wearing professional attire, building trust and credibility, appearing sincere and trustworthy, demonstrating genuine understanding, and employing culturally appropriate communication skills.

H_2: *Non-verbal communication skills are the predictors of hotel guests' satisfaction*

Oral communication skills

Oral communication involves the ability to effectively articulate thoughts and is one of the most widely used and essential competencies. It includes skills such as presenting, active listening and utilizing body language, all of which are integral to effective communication (Maes et al., 1997). Oral communication is crucial for responsible citizenship and professional success. Misunderstandings with customers are likely to occur if there is a lack of strong oral communication skills. In the hospitality industry, effective oral communication is indispensable for handling telephone calls, managing check-ins and check-outs, greeting and welcoming guests, and providing clear explanation of information. It is also vital for negotiation, offering suggestions, presenting solutions and appropriately confirming information or inquiries (Dunbar et al., 2006; Pankaew et al., 2021). According to Sundaram and Webster (2000), verbal behaviours, such as polite greetings, significantly influence customers' perceptions of an employee's friendliness, thereby enhancing the perceived quality of service and overall tourist satisfaction. Inadequate vocabulary when explaining/correcting errors or negotiating can lead to ineffective communication. In order to meet the needs of tourists and ensure their satisfaction, hotel employees must adapt their speaking style to the audience and context, deliver clear and structured presentations and convey complex ideas in a coherent and precise manner through well-organized language.

H_3: *Oral communication skills are the predictors of satisfaction of hotel guests.*

Listening communication skills

Listening entails actively receiving, interpreting and responding to a communicated message. It involves not only hearing but also comprehending and processing the underlying meaning of the message, which is a critical mental task (Krizan et al., 2008). Effective listening is especially crucial in scenarios like telephone conversations, understanding customers' requests and addressing complaints, as these require strong listening skills, which is an essential component of interpersonal communication (Pankaew et al., 2021). Key listening skills include active participation in meetings, attentively hearing messages, focusing on the speaker, understanding and identifying key concepts, recalling information and critically evaluating both the communication and the speaker (Cuic Tankovic et al., 2023). Listening attentively helps employees to better understand customer needs, identify core issues and take appropriate action to resolve concerns and conflicts. This not only enhances customer satisfaction but also builds loyalty by demonstrating respect and empathy, ultimately contributing to the prosperity of the hotel. Furthermore, the ability to grasp, remember and accurately interpret messages can significantly boost productivity and strengthen teamwork. Empathetic listening helps build trust and collaboration, leading to a more cohesive and

effective workplace environment (Stay Express, 2024).

H_4: *listening communication skills are the predictors of hotel guests' satisfaction*

Digital communication skills

Digital literacy extends beyond basic proficiency in using software and devices, including a complex array of cognitive, social and emotional skills that are required to adapt to contemporary media (Eshet-Alkalai, 2004). Key competencies include accessing, evaluating and sharing digital information, creating digital content, maintaining security and privacy, and using technology for problem-solving (Siddiq et al., 2016). In the hospitality industry, digital tools such as mobile apps streamline travel planning and enhance customer experiences. Mainstream apps like Booking.com, Airbnb, and Expedia allow users to search, compare and book services conveniently. Platforms, like Google Maps, provide real-time information regarding tourist attractions, restaurants and transportation that aid informed decision-making. Mobile payment systems further ensure secure and seamless transactions (Neirotti et al., 2014).

The information, communication, content generation, safety and problem-solving parts of the self-assessment grid were created according to each specific criterion to help in building digital skills in Europe. Digital skills or digital literacy involve efficiently accessing digital information, exploring different digital content while conducting research, providing sources of digital information, assessing the appropriateness and authenticity of information, verifying the accuracy of information and one's own policies, displaying information, sharing information with others, using computer software to generate digital products, providing digital feedback about one's work, and understanding the consequences of making information freely available on the web. Digital skills include the ability to identify, find, access, store, organise and analyse digital information for specific purposes, interact and participate in communities and networks, produce creative expression and media output, maintain personal security and privacy and solve conceptual problems (Ferrari, 2014; Siddiq et al., 2016). Key data pertaining to hotel management include forecasting tourist arrivals, demand and occupancy rates, as well as the analysis of online reviews and its impact on hotel performance. Chatbots are capable of managing a large volume of simultaneous and personalized conversations, leverage sophisticated analytics to promptly interpret customer requirements and provide predictive responses. This streamlines interactions, saves staff time by automating repetitive tasks and promptly resolves customers' inquiries (Calvaresi et al., 2023; Melián-González et al., 2019). Staff should be well-versed in using smart digital applications to effectively adapt and cater for guests' preferences in order to enhance guests' satisfaction and overall hotel performance.

H_5: *Digital communication skills are the predictors of hotel guests' satisfaction*

Linguistic politeness strategies

Yule (1996) defined politeness as, "*the tactics used to demonstrate awareness of another person's face*", with "face" referring to "*a person's public self-image*". Similarly, Brown and Levinson (1987) described "face" as, "*the unhindered freedom to act as well as the gratification of having one's ideals approved*" (Sadeghoghli & Niroomand, 2016). Green (1996) defined politeness as, "*any conduct in which a person displays consideration for another person by attempting to make that person feel at ease or by*

making an evident effort to avoid making that person feel uneasy". Respecting the feelings and self-image of others during interactions is fundamental to politeness. When an individual's sentiments or public self-image are jeopardized, it is perceived as a "face-threatening act" (FTA). According to Brown and Levinson (2017), self-image comprises two components, namely a positive aspect or the desire to be approved and liked by others, as well as a negative aspect or the wish to maintain autonomy and freedom from imposition. Certain expressive acts can harm either the listener's positive or negative "face", or both. FTAs are communicative behaviours that threaten the "face" of the hearer, which speakers aim to avoid in order to maintain effective communication. Politeness strategies for avoiding FTAs emphasize three core principles, such as not imposing, providing options, and making the listener feel comfortable. These principles help to minimize social conflicts and build an environment of rapport. Linguistic politeness mitigates inconvenience and contributes to higher traveller satisfaction. Studies highlight that polite-mannered tour guides can avoid FTAs and enhance traveller experiences (Nudin et al., 2021; Supardi et al., 2019; Dewa, 2017). Politeness strategies are essential for strengthening social bonds by acknowledging the needs and interests of interlocutors. Hence, by showing attentiveness and respect, speakers can create an atmosphere of empathy and friendliness, which imposes positive communication dynamics.

Holtgraves (1997) explored the concept of politeness in conversational arguments and highlighted the importance of politeness strategies in mitigating conflicts and maintaining rapport. The study underscored the role of language in recognizing the "face wants" of interlocutors by addressing their needs, interests and desires. Individuals can build solidarity and shared understanding through the use of positive politeness strategies, thus, creating a positive conversational atmosphere. Similarly, Al-Azzawi (2011) examined compliments as a specific form of positive politeness. The study emphasized the power of compliments as communicative acts that express appreciation, admiration and respect. Individuals can strengthen interpersonal bonds and promote social harmony by integrating politeness strategies into the act of giving compliments. Miyamoto et al. (2017) investigated the application of positive politeness strategies in the human-agent interaction domain to enhance relationships between humans and life-like agents. The research highlighted how adopting positive politeness behaviours, such as expressing interest, offering compliments and using polite language, can improve user experiences. Life-like agents can build trust and rapport with human users by incorporating these strategies, ultimately facilitating more engaging and effective interactions.

Cultural differences play a critical role in shaping communication behaviours and politeness strategies. Goby (2007) described the multicultural dimension of communication as, "*a social space where cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power*". Understanding these differences is vital for professional communication. For example, individualistic cultures, such as those in English-speaking countries, emphasize autonomy and self-disclosure. Conversely, collectivist cultures, like China, prioritize group orientation and communal harmony (Zhu et al., 2006). In Japan, where formal language and customer-centric service are deeply valued, FTAs can significantly lower tourists' satisfaction levels. Tour guides must adhere to Japanese norms of politeness, such as using appropriate

honorifics, since casual or teenage-level politeness forms are often considered impolite in professional contexts (Nudin et al., 2021). Service providers can ensure effective communication and enhance customer satisfaction by understanding and respecting cultural variations.

H_6: *Linguistic politeness strategies are the predictors of hotel guests' satisfaction*

Satisfaction of tourists

According to Paksoy et al. (2017), factors that contribute to satisfaction include experiencing joy and happiness doing one's work while avoiding undesirable behaviours, such as boredom and conflict. However, dissatisfaction and conflicts are often unavoidable in the service sector due to varying customer expectations and differing perceptions of service. Some customers may seek recognition and intimacy, while others might prefer strictly professional, service-specific interactions. Reducing potential conflicts and stress by taking initiative in conversations, modulating tone of voice and demonstrating expertise can enhance guest satisfaction during service encounters. Mutual understanding between staff and guests positively influences customer satisfaction. In addition, the style of relationship plays a crucial role in guest contentment. For example, social distance can be established through impersonalisation, such as addressing customers with formal terms like "Sir", whereas using first names signifies closeness. Interactions with individuals of the opposite gender have also been found to yield more favourable communication outcomes (Nikolich & Sparks, 1995). The study also identified key indicators of guest satisfaction, including feeling pleased with the hotel, enjoying their stay, captivated by the hotel's scenic beauty, intention to revisit and recommending the hotel to others.

METHODOLOGY AND RESEARCH METHODS

Yuka (2009) emphasised the importance of creating a positive learning environment and creating productive communication for attaining higher satisfaction by incorporating politeness techniques, such as expressing interest, offering compliments or using inclusive language. This study adopted quantitative methods to examine the impact of communication skills and linguistic politeness on hotel guests' satisfaction by focusing on the importance of applying digital skills in Batam Island, Indonesia.

Study framework

This study aimed to assess random conversations between hotel staff and tourists in a variety of hotels in Batam, Indonesia, in order to quantify the impact of politeness and effective communication on tourists' satisfaction. Cuic Tankovic et al. (2023) had provided the measures for written communication skills (WC), oral communication skills (OC), listening communication skills (LC), digital communication skills (DC), and non-verbal communication skills (NVC). The measures for satisfaction of tourists (ST) and linguistic politeness (LP) were self-developed measure. It is presumed that customer satisfaction is directly impacted by one's ability to communicate orally, in writing, digitally or non-verbally. In addition to language proficiency, Figure 1 illustrates how linguistic politeness can improve tourists' pleasure through communication.

Figure 1. Proposed model for measuring tourists' satisfaction

Sources: Developed by the authors.

The sample, data collection and ethical consideration

This study utilized online data collection methods. The primary instrument was a structured online questionnaire, distributed to travellers and groups (local and international) who had stayed in hotels on Batam Island, Indonesia through social media by certain hotel employees as well as by vacationers. 257 surveys were required to provide a confidence level of 95% and the real value should be within ±6% of the measured/surveyed value for an infinite population size, assuming a population proportion of 0.5. A total of 285 valid responses between July-October 2023 were collected using purposive sampling. Data analysis techniques included descriptive statistics, regression analysis, One Way ANOVA, independent t-test, and correlation. One Way ANOVA and independent t-test methods are used to find significant differences among demographic and other variables. The decision to use hierarchical multiple linear regression in this study was based on the need to examine the incremental effect of different types of communication skills and linguistic politeness on tourist satisfaction (ST). This method allows us to enter predictors in conceptually meaningful blocks, thus helping to understand how each category of variables contributes to explaining variation in ST.

The ethics committee at the University of Batam in Indonesia approved the study protocol, issuing decision no. 473/LPPM-UPB/VII/2023.This study complied with ethical standards concerning voluntary participation and anonymity. All the par-

ticipants gave their approval to be included in the study by answering an informed consent question that was included in the survey form. 57.9 % of them were female and the majority were between the 20-30 (62.5%) years old. The majority had high school education or an equivalent (55.5%) certificate and university degree (33.0%). 78.9 % (225) of the participants were from Indonesia and the rest (21.9%) were from Vietnam (3.5%), Singapore (3.2%), Myanmar (2.8%), India (2.1%), Malaysia (1.8%), Bhutan (1.4%), Kyrgyzstan (1.4%), Philippines (1,4%), Pakistan (0,7%), Kazakhstan (0,7%), Turkey (0.4%) etc. (see Table 1).

Table 1. Demographic profiles of the study sample (N = 285).

Variable		n	%	Variable		n	%
Age	15-20	68	23.9	Education level	Primary education	2	0.7
	20-30	178	62.5		High school or equivalent	158	55.5
	30-40	27	9.5		University	94	33.0
	40-50	10	3.5		Master degree	28	9,9
	50 +	2	0.7		PhD	1	0.4
	Total	285	100.0		Total	285	100.0
Gender	Female	165	57.9	Having Children	No	247	86.7
	Male	120	42.1		Yes	36	12.6
	Total	285	100.0		Total	285	100.0

Sources: Developed by the authors based on respondents' answers.

Statistical analysis

Descriptive statistics were used to present data and Pearson's coefficient (r) correlations, t-independent test, one-way analysis of variance (ANOVA), and hierarchical multiple linear regression methods were used to evaluate data and test hypotheses by applying the SPSS.22 software. Skewness and kurtosis coefficients indicated sufficient symmetry parameters of normality by using skewness and kurtosis values < | 2| as acceptable (George & Mallery, 2010). The factors have values of skewness between -1.164 and -1.07 and kurtosis between 0.32 and 0.52 in our study. Multicollinearity was checeked by means of the correlation matrix of the independent variables that there were low correlations among factors less than 0.7. The Durbin Watson statistic always assume a value between 0 and 4 to check autocorrelation. A value of Durbin Watson = 1.84 in this study indicates that there is no autocorrelation. No heteroscedasticity was detected by checking regression of the standardized residuals, the regression of the standardized predicted values and P-P Plot graphs that they are normally distributed. Explanatory factor analysis (EFA) was used to identify underlying factors within a set of observed variables.

Measures

A 5-point Likert scale (1 = Totally disagree, 2 = disagree, 3 = disagree and agree (neutral), 4 = agree, and 5 = Totally agree) was used to measure the effects of five communication skill dimensions related to hotel guests' satisfaction. These abilities include written, oral, listening, digital and non-verbal communication, which were adapted

from Cuic Tankovic et al.(2023) in the literature. High reliability scores (Cronbach's Alpha values), such as WC (0.964), OC (0.959), LC (0.962), DC (0.965) and NVC (0.982), were found in this study. Factor loadings are shown in Table 3.

Satisfaction (ST), Linguistic Politeness (LP) and Communication skills measures were used in this study. Using a Likert scale, self-developed measures of satisfaction and linguistic politeness were created. First (item ST1) 89.618 % of variance while other items explained the rest of variance. Sphericity tests were developed to test the data's suitability for factor analysis. The Kaiser-Meyer-Olkin (KMO) method was used to determine the consistency of the data, or item/variable values. KMO is a criterion as opposed to a test statistic, unlike Bartlett. A value of .923 is considered a strong Kaiser-Meyer-Olkin Measure of sampling adequacy based on Field (2000) and Bartlett's Test of Sphericity (Approx. Chi-Square= 1894.538 and Sig.= 0.000) were found in this study. Two newly developed measures were analysed using factor analysing and sampling. The Principal Component Analysis and Verimax rotation methods of extraction explain 100% of the variation, and the ST group factor's coefficient value was 0.938 and clustered under one factor. The Cronbach's alpha reliability score was high (0.971) for the ST group. Bartlett's Test of Sphericity for the LP group yielded an approximate Chi-Square of 860.568 and a Sig. of .000, while the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .777 at the middle level. LP was under one group and factor coefficients were greater than 0.954. First item (LP1) explained 91.217 % of Variance and LP had a high Cronbach's alpha (0.952) reliability score.

RESULTS

Descriptive Statistics

60.4% of the participants earned a monthly salary of USD1,000-2,000, so the higher the salary, the more frequently they travelled. Their travel frequency was usually 1-2 times per year and about half of them could not travel every year. Social media is the most important platform used to find a hotel (44.2%, n=126), followed by friends' suggestions (15.8%, n=45). Another important way of finding a hotel was through the recommendation of satisfied guests. Cost was the most important factor when choosing a hotel (34.7%, n=99). Other important factors that played a role when choosing a hotel were bed/room specifications (25.3%, n=72) and cleanliness (23.9%, n=68) (see Table 2).

The factor coefficients and reliability values are satisfactory across all groups (see Table 3). The importance of written communication skills, oral communication skills, listening skills, digital communication skills, non-verbal communication skills and linguistic politeness was unanimously acknowledged by all participants. Mean values for all groups that influence satisfaction are so similar that it is not possible to determine which group holds greater significance. Two of the most critical criteria for enhanced satisfaction are the hotel's picturesque scenery and guests' enjoyable experiences during their stay. Conversely, inappropriate language and a lack of politeness can lead to dissatisfaction. Building trust, honesty and truthfulness are pivotal elements of effective non-verbal communication. No significant differences ($p > 0.05$) were observed for any factor across the variables based on t-tests and one-way ANOVA tests, including gender, age, salary, education level, parenthood, nationality (Indonesia vs. other countries) and travel frequency.

Table 2. Salary, frequency of travel, ways of finding a hotel and reasons for choosing a hotel

Variable		N	%	Variable		n	%
Salary	1. 000-2.000	172	60.4	Finding a Hotel	Agency	21	7.5
	2. 000-3.000	25	8.8		Friend Suggestions	45	15.8
	3.000-4.000	29	10.2		Google Search	81	28.5
	4.000-10.000	37	13.0		Social media	126	44.2
	Others	20	6.4		Others (Booking.com etc.)	6	2.1
	Total	285	100.0	Reason(s) for choosing a hotel	Pools	8	2.8
Travel Frequency	1-2	84	29.5		Bed /Room specifications	72	25.3
	3-4	26	9.2		Cleanness	68	23.9
	5 or more	12	4.2		Cost	99	34.7
	Total	122	42.9		Employees	11	3.9
					Meals	6	2.1

Sources: Developed by the authors based on respondents' answers.

Table 3. Descriptive statistics (N=285)

Items	Group	Factor Coefficients	Means	SD	Cronbach's Alpha	Mean ± SD
Information and ideas presented in a comprehensible and logical sequence	WC1	0.957	3.57	1.17	0.964	3.5263 ±1.10439
The capacity to modify writing styles for various readerships.	WC2	0.972	3.49	1.13		
The capacity to modify writing styles for various formats.	WC3	0.968	3.50	1.12		
Ability to use a large vocabulary to clearly and concisely communicate complicated ideas.	OC1	0.967	3.52	1.14	0.959	3.5263 ± 1.10190
Ability to create clearly and methodically organised presentations on a variety of topics.	OC2	0.962	3.52	1.14		
Speaking in front of an audience and modifying your style of delivery accordingly.	OC3	0.955	3.52	1.13		
Focusing on the speaker while listening to messages.	LC1	0.974	3.52	1.15	0.962	3.5439 ±1.10807
Recognizing messages and identifying key concepts.	LC2	0.966	3.55	1.16		
Keeping messages in mind.	LC3	0.951	3.54	1.12		
Presenting digital information with a target audience and intent in mind.	DC1	0.944	3.57	1.13	0.965	3.5728± 1.08455
Exchanging digital data with other people.	DC2	0.948	3.58	1.13		
Giving digital feedback.	DC3	0.951	3.54	1.13		
Creating digital products (presentations, documents, images and diagrams) using computer software.	DC4	0.962	3.58	1.15		

Maintaining eye contact with interlocutors.	NVC1	0.925	3.55	1.16	0.982	3.5985± 1.09959	
Using appropriate gestures while talking.	NVC2	0.943	3.57	1.19			
Using appropriate professional attire.	NVC3	0.954	3.59	1.14			
Building trust and honesty.	NVC4	0.957	3.61	1.14			
Being truthful and credible.	NVC5	0.967	3.61	1.15			
Showing an honest understanding for other people.	NVC6	.958	3.62	1.16			
Demonstrating appropriate cultural communication skills.	NVC7	0.951	3.61	1.14			
It was a wise decision to visit that hotel	ST1	0.938	3.48	1.11511	0.971	3.5600± 1.06107	
I had an enjoyable time at that hotel	ST2	0.952	3.58	1.10			
I am attracted by the hotel 's beautiful scenery	ST3	0.954	3.60	1.16			
I will visit the hotel again	ST4	0.951	3.55	1.10			
I will recommend the hotel to my friends	ST5	0.939	3.57	1.11			
The tourism personnel's linguistic and behavioural politeness makes me happy	LP1	0.954	3.55	1.09	0.952	3.5485 ±1.05987	
Positive face threatening acts improve my satisfaction	LP2	0.954	3.52	1.13			
Improper linguistic politeness expressions make me dissatisfied	LP3	0.958	3.56	1.10			

Written Communication (WC), Oral communication (OC), Listening Communication (LC), Digital Communication (DC), Non-verbal Communication (NVC), Satisfaction (ST) and Linguistic Politeness (LP), SD=Standard Deviation, GM=Group mean

Sources: Developed by the authors based on respondents' answers.

Correlation among variables and scales based on Pearson correlation

As indicated in Table 4, there is no significant correlation between age, salary or travel frequency and any of the groups. However, a significant correlation exists between communication skills, satisfaction, and linguistic politeness. The strongest correlation is observed between written communication skills and oral communication skills ($r = .961$, $p < 0.01$), while satisfaction exhibits the highest correlation with politeness ($r = 0.917$, $p < 0.01$). Digital communication skills rank second in their correlation with satisfaction ($r = 0.860$, $p < 0.01$), which emphasises the critical role of modern communication skills in shaping tourist satisfaction. In addition, non-verbal communication skills show a strong correlation with digital communication skills ($r = 0.959$, $p < 0.01$).

Table 4. Pearson's correlation

Variable	Age	Salary	TF	WC	OC	LC	DC	NVC	ST	LP
Age	1	0.067	0.093	0.010	0.024	-0.013	0.002	-0.010	0.044	0.014
Salary	0.067	1	0.001	0.045	0.041	0.028	0.021	0.024	0.015	0.041
TF	0.093	0.001	1	-0.129	-0.120	-0.153	-0.133	-0.149	-0.102	-0.10
WC	0.010	0.045	-0.129	1	0.961**	0.92**	0.908**	0.902**	0.83**	0.84**
OC	0.024	0.041	-0.120	0.961**	1	0.93**	0.932**	0.921**	0.82**	0.82**
LC	-0.013	0.028	-0.153	0.922**	0.939**	1	0.951**	0.935**	0.81**	0.81**
DC	0.002	0.021	-0.133	0.908**	0.932**	0.95**	1	0.959**	0.86**	0.83**
NVC	-0.010	0.024	-0.149	0.902**	0.921**	0.93**	0.959**	1	0.84**	0.82**

ST	0.044	0.015	-0.102	0.835**	0.828**	0.81**	0.860**	0.848**	1	0.91**
LP	0.014	0.041	-0.104	0.845**	0.827**	0.81**	0.837**	0.828**	0.91**	1

Skills of Written Communication (WC), Oral Communication (OC), Listening Communication (LC), Digital Communication (DC), Non-verbal Communication (NVC), Satisfaction (ST), Linguistic Politeness (LP), Traveling Frequency(TF)
**. The significance level for the correlation is 0.01 (2-tailed).

Sources: Developed by the authors based on respondents' answers.

Regression analysis of tourists' satisfaction

The conceptual model outlined in Table 5 demonstrates a high R-square value of 0.872 (ANOVA: $F = 636.672$, $p < 0.05$), indicating that linguistic politeness, digital communication skills and listening skills are significant predictors of satisfaction. The model can be expressed as follows:

Tourist Satisfaction = 0.146 + 0.667*linguistic politeness + *0.*439*digital communication skills - 0.147*listening communication skills. Linguistic politeness and digital communication skills exhibit positive coefficients, signifying that their improvement can enhance tourist satisfaction. Notably, linguistic politeness emerges as the most influential factor in this model. On the contrary, listening communication skills have a negative coefficient, suggesting a complex relationship that warrants further investigation.

Table 5. Regression analysis of guests' satisfaction

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.146	0.082		1.780	0.076
Linguistic politeness strategies	0.667	0.039	0.667	16.988	0.000
Digital communication skills	0.439	0.072	0.448	6.063	0.000
Listening communication skills	-0.147	0.067	-0.153	-2.205	0.028

Dependent Variable: ST; Independent Variables: Written communication skills (WC), Oral communication skills (OC), Listening communication skills (LC), Digital communication skills (DC), Non-verbal communication skills (NVC), and Linguistic Politeness (LP)

Sources: Developed by the authors based on respondents' answers.

Digital communication skills (H_5) and linguistic politeness strategies (H_6) are confirmed as positive and significant factors influencing tourist satisfaction. Conversely, listening ability (H_3) has an adverse effect on tourists' satisfaction levels. Written (H_1), non-verbal (H_2) and oral (H_3) communication skills were found to be insignificant predictors of satisfaction, hence, leading to the rejection of hypotheses H_1, H_2, and H_3.

DISCUSSION AND RECOMMENDATIONS

The findings of this study provide insights into the relationship between frontline communication competencies and tourist satisfaction, some of which were expected and some of which were unexpected. While politeness, digital communication skills and listening skills were important predictors of tourist satisfaction, several core

communication skills (especially written communication, oral communication and non-verbal communication) did not have a significant direct effect on satisfaction. The results, which were not significant, call into question widely held views about the importance of basic communication skills in ensuring guest satisfaction. Conventional service quality frameworks and hospitality training models frequently accentuate verbal and non-verbal proficiency as being of paramount importance to guest experience. In contradistinction, linguistic politeness — denoting respectful tone, empathy, and culturally sensitive communication — emerges as a more differentiating factor in how guests evaluate their service experience. This supports theories about communication between people, which say that the way people talk to each other, for example being polite, respectful and considerate, is often more important than the way they talk (Brown & Levinson, 1987). Rather than the format or channel of communication (e.g. verbal, non-verbal) influencing satisfaction, how valued and respected guests feel during interactions may have a stronger influence. Empathy and politeness often define these interactions.

Poor listening skills remains one of the most significant challenges as it restricts speakers from freely expressing their thoughts, which is a type of behaviour that often conveys inattention, impatience or poor judgment (Wolvin & Coakley, 1991). Examples of negative listening include changing the subject, asking irrelevant questions, offering unsolicited advice, multitasking (looking at a smartphone or computer), or physically disengaging from the conversation. According to Kluger et al. (2024), educational background, language proficiency and creativity are crucial qualities required for effective listening. The negative impact of listening communication skills on satisfaction can be attributed to the hotel employee's potential inability to fully understand the guest's needs or appropriately resolving their issues. Furthermore, employees may struggle to comprehend the language spoken by tourists or fail to listen attentively. In some cases, staff may prioritize selling products or guiding tourists for personal gain rather than addressing the latter's concerns, which can be both frustrating and dissatisfying for tourists.

Maes et al. (1997) had identified and highlighted the top three essential skills, namely oral communication, problem-solving and self-motivation. Listening, speaking (oral) and writing skills are deemed as the most critical communication skills in the tourism industry (Pankaew et al., 2021). This study corroborates earlier findings by revealing a high correlation between all communication skills. Most tourists prefer interacting through digital technologies and expect hotel employees to effectively utilize these skills. The politeness and fluency of tour guides have also been shown to significantly influence Japanese tourists' satisfaction (Nudin et al., 2021). Awareness of cultural differences is crucial, as what is considered polite in one culture may not apply universally. Polite communication demonstrates respect for others, benefitting both personal and professional relationships. Rules surrounding communication, rooted in historical contexts, have evolved alongside societal and technological advancements. In this study, satisfaction and linguistic politeness were found to have the strongest relationship. This highlights the vital role of linguistic politeness in hospitality communication. Batam Island, which is frequented by tourists from countries such as Japan, Singapore, and China, can benefit from hotel staff possessing cultural and linguistic knowledge to develop effective politeness strategies.

Hotel staff must stay attuned to emerging trends and continually enhance their digital skills, which are pivotal to the performance and marketing of the hospitality sector. In today's competitive environment, the tourism and hospitality industry must adopt technological innovations to enable real-time services and optimize interactions between hosts and guests (Buhalis et al., 2024). Modern digital tools eliminate the need for guests to rely on phone calls or text messages for their information needs. Information, such as the hotel's operating hours, restaurant recommendations and airline information, are now readily accessible via in-room electronic devices (Huang & Rust, 2021). Digitalization of the tourism sector has significantly improved user engagement and experience, thus enabling hotel bookings, airline ticket bookings, local attraction recommendations and services for disabled customers through mobile applications (Ukpabi et al., 2019). The quality of existing services, and by extension, user satisfaction, can be further enhanced with Chatbots (Calvaresi et al., 2023). The goal is to seamlessly elevate the overall experience while preserving the personal warmth integral to hospitality. Kazandzhieva and Filipova (2019) found that when consumers viewed videos featuring hotel service robots, their intention to use such services increased compared to other groups (Buhalis et al., 2024; Galati et al., 2021).

Effective communication is crucial for successful management practices in the hospitality sector. Strong managerial communication skills enhance employee job satisfaction and commitment, which allow them to focus fully on their roles. Consistent training can improve these skills (Paksoy et al., 2017). Bank tellers who maintained eye contact with customers reported higher satisfaction levels with the services they provided (Ketrow & Perkins, 1986). Furthermore, intercultural characteristics also influence communication strategies. For example, hotel staff in power-oriented cultures, like China and India, should use distinctive communication methods, whereas egalitarian strategies are more effective in cultures with lower power distance, such as New Zealand, where everyone is treated as having the same status (Zhu et al. , 2006). Hotel staff should be trained in effective eye contact, body language and the use of English. Proficiency in English language, Japanese or Chinese is essential for ensuring guests have a satisfying stay. Staff should also understand cultural differences of main guests and adapt their behaviour to meet the expectations of tourists from diverse backgrounds. Hence, by learning what tourists from different countries appreciate, staff can provide a more personalized and culturally sensitive experience. Conflict resolution and problem-solving skills are equally vital. Staff should be equipped to handle discussions and conflicts in a professional manner, thus helping to create positive outcomes. A friendly smile in the morning and polite communication can significantly enhance guests' perceptions, making them feel valued and confident in their choice of accommodation.

Limitations of the study and implications for future research

This study's strength lies in its comprehensive and multidimensional approach for measuring communication skills and politeness strategies. Unlike previous studies with a narrow focus, this study evaluated communication skills across a broad spectrum of attributes, while offering valuable insight for tourism managers. These findings can help managers better assess job applicants and assist higher education institutions in upgrading curricula to include digital technologies, verbal communication and po-

liteness strategies.

These results highlight the need for hospitality managers and trainers to shift their training priorities. Greater emphasis should be placed on contextual sensitivity, politeness strategies and emotional intelligence in staff-customer interactions, even though foundational communication skills remain important. Also, the growing use of digital communication platforms in the tourism industry might lessen the impact of written and non-verbal communication on perception. For instance, guests communicating via email or app-based messaging may be more focused on tone and response time than grammar or body language. This suggests that the quality of communication and the tone used between people have more of an impact than the medium or style used.

However, there are some limitations in this study, which have implications for future research. The study sample consisted of national and international tourists who visited Batam Island, hence, separate samples for each type of tourist would provide a more accurate finding. Besides tourists, respondents should also include people working in the tourism industry. This study employed the purposive sampling method; hence, a larger sample size would comfortably provide more accurate results and findings. Considering that Indonesia is a multi-cultural and multi-racial country, the study should not solely focus on Batam island but also consider other more representative study locations. Tourists from different countries with different cultures should be considered by applying smart technologies to understand the role of AI-based digital technologies and politeness strategies in tourist satisfaction. In addition, the impact of new marketing strategies on tourist satisfaction and hotel performance embedded with smart technologies should be analysed and explored. Management's effect on communications skills should be explored since factors such as autonomy and hierarchy can influence the development and practice of these skills. There is a need for developing a politeness strategy measure that involves all communication methods. A new improved scale based on the measures adopted in this study should be developed by applying explanatory and confirmatory factor analysis to measure the definite effects of politeness. The mixed methods approach should be considered as it allows participants to express and demonstrate their real communication skills.

CONCLUSIONS

Digital communication skills and linguistic politeness strategies are confirmed as positive and significant factors influencing tourist satisfaction. Conversely, listening ability has an adverse effect on tourists' satisfaction levels. While written, non-verbal and oral communication skills were found to be insignificant predictors of satisfaction. However, all factors have high correlations with each other. The effective use of internet technology, comfortable amenities (beds, swimming pool etc.) and reasonable pricing significantly enhances a hotel's appeal. In addition, improved written communication skills and linguistic politeness positively influence tourist satisfaction. Hotel employees across Batam can leverage digital marketing strategies (AI, social media, and search engines like Google etc.) to attract more guests.

This study reveals that while basic communication skills are assumed to be essential in hospitality settings, they may not directly enhance tourist satisfaction unless accompanied by politeness, empathy, and relational competence. These findings urge

a reconceptualization of communication training in tourism — one that values how messages are delivered, not just what or through which channel. Satisfied customers, in turn, are more likely to recommend the hotel to others, thus, amplifying its reputation. This study highlights the importance of politeness and communication training to enhance staff performance, which paves the way for further empirical research in this area. Interestingly, the satisfaction of guests staying in Batam's hotels showed a negative correlation with the perceived quality of staff's listening skills. This indicates a pressing need for improvement in this area. Hotel staff should acquire better proficiency in English , Japanese or Chinese to facilitate effective communication and meet the diverse expectations of guests.

LITERATURE

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

CLUSTER ANALYSIS OF THE MEMBER COUNTRIES OF THE EUROPEAN UNION ACCORDING TO ENERGY, ENVIRONMENTAL AND ECONOMIC INDICATORS

Mihovil Anđelinović | Full Professor, Faculty of Economics and Business, University of Zagreb, Zagreb, Croatia, mandelinovic@efzg.hr; ORCID ID 0000-0003-2061-0693

Davor Labaš | Associate Professor, Faculty of Economics and Business, University of Zagreb, Zagreb, Croatia, dlabas2@net.efzg.hr; ORCID ID 0000-0003-2500-4211

Katarina Sičaja | Assistant, Faculty of Economics and Business, University of Zagreb, Zagreb, Croatia, ksicaja@net.efzg.hr; ORCID ID 0009-0009-1631-4534

Abstract: *In this paper, a cluster analysis was conducted to group the European Union member states according to energy, environmental and economic indicators for 2023. The selected variables are GDP per capita, the share of renewable energy sources in total energy consumption and CO_2 emissions per capita. The aim of cluster analysis is to group the European Union member states based on economic, energy and environmental indicators in order to identify their mutual similarities and differences. The analysis begins with a hierarchical clustering method using the Ward method with squared Euclidean distance. The dendrogram indicated several potential solutions, and particular attention was paid to solutions with three and five clusters. The observed clusters reflect differences in the level of development and approach to energy policy. Countries with higher levels of economic development are characterized by a lower degree of sustainability due to a lower share of renewable energy sources and high greenhouse gas emissions. Conversely, less developed countries achieve better results according to environmental sustainability indicators, but at the same time have limited economic growth potential. To confirm the stability of the clusters, the K-means method, i.e. a non-hierarchical method, was also applied, which further refined the grouping. The results of the discriminant analysis showed high classification accuracy, confirming the reliability of the model. In conclusion, the cluster analysis provided a deeper insight into energy and environmental patterns within the EU, highlighting the need for harmonization of sustainable policies among members with different levels of economic development. The results obtained can serve as a basis for designing targeted and differentiated policies within the EU that take into account the specificities of each group of countries, with a particularly important balance between economic growth and environmental sustainability.*

Keywords: *European Union, GDP per capita, renewable energy sources, CO_2 emissions, cluster analysis*

JEL classification: *C38, Q56, O52*

INTRODUCTION

In the context of current global trends, assessing the sustainability of countries represents a key challenge in achieving sustainable development goals . Economic and environmental indicators are increasingly taking center stage in analyses of sustainable development within the European Union. In the context of global challenges related to climate change and energy transition, differences between member states in terms of economic development, use of renewable energy sources and greenhouse gas emissions are becoming increasingly pronounced. According to an analysis by , 51% of EU regions show increased economic prosperity thanks to the transition to renewable energy sources, with less developed regions being particularly represented in this group. Although some Central and Eastern European countries had a GDP per capita of only about half the EU average in 2004 ; , data from 2023 show visible progress. For example, Bulgaria, which still has the lowest level, reaches 64% of the EU average . According to greenhouse gas emissions in the EU decreased by 19% in the period from 2013 to 2023, but there are large differences between EU member states. While Estonia, Ireland, and Slovenia have achieved reductions in the intensity of CO_2 emissions by more than 40%, other countries have recorded much smaller improvements. This further confirms the unevenness of environmental and economic effects within the EU. The results of the research by indicate diversity among the new EU member states regarding the structure of renewable energy production, which is related to their specific demographic and economic potential. The authors also emphasize the existence of a significant development gap in relation to the old EU members, which is visible in the significant deviations of GDP per capita. Therefore, this further confirms the need to analyze groups of countries with comparable development characteristics. GDP per capita, the share of renewable sources in total energy consumption, and CO_2 emissions per capita are key variables that provide insight into the interrelationships between economic growth, energy policy, and environmental impact. Given the heterogeneity of the European Union member states in the above aspects, cluster analysis is increasingly used as an effective tool for segmenting countries into groups with similar characteristics in order to enable a better understanding of existing sustainability patterns and the design of targeted policies . Such analysis allows the identification of groups of countries that have comparable energy and environmental characteristics and can serve as a basis for the adoption of differentiated and targeted policies at the European Union level. The aim of the research is to identify groups of EU member states that share similar levels of economic development and sustainability in order to determine patterns in energy efficiency and ecological footprint and to enable a better understanding of differences and similarities between EU countries in the context of common sustainable development goals. The specific objectives of the research are as follows:

- To determine whether there are groups of countries that share similar economic and environmental characteristics.
- To analyze which variable contributes most to the formation of clusters.
- To compare the resulting clusters and interpret them in the context of energy policy and sustainability in the EU.

- To provide suggestions for improving policies and research approaches based on the identified groups of countries.

RESEARCH METHODOLOGY

This paper used a quantitative research approach with the aim of grouping the European Union member states according to economic, energy, and environmental indicators. Official statistical data taken from the Eurostat database were used. These are secondary data sources that are reliable and verified. The sample includes all 27 European Union member states, ensuring complete coverage of the population and representativeness of the results. In order to enable comparability between the variables in the analysis, the data were standardized. The methodological framework of the research includes the application of hierarchical and non-hierarchical cluster analysis. Before conducting the cluster analysis, the correlation between the variables was examined to determine whether there was multiple collinearity that could negatively affect the reliability and interpretation of the analysis results. If the VIF value is in the range between 1 and 5, this indicates a moderate correlation between the variables . Since all VIF values in this study are below the threshold value (VIF < 5), it can be concluded that there is no significant multicollinearity between the variables, thus ensuring the reliability of the cluster analysis results. After carrying out the cluster analysis, discrimination analysis was also used to determine the reliability and accuracy of the classification of countries into clusters. Data processing was carried out with the help of *Statistica* statistical software.

HIERARHICAL CLUSTER ANALYSIS

Cluster analysis encompasses a range of multivariate methods aimed at grouping objects into groups based on their shared characteristics . The two basic methods of cluster analysis are hierarchical and non-hierarchical analysis . Hierarchical clustering, also known as hierarchical cluster analysis, is a statistical clustering method that aims to create a hierarchy of clusters . According to , various linkage methods are applied in hierarchical cluster analysis, including the single linkage method, complete linkage method, average linkage method, Ward's method and centroid method. The result of hierarchical cluster analysis is usually presented as a dendrogram . A dendrogram is a graphic representation of the gradual joining of objects into clusters, where the distances between them are read on the horizontal axis, while individual observations are shown on the vertical axis . Furthermore, different methods of hierarchical cluster analysis were performed with the application of different distance measures. The clearest cluster structure is given by the application of Ward's method with the squared Euclidean distance. The dendrogram shown in Figure 1 shows the separation of five clusters, which confirms the choice of that solution as the most suitable for further interpretation.

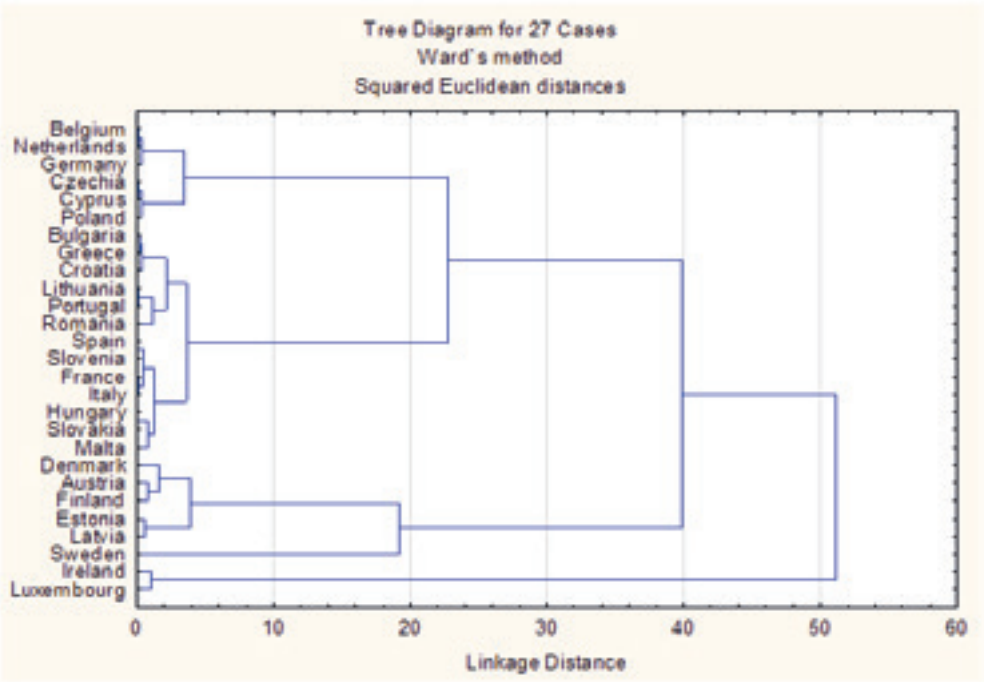

Figure 1. Dendrogram cluster analysis for 27 EU member states

Source: authors' work, result of processing in *Statistica*

At the initial levels of hierarchical clustering, i.e. below level 3, the expected similarities between EU member states are observed, as shown in Figure 2 below. For example, Hungary and Slovakia merge in one of the first iterations (distance 0.0088559), indicating a high degree of similarity in development and environmental factors. This early consolidation is likely a result of their similar economic structure, energy policies and level of adaptation to sustainable standards. Malta joins this cluster later (distance 0.8076450), which may indicate specific common patterns in individual indicators, despite the geographical distance. A similar pattern is visible in Spain and Slovenia, which form an early cluster at a low distance (0.0429791). Later, France and Italy gradually join them at a distance of 0.5145351 and Hungary at a distance of 1.250602, thus forming a group of countries with similar development indicators and energy priorities. Belgium and the Netherlands cluster early (distance 0.1828188), indicating a high degree of concordance in terms of economic development and environmental policies. Later, Germany joins them (distance 0.4013445), thus forming a cluster of highly developed economies with an active approach to reducing CO_2 emissions and increasing the share of renewable energy sources. At intermediate levels of distance (approximately between 3 and 10), larger and more complex groups of countries begin to form, and clustering patterns become increasingly diverse. The Denmark-Austria-Finland cluster is joined by Estonia and Latvia at a distance of 3.937898. Furthermore, Lithuania and Portugal join the Bulgaria–Greece–Croatia cluster at intermediate levels of convergence at a distance of 3.652641, which indicates their high similarity in economic and environmental indicators. The cluster consisting of Bel-

gium-Netherlands-Germany extends to the Czech Republic and Cyprus at a distance of 3.438881. This group of countries shares comparable levels of CO_2 emissions, indicating a similar degree of environmental burden. At the highest levels of distance (above 10), the already formed clusters finally merge into a single set of all countries. At these levels of distance, previously defined clusters such as Belgium-Netherlands-Germany-Czech Republic-Cyprus and Denmark-Austria-Finland-Estonia-Latvia merge.

	Amalgamation Schedule Ward`s method Squared Euclidean distances				
linkage distance	Obj. No. 1	Obj. No. 2	Obj. No. 3	Obj. No. 4	Obj. No. 5
,0088559	Hungary	Slovakia			
,0429791	Spain	Slovenia			
,0781959	Czechia	Cyprus			
,0887239	Lithuania	Portugal			
,1478279	France	Italy			
,1828188	Belgium	Netherlands			
,2243782	Bulgaria	Greece			
,3218806	Bulgaria	Greece	Croatia		
,3454772	Czechia	Cyprus	Poland		
,4013445	Belgium	Netherlands	Germany		
,5145351	Spain	Slovenia	France	Italy	
,5941753	Estonia	Latvia			
,8076450	Hungary	Slovakia	Malta		
,8332978	Austria	Finland			
1,091508	Ireland	Luxembourg			
1,206819	Lithuania	Portugal	Romania		
1,250602	Spain	Slovenia	France	Italy	Hungary
1,665941	Denmark	Austria	Finland		
2,150418	Bulgaria	Greece	Croatia	Lithuania	Portugal
3,438881	Belgium	Netherlands	Germany	Czechia	Cyprus
3,652641	Bulgaria	Greece	Croatia	Lithuania	Portugal
3,937898	Denmark	Austria	Finland	Estonia	Latvia
19,18329	Denmark	Austria	Finland	Estonia	Latvia
22,76650	Belgium	Netherlands	Germany	Czechia	Cyprus
39,92009	Belgium	Netherlands	Germany	Czechia	Cyprus
51,14328	Belgium	Netherlands	Germany	Czechia	Cyprus

Figure 2. Initial cluster merging iterations

Source: authors' work, result of processing in *Statistica*

NON-HIERARCHICAL CLUSTER ANALYSIS

Unlike hierarchical methods, non-hierarchical cluster analysis methods require that the number of clusters be defined in advance . Among the most commonly used non-hierarchical methods, the K-means method stands out, which is often applied after hierarchical analysis to confirm the cluster structure and reduce the impact of possible errors in the initial classification

SOLUTION ANALYSIS WITH THREE CLUSTERS

Using non-hierarchical cluster analysis with three clusters, an analysis of variance was conducted, the results of which are shown in Figure 3. The obtained F-values show to what extent each of the variables contributes to the formation of differences between the formed clusters. The results of the analysis of variance show that the share of renewable energy sources is the variable that contributes the most to the differentiation between clusters, with the highest F-value (F=41.4), which makes this variable a key factor in the clustering process. This is followed by CO_2 emissions with an F-value of 12.2, which also indicates a significant role in the differentiation between clusters, although it is less pronounced than for renewable energy sources. In contrast, GDP per capita shows the lowest F-value (F=8.6), which suggests that economic differences between clusters are not as pronounced as environmental ones. In other words, the share of renewable energy sources and CO_2 emissions played a crucial role in the formation of clusters, while the role of GDP was secondary. The results obtained from the non-hierarchical analysis confirm the patterns observed with the hierarchical method but also more clearly delimit them into three groups. The first group consists of countries with the highest GDP per capita, the lowest shares in renewable energy sources, and the highest level of CO_2 emissions per capita. The second group consists of countries with moderately high GDP per capita, the highest shares in renewable energy sources, and the highest level of CO_2 emissions per capita. The third group consists of countries with the lowest values of GDP per capita and CO_2 emissions per capita and low shares in renewable energy sources.

	Analysis of Variance					
Variable	Between SS	df	Within SS	df	F	signif. p
GDP_per_capita	10,85403	2	15,14597	24	8,59954	0,001527
Renewable_energy_share_pct	20,15891	2	5,84109	24	41,41466	0,000000
CO2_emissions_per_capita	13,09713	2	12,90287	24	12,18067	0,000223

Figure 3. Analysis of variance in non-hierarchical analysis of three selected clusters

Source: authors' work, result of processing in *Statistica*

According to Figure 4, the first group of countries consists of Belgium, the Czech Republic, Germany, Ireland, Cyprus, Luxembourg, and the Netherlands. These countries are characterized by a relatively high level of economic development, sharing medium to high values of GDP per capita and elevated levels of CO_2 emissions per capita. The cluster reflects a group of countries with developed industrial infrastructure and strong economic activity, which is also reflected in a higher emission burden. Although all members of the group are in line with expectations, Luxembourg stands out

as the country with the greatest deviation from the center of the cluster, which indicates its specific and extremely high economic indicators that surpass other developed members. The Netherlands, on the other hand, shows the least deviation within the group, making it a typical representative of this cluster.

	Members of Cluster Number 1 and Distances from Respective Cluster Center Cluster contains 7 cases
	Distance
Belgium	0,384117
Czechia	0,795309
Germany	0,371662
Ireland	0,908028
Cyprus	0,736251
Luxembourg	1,424188
Netherlands	0,259156

Figure 4. Members of the first cluster and distance from the center of the cluster for each EU member state

Source: authors' work, result of processing in *Statistica*

It can be seen from Figure 5 that the second group of countries consists of Estonia, Denmark, Latvia, Austria, Finland, and Sweden. These countries are characterized by a strong orientation towards sustainable energy solutions, which is reflected in the highest share of renewable energy sources in total consumption among all clusters. At the same time, they record similar, relatively moderate levels of CO_2 emissions, which indicates successful policies of energy transition and ecological efficiency. These are developed countries with high GDP per capita. Within the cluster, Sweden stands out as the furthest from the center of the group, which results from the highest value of the share of renewable energy sources and the lowest CO_2 emissions in the entire EU. Austria, on the other hand, shows the smallest deviation, which positions it as a balanced representative of the group.

	Members of Cluster Number 2 and Distances from Respective Cluster Center Cluster contains 6 cases
	Distance
Denmark	0,501997
Estonia	0,738487
Latvia	0,601445
Austria	0,451480
Finland	0,584653
Sweden	1,632282

Figure 5. Members of the second cluster and distance from the center of the cluster for each EU member state

Source: authors' work, result of processing in *Statistica*

Figure 6 below shows the third group, which consists of 14 countries, mainly from Central, Eastern, and Southern Europe: Bulgaria, Greece, Spain, France, Croatia, Italy, Lithuania, Hungary, Malta, Poland, Portugal, Romania, Slovenia, and Slovakia. This group shows moderate values of the share of renewable energy sources and lower levels of CO_2 emissions compared to the other clusters. The ecological profile of these countries indicates a balanced, but still transitional, energy structure. This group is characterized by a lower to medium-high GDP per capita, which places them in the less developed group in the context of the European Union. The economic level, although diverse, is on average below the level of the first and second clusters. Within the group, Slovenia is very close to the center of the cluster, which suggests that its profile most accurately reflects the average characteristics of this group. In contrast, Poland shows the largest deviation, which may indicate specific energy or economic characteristics that make it a less typical representative of the group.

	Members of Cluster Number 3 and Distances from Respective Cluster Center Cluster contains 14 cases
	Distance
Bulgaria	0,292725
Greece	0,337694
Spain	0,213459
France	0,369434
Croatia	0,255391
Italy	0,307235
Lithuania	0,425675
Hungary	0,302348
Malta	0,518910
Poland	0,867838
Portugal	0,534344
Romania	0,568229
Slovenia	0,134883
Slovakia	0,290310

Figure 6. Members of the third cluster and distance from the center of the cluster for each EU member state
Source: authors' work, result of processing in *Statistica*

Furthermore, Figure 7 shows the mean values of the three clusters according to three variables: GDP per capita, share of renewable energy sources in total consumption, and CO_2 emissions per capita. Each cluster shows a recognizable profile, which is clearly reflected in the differences shown by the lines in the graph.

- Cluster 1 (blue line)

This cluster is characterized by high GDP per capita, the lowest share of renewable energy sources, and high levels of CO_2 emissions. This cluster suggests a group of economically developed countries with a pronounced industrial infrastructure that still rely on conventional energy sources, resulting in higher greenhouse gas emissions despite high GDP.

- Cluster 2 (red line)

This cluster shows the highest share of renewable energy sources, with GDP per capita and CO_2 emissions around zero (average). This cluster indicates countries that have successfully integrated renewable energy sources into their energy system while maintaining a moderately high level of economic development and a balanced ecological-economic approach.

- Cluster 3 (green line)

Cluster 3 is characterized by low GDP per capita, low share of renewable energy sources, and low CO_2 emissions. This cluster reflects less developed countries in the energy transition phase, where lower economic activity and less developed industry result in lower total CO_2 emissions but also limited capacity to invest in renewable energy sources.

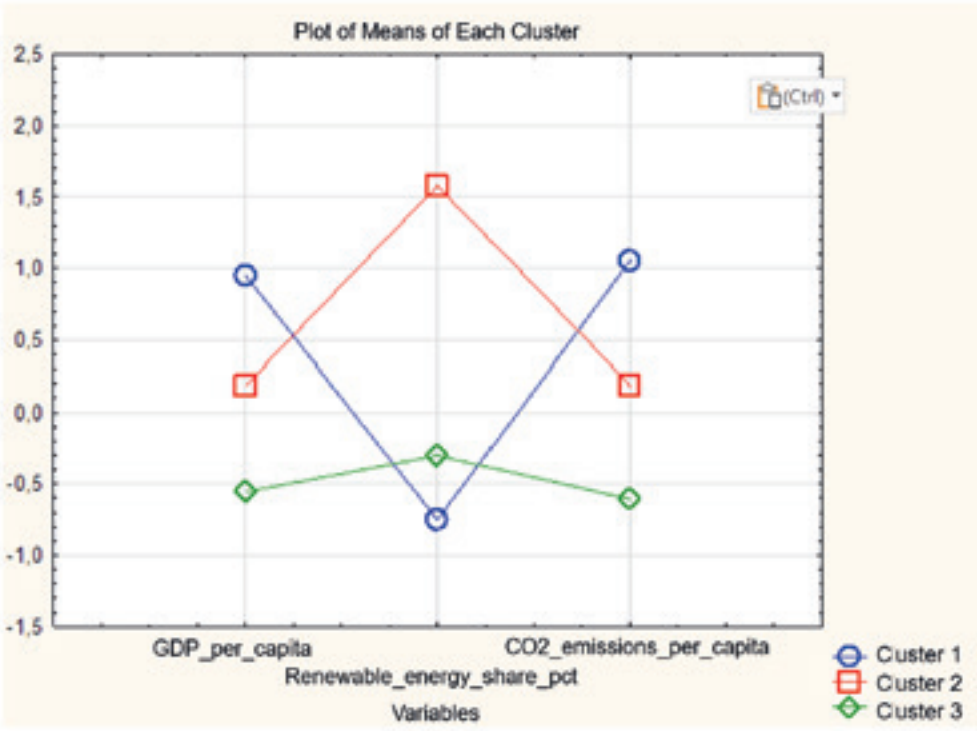

Figure 7. Graphical representation of the means of each cluster for the three selected clusters

Source: author's work, result of processing in *Statistica*

SOLUTION ANALYSIS WITH FIVE CLUSTERS

The results of the analysis of variance obtained by applying non-hierarchical cluster analysis with 5 clusters are shown in Figure 8 below. The obtained F-values show to what extent each of the variables contributes to the formation of differences between the formed clusters. The results of the analysis of variance show that the share of renewable energy sources is the variable that contributes the most to the differentiation between clusters, with the highest F-value (F=30.7), which makes this variable a key factor in the clustering process. It is followed by GDP per capita with an F-value

of 19.9, which also indicates a significant role in the differentiation between clusters, although it is less pronounced than for renewable energy sources. In contrast, CO_2 emissions per capita show the lowest F-value (F=9.3). In other words, the share of renewable energy sources and GDP per capita played a crucial role in the formation of clusters, while the role of CO_2 emissions per capita was secondary. The results obtained by the non-hierarchical analysis confirm the patterns observed by the hierarchical method but also more clearly delimit them into three groups. The first group consists of countries with lower GDP per capita and low levels of CO_2 emissions per capita and renewable energy sources. The second group consists of countries with low shares in renewable energy sources and high levels of CO_2 emissions with average GDP. The third group consists of countries with the lowest values of GDP per capita and low levels of CO_2 emissions per capita, with an average share in renewable energy sources. The fourth group consists of countries with the highest values of GDP per capita and CO_2 emissions per capita and the lowest shares in renewable energy sources, while the fifth group consists of countries with extremely high shares in renewable energy sources and average values of GDP per capita and CO_2 emissions per capita.

	Analysis of Variance					
Variable	Between SS	df	Within SS	df	F	signif. p
GDP_per_capita	20,37737	4	5,622631	22	19,93293	0,000000
Renewable_energy_share_pct	22,05468	4	3,945322	22	30,74546	0,000000
CO2_emissions_per_capita	16,36686	4	9,633141	22	9,34459	0,000143

Figure 8. Analysis of variance in non-hierarchical analysis of five selected clusters

Source: authors' work, result of processing in *Statistica*

Compared to the previous solutions with 4 and 5 clusters, France, Italy, Hungary, Malta and Slovakia were separated into a separate cluster, which can be seen in Figure 9.

	Members of Cluster Number 1 and Distances from Respective Cluster Center Cluster contains 5 cases
	Distance
France	0,292614
Italy	0,187833
Hungary	0,264056
Malta	0,285208
Slovakia	0,221793

Figure 9. Members of the first cluster and distance from the center of the cluster for each EU member state

Source: authors' work, result of processing in *Statistica*

Furthermore, Figure 10 shows the same distribution as in the fourth cluster from the previous case.

	Members of Cluster Number 2 and Distances from Respective Cluster Center Cluster contains 6 cases
	Distance
Belgium	0,297046
Czechia	0,286470
Germany	0,272864
Cyprus	0,200173
Netherlands	0,470364
Poland	0,484821

Figure 10. Members of the second cluster and distance from the center of the cluster for each EU member state

Source: authors' work, result of processing in *Statistica*

Since France, Italy, Hungary, Malta and Slovakia separated into a separate cluster, the countries shown in Figure 11 form a new cluster.

	Members of Cluster Number 3 and Distances from Respective Cluster Center Cluster contains 8 cases
	Distance
Bulgaria	0,348233
Greece	0,392904
Spain	0,233883
Croatia	0,112298
Lithuania	0,241795
Portugal	0,352006
Romania	0,472630
Slovenia	0,195854

Figure 11. Members of the third cluster and distance from the center of the cluster for each EU member state

Source: authors' work, result of processing in *Statistica*

Figure 12 shows that the distribution is the same as in the third cluster from the previous case.

	Members of Cluster Number 4 and Distances from Respective Cluster Center Cluster contains 2 cases
	Distance
Ireland	0,301594
Luxembourg	0,301594

Figure 12. Members of the fourth cluster and distance from the center of the cluster for each EU member state

Source: authors' work, result of processing in *Statistica*

Figure 13 also shows the same distribution as in the second cluster from the previous case.

	Members of Cluster Number 5 and Distances from Respective Cluster Center Cluster contains 6 cases
	Distance
Denmark	0,501997
Estonia	0,738487
Latvia	0,601445
Austria	0,451480
Finland	0,584653
Sweden	1,632282

Figure 13. Members of the fifth cluster and distance from the center of the cluster for each EU member state

Source: authors' work, result of processing in *Statistica*

Figure 14 shows the mean values of the three clusters according to three variables: GDP per capita, share of renewable energy sources in total consumption, and CO_2 emissions per capita. Each cluster shows a recognizable profile, which is clearly reflected in the differences shown by the lines in the graph.

- Cluster 1 (blue line)

This cluster is characterized by low GDP per capita, a low share of renewable energy sources, and a low level of CO_2 emissions, i.e. all values are below average. This cluster reflects less developed countries in the energy transition phase with lower total CO_2 emissions due to lower levels of industrialization.

- Cluster 2 (red line)

The cluster is characterized by an average GDP per capita (around zero), a below-average share of renewable energy sources, and a moderately high level of CO_2 emissions (close to 1). Elevated CO_2 emissions indicate energy-inefficient systems and slower introduction of sustainable technologies.

- Cluster 3 (green line)

This cluster is characterized by the lowest GDP values, an average share of renewable energy sources, and low CO_2 emissions. This cluster refers to less econom-

ically developed countries, whose industrial capacity is limited, resulting in lower CO_2 emissions. At the same time, the average share of renewable energy sources reflects the initial steps towards a more sustainable energy model.

- Cluster 4 (pink line)

Cluster 4 is characterized by the highest GDP per capita, the lowest share of renewable energy sources, and above-average levels of CO_2 emissions. This cluster indicates highly developed economic systems with intensive industrial production, which results in significant greenhouse gas emissions.

- Cluster 5 (black line)

This cluster shows an above-average share of renewable energy sources, with average GDP per capita and CO_2 emissions per capita hovering around zero. This cluster points to countries that have successfully integrated renewable energy sources while maintaining a balance between economic development and environmental responsibility. These countries exemplify a more sustainable approach, where progress in green energy does not come at the expense of economic stability.

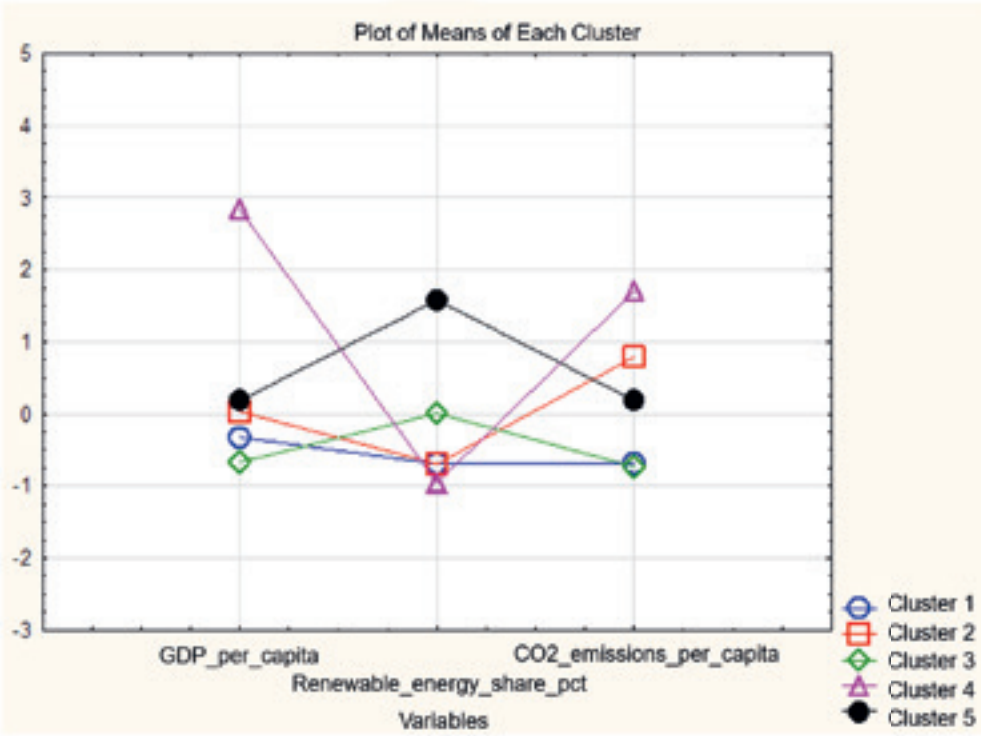

Figure 14. Graphical representation of the means of each cluster for the five selected clusters

Source: authors' work, result of processing in *Statistica*

DISCRIMINANT ANALYSIS

Discriminant analysis is a multivariate statistical technique used to determine the relationship between one categorical dependent variable and several independent variables, which are usually continuous . The goal of the analysis is to classify the observations into predefined groups and to identify those variables that contribute the

most to the differentiation between these groups. Discriminant analysis is an important statistical tool used to understand differences between groups and to predict, or classify new samples into appropriate groups based on these differences.

SOLUTION ANALYSIS WITH THREE CLUSTERS

The coefficients of the classification function show how much a particular variable contributes to the distinction between clusters. Namely, a higher coefficient means a greater influence of that variable on the separation of groups. From Figure 15, the following can be concluded:

- GDP per capita has the highest positive coefficient in the first cluster (G_1:1 = 1.32322), which indicates that this variable contributes the most to distinguishing this cluster, i.e. that countries in this cluster have extremely high GDP per capita values that clearly distinguish them from other groups.
- The share of renewable energy sources has a very high positive coefficient in the second cluster (G_2:2 = 10.8282), which means that this variable defines this cluster the most. In other words, countries from the second cluster are characterized by a very high share of renewable energy sources in total energy consumption.
- In the third cluster, the share of renewable energy sources also has the largest contribution, but in a negative direction (G_3:3 = -3.65204). This suggests that countries in this cluster have significantly lower values of this variable compared to the other groups, making them easily recognizable through a lower degree of use of renewable energy sources.

Variable	G_1:1 p=,25926	G_2:2 p=,22222	G_3:3 p=,51852
GDP_per_capita	1,02617	4,7313	-2,54080
Renewable_energy_share_pct	-1,97721	10,8282	-3,65204
CO2_emissions_per_capita	1,32322	0,4903	-0,87174
Constant	-3,26189	-10,5334	-2,21770

Figure 15. Classification function coefficients for three clusters

Source: authors' work, result of processing in *Statistica*

Furthermore, the classification matrix serves to assess the success of classifying units into clusters in relation to the previously obtained division from the non-hierarchical analysis. In this case, Figure 16 shows that all observations are located on the main diagonal of the matrix, which means that the model achieved complete classification accuracy. This result indicates a clear demarcation between clusters and confirms the high reliability and consistency of the model.

Group	Percent Correct	G_1:1 p=,25926	G_2:2 p=,22222	G_3:3 p=,51852
G_1:1	100,0000	7	0	0
G_2:2	100,0000	0	6	0
G_3:3	100,0000	0	0	14
Total	100,0000	7	6	14

Classification Matrix (Spreadsheet1)
Rows: Observed classifications
Columns: Predicted classifications

Figure 16. Classification matrix for three clusters

Source: authors' work, result of processing in *Statistica*

SOLUTION ANALYSIS WITH FIVE CLUSTERS

Based on Figure 17, several conclusions can be drawn about the characteristics of individual clusters:

- The first cluster is characterized by a significantly lower share of renewable energy sources compared to the other clusters, given that this variable has the largest contribution in the negative direction (G_1:1 = –9.40766). This indicates that the countries in this cluster are less oriented towards renewable energy sources.
- The second cluster is clearly distinguished by its high GDP per capita, since this variable has the highest positive coefficient (G_2:2 = 0.93805). This suggests that the countries in this cluster are economically more developed compared to the others.
- The third cluster is characterized by lower levels of CO_2 emissions, as this variable has the largest negative contribution (G_3:3 = –3.41577). Countries in this cluster therefore have a lower carbon footprint.
- The fourth cluster also stands out for its high GDP per capita (G_4:4 = 13.4490), which further confirms the economic status of the countries within this group.
- The fifth cluster has an extremely high share of renewable energy sources (G_5:5 = 16.1286), which means that the countries within this group are clearly differentiated from the others by their orientation towards sustainable energy sources.

Variable	G_1:1 p=,18519	G_2:2 p=,22222	G_3:3 p=,29630	G_4:4 p=,07407	G_5:5 p=,22222
GDP_per_capita	-1,55965	0,93805	-3,31426	13,4490	0,2977
Renewable_energy_share_pct	-9,40766	-3,62858	-2,60167	-3,5741	16,1286
CO2_emissions_per_capita	-5,81350	0,47282	-3,41577	5,0601	7,2394
Constant	-7,18408	-2,96654	-3,56171	-27,6710	-14,9312

Classification Functions; grouping: CLUSTER (Spreadsheet12)

Figure 17. Classification function coefficients for five clusters

Source: authors' work, result of processing in *Statistica*

According to Figure 18, it can be concluded that in this case, all observations are located on the main diagonal of the matrix, which means that the model achieved complete classification accuracy. The high accuracy of the classification matrix in all three- and five-cluster scenarios examined indicates clearly expressed differences between clusters and consistent patterns in the data. This suggests that the selected set of variables is appropriate for distinguishing EU member states and that the model reliably recognizes mutual similarities and differences between them.

Classification Matrix (Spreadsheet12)
Rows: Observed classifications
Columns: Predicted classifications

Group	Percent Correct	G_1:1 p=,18519	G_2:2 p=,22222	G_3:3 p=,29630	G_4:4 p=,07407	G_5:5 p=,22222
G_1:1	100,0000	5	0	0	0	0
G_2:2	100,0000	0	6	0	0	0
G_3:3	100,0000	0	0	8	0	0
G_4:4	100,0000	0	0	0	2	0
G_5:5	100,0000	0	0	0	0	6
Total	100,0000	5	6	8	2	6

Figure 18. Classification matrix for five clusters
Source: authors' work, result of processing in *Statistica*

CONCLUSION

The cluster analysis was based on a combination of hierarchical and non-hierarchical approaches. First, different methods of hierarchical cluster analysis were conducted with different distance measures. The results obtained by the Ward method with squared Euclidean distances were selected for further interpretation. This method enabled the grouping of European Union member states into distinctive clusters based on three variables: GDP per capita, share of renewable energy sources in total consumption, and CO_2 emissions per capita. Based on the pronounced differences in the coupling distances, models with three and five clusters were identified as potentially stable. Then, a non-hierarchical cluster analysis was conducted to confirm the stability and consistency of the previously identified structures. Although the three-cluster solution offers a simpler structure, it fails to adequately capture the complexity and diversity among the observed countries and did not bring additional interpretative value compared to the five-cluster solution. The five-cluster solution allows for a more precise demarcation between countries and a clearer emphasis on the specificities of countries such as France, Italy, Hungary, Malta, and Slovakia, which would remain unrecognized as a separate group in a smaller number of clusters. Also, each of the five clusters has a clearly recognizable profile, which contributes to the analytical value of the model and allows for more relevant conclusions for the needs of shaping energy and environmental policies. Therefore, the five-cluster solution proves to be more appropriate and informative, since it allows for a deeper and more precise analysis of the differences between the observed European countries. The resulting cluster structure reflects recognizable regional and economic patterns within the European Union, which further confirms the relevance of the variables used and the applied

methodology. In conclusion, such a grouping of countries allows for a more precise view of common characteristics and trends within individual groups and can serve as a basis for designing energy and climate strategies that take into account specific patterns of renewable energy consumption and CO_2 emission levels. Based on the identified groups of countries, a differentiated approach to energy and climate policy is recommended, whereby priorities and measures should be adjusted to the level of economic development and the structure of the energy system of each cluster. In order to improve research approaches, it would be useful to conduct longitudinal analyses to monitor the dynamics of the transition and evaluate the effectiveness of existing policies within each cluster. Also, the limitations of this research relate primarily to the choice of variables, the time frame, and the methodological approach. Although key economic, energy, and environmental indicators were analyzed, they do not cover all dimensions of sustainable development, such as social factors. In addition, the research was conducted for one year (2023), which does not allow monitoring changes over time. The results may also be influenced by the choice of clustering method and the number of clusters, while the application of discriminant analysis assumes certain statistical conditions. Finally, secondary data from the Eurostat database were used, which enatils methodological limitations related to the source and structure of the data.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

DIGITAL INFORMAL LEARNING AND THE FUTURE WORKFORCE: CROSS-REGIONAL EVIDENCE

Hana Trávníčková | Ing., PhD Candidate, Specialist in Human Resource Management, Employee Training, Competency Development, Technical University of Liberec, Faculty of Economics, Department of Business Administration and Management, Voroněžská 1329/13, 460 01 Liberec-Staré Město, Czech Republic, hana.travnickova@tul.cz; ORCID ID: 0000-0001-9629-6077

Abstract: *In today's dynamic economic environment, the competitiveness of firms and economies depends on the continuous development of their workforce. Informal learning represents a vital yet often underestimated element of this process, shaping graduate lifelong learning, reskilling, and upskilling. This paper examines the informal learning sources of university business students in Europe, focusing on the Czech Republic (Czechia) as a representative of Central Europe, and complements the analysis with evidence from the Republic of China (Taiwan) as a comparative case from Asia. The aim is to identify which informal learning sources are most frequently used by business students and how these preferences compare with the European Union average, as reported by the Adult Education Survey (AES), to assess their implications for lifelong learning, reskilling, and upskilling. The study applies a mixed-methods approach, combining the most recent AES data with primary evidence from a pilot survey conducted in 2025 among 214 undergraduate business students in Czechia and Taiwan. The survey followed the European Commission's classification of informal learning activities and examined five categories: family, friends, and colleagues; electronic devices; printed materials; visiting educational places; and educational centres. The results indicate that Czech students rely primarily on electronic devices (91.2%) and peer networks (76.0%), while Taiwanese students combine digital resources (84.3%) and family, friends, and colleagues (84.3%) with stronger use of educational centres (49.4%) and guided tours (43.8%). In contrast, EU data highlight the continued importance of printed materials (54.6%). The study concludes that informal learning is not merely a supplement to formal training but an important foundation for building adaptable workforces. By linking European-level statistics with survey-based evidence, it contributes to understanding how universities and policymakers can design strategies that strengthen digital learning and AI-supported tools to prepare students for rapidly changing, technology-driven economies and sustainable growth in the future.*

Keywords: *business students, European Union, Taiwan, Czechia, learning source*

JEL classification: *J24, M53, O15*

INTRODUCTION

In the current era marked by rapid technological advancements and shifting labour market demands, the significance of upskilling and reskilling has become increasingly pronounced (European Commission, 2024). New employees´ skills are required based on technological progress such as artificial intelligence, automation and robotisation (European Centre for the Development of Vocational Training, 2024; Murrar et al., 2022). The coronavirus pandemic has opened up many new challenges and has affected corporate training and formal education (Rosenbaum et al., 2021), and reskilling and upskilling trends (Itam & Warrier, 2024). These disruptions underline the importance of lifelong learning, as emphasised by the European Union Council in the Skills Pact initiative, which aims to enhance the competencies of over 25 million adults by 2030 (European Commission, 2024). Consequently, adopting a skills-oriented approach has become vital for organisations worldwide, particularly in prioritising the reskilling and upskilling of their workforce (World Economic Forum, 2024) (Novaković et al., 2025).

For tertiary graduates, the need for continuous upskilling and reskilling is particularly important in nowadays job market. The necessity for continuous skill enhancement is underscored by several factors, including the changing nature of work, the impact of technological advancements, and the need for improved employability (Schultheiss et al., 2023). The future of work requires individuals to possess a multifaceted skill set, encompassing technological, cognitive, and social competencies, which are critical for navigating contemporary challenges (Achoki, 2023). Graduates who actively engage in upskilling are better prepared to address these challenges, ensuring their relevance and competitiveness in the workforce (Bikar et al., 2023).

The problem this paper addresses is the lack of attention paid to informal learning sources influencing habits and competencies necessary for lifelong learning. The foundation for continuous development is often established during university studies, particularly through informal and non-formal practices (Agić et al., 2022; Kulaš Mirosavljević et al., 2023). Economics students, as the future labour force, provide valuable insights for employers what learning behaviours could shape readiness for reskilling and upskilling of young professionals in the future.

This study aims to analyse informal learning sources utilised by economics-related university students in two different contexts – Czechia, representing Central and Eastern Europe, and Republic of China, called Taiwan or Chinese Taipei, representing Asia, both small countries with similar interests in innovation, research topics and technological development (DZS, 2025). These results are compared with the European Union (EU) data from the Adult Education Survey to capture broader trends in Europe and reveal their implications for lifelong learning, reskilling, and upskilling.

The motivation for undertaking this research lies in the fact that today's students represent tomorrow's workforce; understanding their learning preferences helps anticipate future challenges and opportunities in workforce development.

The following questions guide the research:

RQ1: Which informal learning sources are most frequently used by university business students in Czechia and Taiwan?

RQ2: How do these preferences compare with EU-level data, and what implications do the observed differences have for lifelong learning of future workforce?

The structure of the paper is as follows: Section 2 reviews the relevant literature on lifelong learning, reskilling, and informal education. Section 3 outlines the research methodology, including data sources and sample characteristics. Section 4 presents the empirical results from the pilot student survey and EU data. Section 5 discusses the findings considering existing literature and policy frameworks of EU. Finally, Section 6 summarises conclusions and outlines implications for future research and practice.

LITERATURE OVERVIEW

One of the key challenges facing European businesses and employers today is acquiring and developing employee competencies (Council Recommendation of 16 June 2022 on a European Approach to Micro-Credentials for Lifelong Learning and Employability 2022/C 243/02, 2022). In recent years, universities have played a more active role in employee training, complementing corporate initiatives to enhance workforce capabilities (Cumberland et al., 2023; Stoten, 2022). The skill-based approach is one of the recommended trends for higher competitiveness of business globally (World Economic Forum, 2024). Upskilling and reskilling have become standard practices in organizations to help manage skill gaps related to AI implementation (Cramarenco et al., 2023) and are part of lifelong learning including formal, non-formal and informal education and training (Johnson & Majewska, 2024).

Upskilling refers to the enhancement of an employee's existing skills, often by incorporating new competencies that improve performance within current roles. The World Economic Forum has projected that approximately 50% of all employees will require upskilling by 2025, emphasizing the urgency of this initiative across various industries (Lee et al., 2022). Beyond individual benefits, upskilling contributes to organizational competitiveness by attracting and retaining talent in high-turnover labour markets (Gamberini & Pluchino, 2024).

Reskilling, in contrast, focuses on equipping employees with entirely new skills required for transitioning into different job roles. This is particularly critical in industries where automation and artificial intelligence replace traditional jobs (Zhong & Juwaheer, 2024). Reskilling mitigates the adverse impacts of technological disruptions by enabling employees to adapt to emerging roles and responsibilities, especially in the case of artificial intelligence (Istudor et al., 2024). Artificial intelligence impacts employees in various ways, for instance in the banking industry (Nikolić, 2025) where many business graduates will be a future workforce.

In addition, university graduates should develop their skills also in context of their employability (Bikar et al., 2023). Graduates who actively pursue upskilling and reskilling opportunities are more likely to secure meaningful employment and achieve job satisfaction, as they can undertake more complex and rewarding tasks (Ramanathan et al., 2022). Integrating industry-relevant skills into educational programs is essential for preparing graduates for the workforce. Research indicates that many graduates express dissatisfaction with their skills training, suggesting a gap between academic preparation and industry expectations (Novaković et al., 2025) (Garden, 2023). Graduates can bridge this gap by participating in upskilling initiatives, gaining practical experience and competencies that align with market demands (Ramanathan et al., 2022). As Figure 1 illustrates, adults' skill development sources are diverse, encompassing formal, non-formal, and informal education pathways (Johnson & Majewska, 2024).

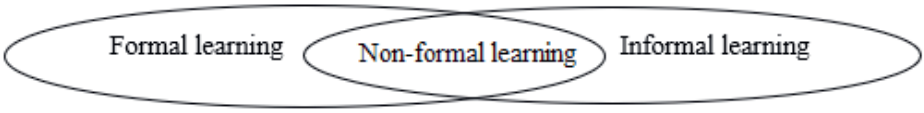

Figure 1: Interaction of formal, non-formal and informal learning in lifelong learning
Source: own elaboration based on Johnson & Majewska (2024)

1. Formal education is characterised by a structured curriculum, typically delivered in institutional settings such as schools and universities. It follows a systematic approach and often leads to recognised qualifications and certifications. This type of education is designed to impart specific knowledge and skills through a predetermined set of learning outcomes, which are assessed through standardised testing and evaluations (European Commission, 2016).

2. Non-formal education or non-formal training, on the other hand, refers to organised educational activities that occur outside the formal education system. This type of education is often more flexible and adaptive, catering to the needs of specific groups, such as marginalised communities or adults seeking to improve their skills. Typical non-formal learning activities include courses, workshops or seminars, guided on-the-job training, or private lessons (Eurostat, 2025a). For example, microlearning become one of modern tool for employee and competency development (Ostin, 2024). Non-formal learning and training is important for company competitiveness and as following Figure 2 shows in most European countries is sponsored by employers.

Figure 2: Participation of tertiary-educated young adults (18–24 years old) in job-related non-formal education and training in selected EU countries and EU-level data in 2022, in %
Source: own elaboration based on Eurostat, 2025b

Figure 2 presents the proportion of tertiary-educated young adults from 18 to 24 years old engaged in job-related non-formal education and training, distinguishing between activities sponsored by employers and those funded by other sources (not sponsored by the employer). On average in the EU, 29.9% of young adults participate in such activities, of which 21.2% are employer-sponsored. In Czechia the participation rate is only 17.4%, with 16.1% of activities funded by employers, placing the country significantly below the EU-level data (Eurostat, 2025c). In the Taiwanese context, non-formal education is also seen as a significant contributor to lifelong learning.

Research shows that Taiwan has developed a strong system of non-formal education, particularly in areas such as environmental and community learning, supported by both government and non-government organisations (Hsu, 2017). Non-formal education is mostly complemented by informal learning.

3. Informal learning refers to the learning that occurs outside of structured educational settings. This type of learning is often spontaneous and can take place in various contexts, including workplaces, social interactions, and community engagements. Informal learning encompasses a wide range of activities, such as peer learning, mentorship, self-directed study, and experiential learning, which contribute to skill development and knowledge acquisition without the constraints of formal curricula. Informal learning is often more flexible and can be tailored to employees' specific needs, allowing them to acquire new skills more personalised. Integrating digital technologies and platforms has further facilitated informal learning, enabling employees to access resources and training materials at their convenience (Morandini et al., 2023).

Informal learning encourages lifelong learning and adaptability, enabling graduates to acquire new skills and knowledge relevant to their careers continuously (Chisvert-Tarazona et al., 2019). Graduates might engage in informal learning by attending industry conferences or collaborating with peers on projects, all of which can enhance their professional competencies. Recent studies also highlight the role of online learning during the COVID-19 pandemic, which reinforced the reliance of students on digital and informal resources (Agić et al., 2022).

Informal learning can be categorised based on AES (Eurostat, 2025b) into five distinct sources, each contributing to the learning and skill development of individuals outside of structured educational settings:

1. Family member, friend or colleague: Informal learning often occurs through interactions with family members, friends, and colleagues. These relationships provide opportunities for knowledge sharing, mentorship, and peer learning. For instance, informal discussions about work-related challenges or sharing personal experiences can enhance understanding and skill acquisition. This type of training is characterised by its spontaneous nature and the personal connections that facilitate learning.

2. Electronic devices: The use of electronic devices, such as smartphones, tablets, and computers, has revolutionised informal learning. Individuals can access many information and learning resources online, including tutorials, webinars, and educational apps. This self-directed approach allows learners to tailor their training to their specific needs and interests, making it a valuable source of informal education. The flexibility offered by electronic devices enables learners to engage with content at their own pace and convenience.

3. Printed materials: Printed materials also belong to informal learning sources. Books, articles, and professional journals provide in-depth knowledge and insights into various fields. Individuals can enhance their understanding of specific topics or acquire new skills through self-study of these resources. The accessibility of printed materials allows learners to explore subjects that interest them, contributing to their overall professional development.

4. Guided tours of museums, historical, natural or industrial sites: Guided tours offer experiential learning opportunities. These tours provide context and background information that enrich the learning experience. Participants can engage with experts

and gain insights that may not be available through traditional educational channels. Such informal learning experiences can foster a deeper appreciation for cultural, historical, and scientific knowledge.

5. Visiting learning centres (including libraries): Libraries serve as vital educational centres, facilitating informal learning and providing access to a wide range of resources. They often host workshops, seminars, and community programs that promote learning and skill development. By leveraging the resources and services offered by libraries, individuals can enhance their knowledge and competencies in various fields.

To sum up, exploring trends in non-formal education and informal learning is important, as these are foundational for upskilling and reskilling, especially for tertiary-educated employees (Agarwal et al., 2022; Homayoun et al., 2024).

METHODOLOGY

The methodology applied in this study builds on a literature review and on both secondary and primary data sources. Secondary data were derived from the latest edition of the Adult Education Survey (AES) conducted by Eurostat in 2022, with published aggregated data in 2024. The AES is a harmonised survey that has been carried out regularly in most European countries since 2007, approximately every five years, and provides internationally comparable data on formal, non-formal, and informal education of adults aged from 18 to 69 years (Eurostat, 2025b). For this paper, the subgroup of tertiary-educated adults aged 18 to 24 years was most relevant to provide a benchmark for undergraduates.

The primary data stem from a pilot survey conducted in March and April 2025 among 214 undergraduate business students from a selected university in Czechia and a partner business university in Taiwan. Most of the respondents (96.7 %) were between 19 and 24 years old; only 7 respondents were slightly older. Table 1 reflects the gender profile of respondents.

Table 1. Respondent profile of pilot survey of undergraduates in Czechia and Taiwan.

Country	Woman	Man	Total	Percentage
Czechia	82	43	125	58.4 %
Taiwan	72	17	89	41.6 %

Source: own elaboration

The students were asked to indicate which sources of informal learning they use. The survey applied a structured questionnaire with closed questions based on the classification of informal learning sources used in AES (Eurostat, 2025b). These included: family, friends, and colleagues; electronic devices; printed materials; visiting educational places; educational centres; and cooperation with companies. For the conducting of the survey, the CAWI method through Google Form was applied. Respondents had the option to select more resources, as per the methodology of the AES. For data analysis, descriptive statistics were used. The methodological contribution of this paper lies in combining large-scale official data of AES published in 2024 with a focused pilot survey on business university students.

EMPIRICAL EVIDENCE

The empirical evidence for this study is based on two complementary sources of data, which together provide macro-level and micro-level insights into informal learning.

First, secondary data were obtained from the AES (Eurostat, 2025b), published and aggregated by Eurostat in 2024 and later. AES enables benchmarking of Czechia within the EU context and illustrates regional disparities in life learning engagement. Figure 3 presents a map of participation in informal education among tertiary-educated young adults across EU countries in 2022, clearly showing rates in Europe compared to Central, Eastern, and Southern regions, with Czechia (87.0%) slightly positioned above the EU-level data (84.5 %).

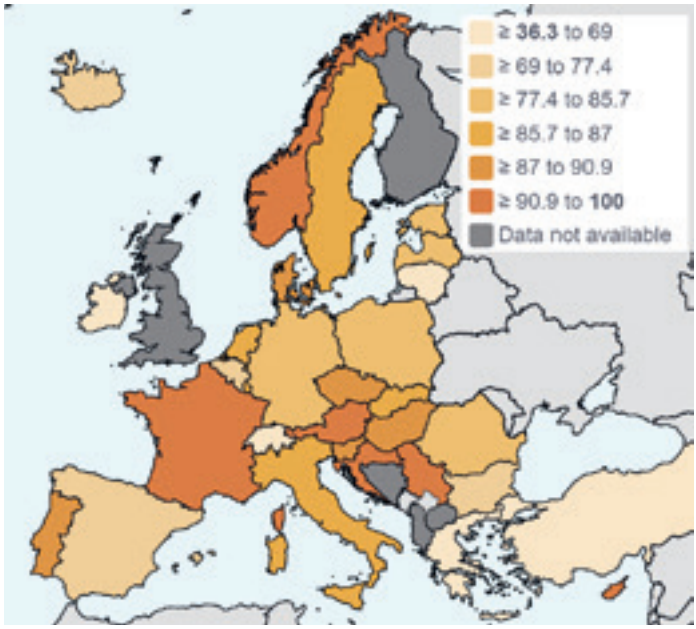

Figure 3: Participation of tertiary-educated young adults (18–24) in informal education across EU countries in 2022, in %

Source: Eurostat, 2024

Second, primary data were collected through a pilot survey. Figure 4 illustrates the comparison of informal sources selected by Czech and Taiwanese students and the EU-level data.

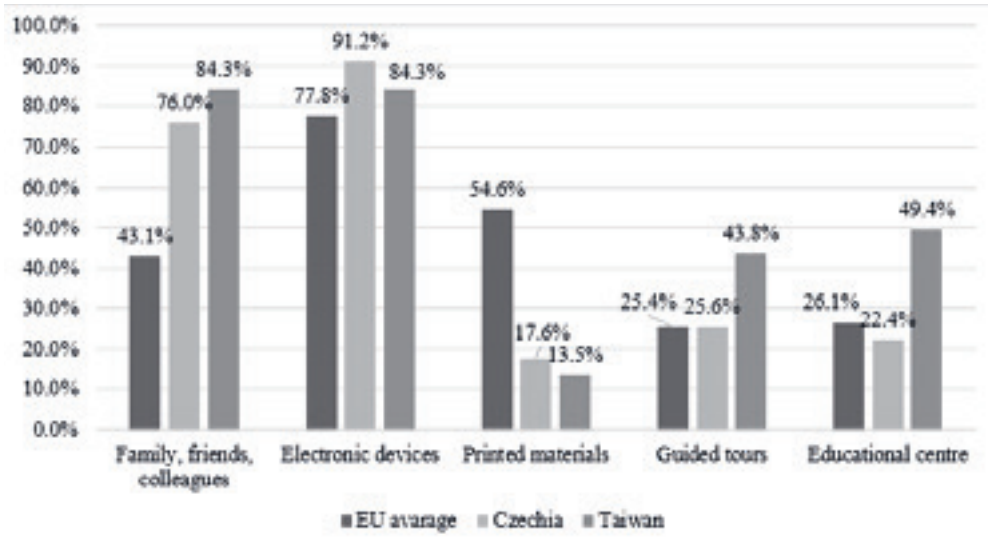

Figure 4: Sources of informal learning among business students in Czechia and Taiwan (pilot survey, 2025) compared with EU data (AES 2022, tertiary-educated, 18–24), in %

Source: own elaboration based on pilot survey data (2025) and Eurostat (2022)

Czech students show very high reliance on electronic devices (91.2%) and peer networks (76.0%), while Taiwanese students, although also digitally oriented (84.3%), use institutional resources such as educational centres (49.4%) and guided tours (43.8%) far more than Czech students. In contrast, the EU-level data demonstrates a strong reliance on printed materials (54.6%), which are less relevant for current business undergraduates in Czechia and Taiwan.

RESULTS AND DISCUSSION

The analysis of informal learning sources provides evidence of regional differences. Czech business students demonstrate a very high reliance on electronic devices and peer networks, whereas Taiwanese students, while also digitally oriented, show a broader mix of informal learning practices, including use of educational centres such as libraries or guided tours.

These findings highlight a shift towards digital learning, especially for the future workforce educated at universities. This aligns with previous research showing that younger cohorts increasingly favour technology-enabled learning (Morandini et al., 2023). The COVID-19 pandemic accelerated this transition, as Agić et al. (2022) demonstrated in their study of online learning, where both students and professors adjusted to digital modes of education

Compared to the EU-level data, which highlights, besides electronic devices (77.8%), printed materials (54.6%) and family, friends, and colleagues (43.1%) as key informal learning sources, students from Czechia and Taiwan demonstrate different learning patterns. Czech students show much higher reliance on electronic devices (91.2% vs. 77.8% EU) and peer networks (76.0% vs. 43.1% EU), while assigning only marginal importance to printed materials (17.6%). Taiwanese students, on the other hand, combine digital resources (84.3%) with greater use of institutional and expe-

riential sources such as educational centres (49.4% vs. 22.4% EU) and guided tours (43.8% vs. 25.4% EU). These findings suggest that the younger generation of university students diverges from the EU-level data by moving away from print-based learning and adopting more technology-driven and interactive forms of informal learning.

These results clearly reflect the broader context of lifelong learning and reskilling highlighted in the introduction. The EU-level data still emphasises more traditional, print-based forms of informal education. In contrast, the reliance of Czech and Taiwanese students on digital tools and peer learning underscores the shift described in recent literature, where younger cohorts increasingly favor technology-enabled and flexible learning modes (Agić et al., 2022; Morandini et al., 2023). This digital orientation aligns with current policy priorities such as the EU Skills Pact, which stresses the importance of preparing future employees for technological change (European Commission, 2024). As Nikolić (2025) notes, AI is reshaping employees in a selected industry, creating both opportunities and challenges for organisations.

Moreover, AI is expected to influence not only formal but also non-formal and informal learning by enabling adaptive and personalised learning pathways (Istudor et al., 2024). AI tools could further enhance Czech and Taiwanese students' informal learning practices, as they already show strong readiness for digital learning.

These insights suggest that universities and employers should recognise the informal and digital learning practices already adopted by students and integrate them more systematically into upskilling and reskilling strategies. Therefore, understanding how students incorporate digital tools into their learning is crucial for anticipating how future employees will adapt to AI-driven environments and how lifelong learning trends will evolve both in higher education and in corporate settings.

This study's limitations include the relatively small sample of 214 business students and the restricted scope of AES indicators. Nevertheless, by combining official large-scale survey data with pilot research, the study contributes valuable insights into how generational and regional differences shape informal learning behaviours. Future research should extend the analysis to more countries, studies and contexts to capture broader cultural and institutional variations. Applying more advanced statistical methods, such as structural equation modelling, would also allow for more robust testing of relationships between informal learning practices, employability, and digital readiness. In addition, longitudinal research would provide a deeper understanding of how these patterns evolve over time, particularly considering technological disruptions such as artificial intelligence.

Despite these limitations, the study presents novel and timely results that enrich the debate on lifelong learning and highlight the role of informal and digital education in preparing graduates for future labour market challenges.

CONCLUSION

This paper examined the informal learning sources of university business students in Czechia and Taiwan and compared them with EU-level data from the Adult Education Survey (AES). The results showed that Czech students relied most on electronic devices and peer networks, while Taiwanese students combined digital tools with stronger institutional sources, in contrast to the EU-level data of young tertiary-educated adults, who still showed considerable reliance on printed materials. The

study contributes by linking macro-level European statistics with micro-level pilot survey evidence, offering new insights into how educational level and regional differences shape informal learning and thus influence the adaptability of future workforces, providing one of the first cross-regional comparisons of informal learning at the intersection of Europe and Asia. Despite limitations such as the relatively small sample size and reliance only on AES indicators, the findings provide relevant implications for practice and policy: universities should strengthen digital learning to better match students' habits and prepare them for future labour market challenges. Future research should expand the analysis to additional countries, take into account more studies and apply a wider range of research tools. It would also be appropriate to examine more deeply the influence of artificial intelligence on formal, informal, and non-formal education. Overall, the study demonstrates that informal learning is not merely a supplement to formal training but an important driver of employability, competitiveness, and sustainable growth in rapidly changing economies.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

A STUDY ON THE EFFECT OF DIGITAL GAME ADDICTION ON ATTITUDE

Fadime Dilber Associate Professor, Karamanoğlu Mehmetbey University, Faculty of Applied Sciences, Department of New Media and Communication, Karamanoğlu Mehmetbey University, Yunus Emre Campus, 70200 KARAMAN / TURKEY, fdilber@kmu.edu.tr; ORCID ID 0000-0002-0935-2593, The Address:

Murat Sağlam Associate Professor, Karamanoğlu Mehmetbey University, Faculty of Applied Sciences, Department of New Media and Communication, Karamanoğlu Mehmetbey University, Yunus Emre Campus, 70200 KARAMAN / TURKEY, murat4081@hotmail.com; ORCID ID 0000-0001-8036-7942

Mehtap Genç Assistant Professor, Karamanoğlu Mehmetbey University, Faculty of Health Scıences/ Psychiatric Nursing, Karamanoğlu Mehmetbey University, Yunus Emre Campus, 70200 KARAMAN / TURKEY, mehtap_coplu@kmu.edu.tr; ORCID ID 0000-0002-6420-9327

Yasemin Şanlı Associate Professor, Karamanoğlu Mehmetbey Unıversıty/Faculty of Health Scıences/ Department Of Mıdwıfery/Major In Mıdwıfery, Karamanoğlu Mehmetbey University, Yunus Emre Campus, 70200 KARAMAN / TURKEY, yasminalya.09@gmail.com; ORCID ID 0000-0001-9169-0577

Abstract: *Increased internet access and usage are considered to be one of the most important determinants of behavioral addictions such as digital game addiction. Children and adolescents constitute a high-risk group in terms of digital game addiction. This situation highlights the importance of specifically addressing children and adolescents in preventive interventions. The purpose of this study is to determine the effect of digital games on attitude change. In this study, the relationship between digital game addiction and attitude change was examined using a structural equation model among 248 students attending a public university who play digital games. According to the results obtained from the analyses, it was found that the reasons individuals play digital games significantly and positively influence the three main dimensions of digital game addiction (''excessive focus and procrastination,'' ''deprivation and seeking,'' and ''emotional change and immersion''). These findings indicate that students' motivations for playing digital games play a decisive role in both the formation process and the continuity of digital game addiction. Based on the study results, it is recommended that intervention programs developed for behavioral addictions such as digital game addiction be designed in a way that takes into account the internal and external motivational factors that drive individuals to play games.*

Keywords: *Gaming Addiction, Addiction, Attitude Change, Reasons for Playing Digital Games*

JEL classification: *Z13*

INTRODUCTION

Advances in technology are radically changing our daily habits and shifting our understanding of entertainment and gaming to digital platforms. The replacement of traditional outdoor games with digital games played on screens is leading to changes in many areas, from individuals' forms of social interaction to their attitudes.

Gaming addiction, one of the types of technological addiction, is a behavioral addiction caused by excessive and uncontrolled playing of digital games using technological devices such as game consoles, tablets, televisions, phones, and computers. Digital game addiction, which is becoming increasingly prevalent among adolescents, can have negative effects on individuals' social interactions, academic performance, and psychological well-being .

Excessive and uncontrolled use of digital games can lead to negative consequences such as mental health problems and addiction, while controlled use can support individuals' emotional, cognitive, and social development. Digital gaming behavior is shaped by basic psychological needs such as socialization, self-confidence, and competence, as well as motivations aimed at fulfilling these needs. The effort to fulfill these needs in a digital environment can sometimes turn into an uncontrolled gaming habit and lead to digital game addiction.

THE CONCEPT OF DIGITAL GAMES

Throughout human history, games have served as a cultural element that increases interaction between individuals and plays an important role in shaping social structures. However, in today's rapidly advancing technological world, the traditional understanding of games is undergoing a fundamental transformation, evolving into a different dimension under the influence of the digital world and moving from physical spaces to virtual environments. This transformation is redefining both the way games are played and their effects on individuals .

Digital games are visual games that run on computer-based systems, offer personalized experiences to users thanks to their programmable structures, and can be played on various electronic devices such as phones, tablets, desktop computers, and game consoles .The first commercial product in this field was released in 1971 under the name "Computer Science" and is considered the starting point of the digital game industry . The rapid growth observed in the gaming industry since the 1990s has paved the way for both the diversification of digital games and the release of new versions that are consumed more quickly and constantly updated . On the other hand, with the acceleration of urbanization, the restriction of physical spaces where games can be played, urbanization, and the increase in population density have caused children to move away from traditional play environments. In addition, the weakening of neighborhood culture, individuals with different socio-cultural backgrounds sharing the same living spaces, and increasing security concerns have made streets less safe for children. Therefore, digital games have become an attractive option, both as a safe alternative for play and as a means for individuals to develop a virtual identity through roles, statuses, and actions they cannot experience in real life.

DIGITAL GAME ADDICTION

The Turkish Language Association (TDK) defines addiction as "a state of dependence on something or someone; subjection" . Dependency is a concept related to a person's strong desire to perform an action and the temporary sense of relief they experience when they engage in this behavior. If this action cannot be performed, the individual may experience restlessness, feelings of inadequacy, and symptoms of deprivation. In this context, dependency can be defined as an individual repeating a behavior that provided them with pleasure or satisfaction in the past, with the expectation that it will provide similar satisfaction in the future. However, if the satisfaction obtained from previous experiences is insufficient, the individual may become conditioned to this behavior in order to obtain the same satisfaction from new experiences. This situation becomes particularly evident in technology-related behavioral addictions. Addictions to media, television, smartphones, computers, and the internet fall under this category .

Digital addiction can be defined as an addiction to watching, listening to, or playing games on electronic devices for entertainment purposes, and has become a widespread trend in recent years due to technological developments.

Digital game addiction is characterized by an individual's inability to control their gaming behavior, prioritizing their relationship with gaming over their daily life, and consequently neglecting their academic, social, or personal responsibilities. While this condition can be observed in all age groups, it is particularly prevalent among adolescents. During adolescence, excessive engagement with digital games, preferring them over traditional games, and identifying with game content are among the factors that increase the risk of addiction. Additionally, individuals may exhibit psychological withdrawal symptoms such as anger, restlessness, insomnia, and mood disorders when they are unable to play games .

According to World Health Organization (WHO) data, digital game addiction is observed at rates ranging from 1.3% to 9.9% globally, and these rates are increasing every year. These figures reveal that one in ten people is at risk of digital gaming addiction, indicating that this issue should be addressed as a global public health concern. According to data from the Turkish Statistical Institute (TÜİK), the rate of internet usage among children has increased significantly over the years. While the rate of internet usage among children was 82.7% in 2021, this rate has risen to 91.3% as of 2024. When evaluated by gender, the internet usage rate, which was 83.9% for boys and 81.5% for girls in 2021, reached 92.2% for boys and 90.3% for girls in 2024 . These data suggest that increased internet access and usage are among the most important determinants of behavioral addictions such as digital game addiction. Children and adolescents, on the other hand, constitute a high-risk group for digital game addiction due to their vulnerability to environmental stimuli and high rates of internet use. This situation highlights the importance of specifically addressing children and adolescents in protective interventions.

THE EFFECTS OF DIGITAL GAME ADDICTION

It is stated that digital games reduce individuals' fatigue and stress levels, help them escape from the pressures of complex city life and stress factors in their work life, increase their motivation as a source of entertainment, and contribute to the develop-

ment of self-confidence. Digital games designed for educational purposes accelerate the learning process, positively influence academic achievement in the targeted subject area, and support students' learning motivation by capturing their interest. In addition, it is stated that digital games encourage social interaction, reduce aggressive attitudes and behaviors, and contribute to the development of social skills such as cooperation, sharing, empathy, and mutual aid . Digital games also positively affect short-term memory development, and multi-user game platforms increase communication and interaction . In addition, various studies have shown that digital games have positive effects on foreign language learning. It is also stated that this learning approach is consistent with Krashen's language acquisition theory (1982) and is supported by the theory's basic principles .

In addition to the positive aspects of digital games mentioned above, it is known that various negative effects arise when they are played for long periods of time without control or awareness. One of the most common and tangible negative effects of digital games is the risk of obesity associated with prolonged inactivity. Insufficient physical activity leads to negative outcomes on the musculoskeletal system and is considered a primary cause of various health issues . Not spending enough time on social life while playing digital games can lead to deterioration in family and friend relationships . In addition, playing violent digital games contributes to increased physical reactions and heightened aggressive perceptions, feelings, and behaviors. This situation causes individuals to be perceived as incompatible by their surroundings and to be rejected in social environments . On the other hand, games can offer unique coping strategies that divert users' attention and energy away from real-life problems and stress . Therefore, some individuals may turn to prolonged video game sessions to avoid problems rather than developing coping mechanisms for the stress and problems they face .

Digital game addiction can have serious negative effects on players . In the literature, symptoms such as "inability to control the duration of gaming," "loss of interest in other activities," "continuing to play games despite negative effects," and "feeling psychologically inadequate due to inability to play games" are highlighted . Additionally, digital game addiction can lead to other issues such as low self-esteem, high levels of loneliness and shyness, increased heart rate, aggression and impulsivity, psychological problems such as depression, compulsive behaviors, suicidal tendencies, attention deficit and hyperactivity, and low self-acceptance. These factors are positively associated with problematic gaming tendencies.

METHOD

Subject and Purpose of the Study

The main focus of this study is how playing digital games and being in the digital gaming environment affects attitude changes beyond just being a way to spend free time in people's daily lives. Digital games are significant in that they can encourage individuals to develop their own cultural practices, actively participate in gaming groups in accordance with the rules of the game, organize themselves within the game, and develop the ability to exhibit critical, intellectual, and strategic attitudes and behaviors. In this context, the research aims to identify the impact of digital games on attitude change.

The research topic was determined based on the fact that no studies have been

found on attitude changes among university students who play digital games, and it is believed that this study will contribute to the literature and to individuals who play digital games, their families, and digital game producers. This study is expected to contribute to the literature by describing digital games and players, examining the relationship between online games and life inside and outside the game, and revealing the extent to which all of these are related to changes in players' attitudes toward social issues through different research techniques.

Hypotheses

The hypotheses developed within the scope of the study are as follows:

H1: The reasons for playing digital games positively affect the sub-dimension of digital game addiction, "excessive focus and procrastination**.**"

H2: The reasons for playing digital games positively affect the sub-dimension of digital game addiction called "withdrawal and seeking."

H3: The reasons for playing digital games positively affect the sub-dimension of digital game addiction called "emotional change and immersion."

Research Universe and Sample

University students studying at a state university in Turkey's Central Anatolia Region during the 2024-2025 academic year constituted the universe of the study, while 348 students who volunteered to participate in the study and completed the data collection tools in full constituted the sample of the study.

Data Collection and Measurement Tools

The questionnaire used in the study consists of 36 questions, excluding gender, marital status, age, income status, digital gaming, frequency of digital gaming, year of digital gaming, and personality structure. The questionnaire utilizes scales previously used in the literature to measure the reasons for digital gaming and digital gaming addiction. All scales were rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Table 1 shows the scales used in the study. The following table shows the scales used in the study:

Table 1. Scales Used in the Research

Variable	Subdimensions	Code	Items	Source
Reasons for Playing Digital Games	-	DON1	Completing the tasks in the game is important to me.	
		DON2	When I play games, I feel more like myself than I do in real life.	
		DON3	Digital games offer teamwork, encouragement, and a fun environment.	
		DON4	I like chatting with other players and socializing while playing digital games.	
		DON5	I trust my gaming friends and would like to meet them in real life.	
		DON6	I play games to make the most of my free time.	
		DON7	I play games to relieve the stress and anxiety I am experiencing.	

		DON8	Playing games is good for my physical and mental health.
		DON9	I experience various attitude changes while playing games.
		DON10	I feel close to the people I play games with.
		DON11	I think we share common values with other individuals in digital gaming environments.
		DON12	Playing games together has a positive effect on my relationships with the people I play games with.
		DON13	The feelings of my friends who play games with me are important to me.
		DON14	I respond in various ways to the problems my friends encounter in the game.
		DON15	Communication with other players while playing games is important to me.
Digital Game Addiction Scale	**Overfocusing and Procrastination**	AOE1	There are times when I skip my classes to play digital games.
		AOE2	Digital games are an indispensable part of my life (they are very important to me).
		AOE3	A life without digital games would be boring to me.
		AOE4	A life without digital games would be meaningless to me.
		AOE5	Because I play digital games, I don't have time for other fun activities (such as sports or music).
		AOE6	The first thing that comes to mind when I wake up in the morning is playing digital games.
		AOE7	I spend most of my time outside of school playing digital games.
		AOE8	I prefer playing digital games to going to school.
		AOE9	I don't want to stay away from digital gaming devices such as computers, phones, tablets, and consoles.
		AOE10	I prefer playing digital games to chatting face-to-face with others.
		AOE11	There are times when I delay going to the bathroom while playing digital games.
	Deprivation and Search	YA1	I get angry/upset when I can't play digital games whenever I want.
		YA2	I lose my appetite when I don't play digital games.
		YA3	I feel restless when I don't play digital games.
		YA4	I fantasize about playing digital games during class.
		YA5	When I go anywhere outside my home, I look around to see if there is a device (computer, phone, tablet, console, etc.) that I can use to play digital games.
		YA6	When I see technological devices such as computers, cell phones, or tablets, the first thing that comes to mind is playing digital games.

	Emotional Change and Immersion	DDD1	Playing digital games relaxes me when I am unhappy.
		DDD2	I want to play digital games for longer and longer periods of time.
		DDD3	I don't notice when I get hungry while playing digital games.
		DDD4	There are times during the day when I suddenly feel like playing digital games.

* DON = Reasons for Playing Digital Games, AOE = Excessive Focus and Procrastination, YA = Deprivation and Searching, DDD = Emotional Change and Immersion.

Source: Henseler, J., Hubona, G. & Ray, P. 2016. Using PLS path modeling in new technology research: updated guidelines. Industrial management & data systems, 116, 2-20.

Ethical Aspects of the Research

Permission to conduct the research was obtained from the Scientific Research and Publication Ethics Committee of Karamanoğlu Mehmetbey University Faculty of Social and Human Sciences (Date: 07.05.2025/ Number: 06-2025/175). Participation in the study was voluntary. Therefore, participants were informed about the purpose and content of the study, and written consent was obtained from participants who volunteered to participate in the study.

Descriptive Statistics

Table 2. presents demographic information and other descriptive data:

		Frequency	Percentage	Cumulative Percentage
Gender	**Female**	166	47,7	47,7
	Male	182	52,3	100
	Total	348	100	
Age	**18-24**	306	87,9	87,9
	25-29	29	8,3	96,3
	30-34	13	3,7	100
	Total	348	100	
Marital Status	**Single**	325	93,4	93,4
	Married	23	6,6	100
	Total	348	100	
Income	**5.000 TL ve Altı**	158	45,4	45,4
	5.000 TL-10.000 TL	95	27,3	72,7
	10.000 TL-20.000 TL	39	11,2	83,9
	20.000 TL-30.000 TL	32	9,2	93,1
	40.000 TL Ve Üstü	24	6,9	100
	Total	348	100	
Do you play digital games?	**Yes, I play**	292	83,9	83,9
	Yes, I used to play, but I quit	56	16,1	100
	Total	348	100	

How often do you play digital games?	**Less than 1 hour per day**	107	30,7	30,7
	1-3 hours per day	106	30,5	61,2
	3-5 hours per day	71	20,4	81,6
	More than 5 hours per day	64	18,4	100
	Total	348	100	
How many years have you been playing digital games?	**Less than 1 year**	46	13,2	13,2
	1-3 years	74	21,3	34,5
	3-6 years	72	20,7	55,2
	More than 6 years	156	44,8	100
	Total	348	100	
Your Personality	**Outgoing/Social/Optimistic (Positive Thinker)**	225	64,7	64,7
	Introverted/Shy/Pessimistic (Negative Thinker)	123	35,3	100
	Total	348	100	

Source: This table is standard because it contains demographic values.

The majority of participants were aged 18-24 (87.9%) and single (93.4%), with more than half (52.3%) being male. 45.4% stated that their monthly income was 5,000 or less. The majority (83.9%) of participants who reported playing digital games stated that 30.7% played digital games for less than 1 hour per day, while 44.8% reported having played digital games for more than 6 years. More than half of the participants (64.7%) described their personality as extroverted/social/optimistic (positive thinker) (Table 2).

RESEARCH METHODOLOGY AND FINDINGS

In the study, the hypotheses developed within the structural equation model were tested using the Partial Least Squares method to estimate the structural equation model (PLS-SEM) with the Smart PLS 4 (Ringle, et. al., 2022), statistical program. In this context, in terms of the reliability and validity tests of the scale, factor loadings were examined for item reliability, Cronbach's Alpha and composite reliability values for internal consistency reliability, explained variance values for convergent validity, and finally, cross-loadings and Fornell-Larcker Criterion values for discriminant validity. Subsequently, the structural equation model was estimated using the Partial Least Squares method. The research model is presented in Figure 1:

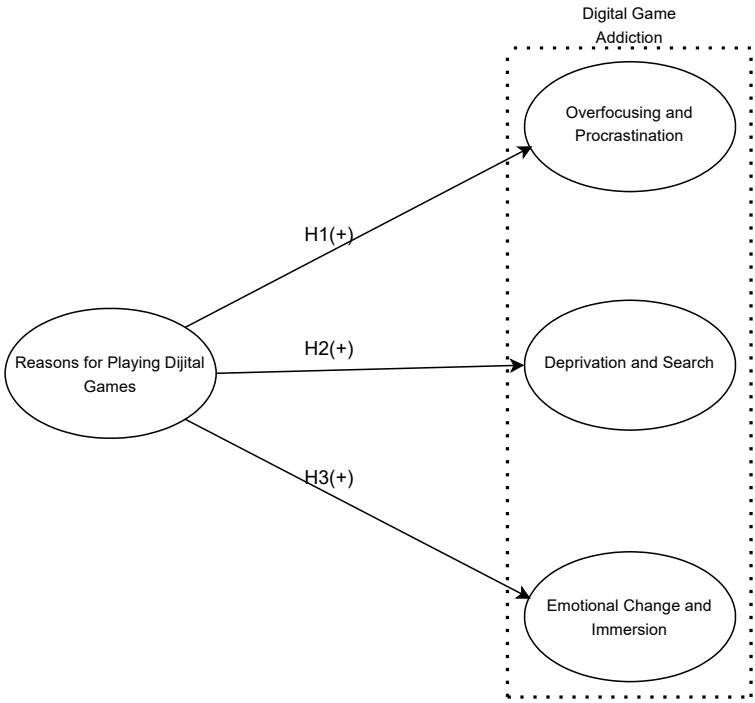

Figure 1. Research Model

Source: Henseler, J., Hubona, G. & Ray, P. 2016. Using PLS path modeling in new technology research: updated guidelines. Industrial management & data systems, 116, 2-20.

Research Model Scale Reliability and Validity Results

First, validity and reliability studies were conducted for the scales. In this context, item reliability, internal consistency reliability, convergent validity, and discriminant validity were examined. To test item reliability, standardized item loadings were examined for each item (Hair, et. Al., 2010). For internal consistency reliability, Cronbach's alpha coefficient and composite reliability (CR) coefficient were considered (Hair et. al., 2017). For convergent validity, attention was paid to the average variance extracted (AVE) values of the statements . To determine discriminant validity, cross-loading values and the square roots of the AVE values in the Fornell-Larcker table were examined (Hair et al., 2017; Henseler, et. al., 2015).

Convergence Criteria

Finally, within the scope of analyses of the measurement model, convergence indices were checked to understand the extent to which the model corresponded with the research data. Convergence values are expected to be less than 0.08 for SRMR and close to 1 for NFI . Hensler et al. (2016) state that the d_ULS and d_G values should be below the 95% percentile value obtained using the bootstrap method (HI 95% for d_G). In this study, the SRMR value was calculated as 0.073 and the NFI value as

0.912. Other parameters related to fit indices are d_ULS 2.660, d_G 0.787, and Chi-square 1520.778. In this study, since the d_ULS and d_G values are below the relevant HI 95% limits calculated using bootstrap, it was concluded that the model shows good fit with the data.

Table 3. Factor Loadings

Variables	Sub-dimensions	Items	Factor loadings > 0.5	Standard deviation	T statistic
Reasons for Playing Digital Games	-	DON1	0.624	0.038	16.589
		DON10	0.762	0.026	29.351
		DON11	0.731	0.034	21.602
		DON12	0.708	0.033	21.340
		DON13	0.703	0.034	20.726
		DON14	0.674	0.037	18.154
		DON15	0.748	0.025	29.962
		DON2	0.657	0.033	19.705
		DON3	0.699	0.034	20.296
		DON4	0.727	0.028	26.379
		DON5	0.711	0.030	24.003
		DON8	0.664	0.035	18.944
Digital Game Addiction	Overfocusing and Procrastination	AOE1	0.693	0.031	22.147
		AOE2	0.827	0.023	35.811
		AOE3	0.814	0.024	34.137
		AOE4	0.799	0.024	33.041
		AOE5	0.740	0.033	22.480
		AOE7	0.811	0.019	42.581
		AOE9	0.698	0.028	24.503
	Deprivation and Searching	YA1	0.801	0.027	30.204
		YA2	0.825	0.024	34.420
		YA3	0.883	0.016	55.133
		YA4	0.803	0.030	26.456
		YA5	0.882	0.015	59.218
		YA6	0.822	0.022	37.166
	Emotional Change and Immersion	DDD1	0.798	0.021	37.793
		DDD2	0.820	0.024	33.998
		DDD3	0.704	0.040	17.415
		DDD4	0.768	0.030	25.304

Items DON6, DON7, DON9, AOE6, AOE8, AOE10, and AOE11 were excluded from the analysis due to factor loading issues.

Source: Hair, J. H. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Second Edition. Los Angeles: Sage

Table 4. Cronbach's Alpha, Composite Reliability, and Explained Mean Variance Values

	Cronbach's alpha	Composite reliability (rho_a)	Average variance extracted (AVE)
AOE	0.885	0.886	0.594
DDD	0.779	0.795	0.599
DON	0.906	0.908	0.508
YA	0.914	0.925	0.700

Source: Hair, J. H. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Second Edition. Los Angeles: Sage

Fornell, C., & Larcker, D. (1981). Structural equation models with unobservable variables and measurement error. Journal of Marketing Research, s. 18(1), 39–50.

Table 5. Cross Loads

	AOE	DDD	DON	YA
AOE1	**0.693**	0.429	0.376	0.428
AOE2	**0.827**	0.583	0.393	0.567
AOE3	**0.814**	0.579	0.406	0.531
AOE4	**0.799**	0.548	0.353	0.643
AOE5	**0.740**	0.558	0.364	0.647
AOE7	**0.811**	0.639	0.413	0.693
AOE9	**0.698**	0.547	0.449	0.458
DDD1	0.534	**0.798**	0.502	0.455
DDD2	0.677	**0.820**	0.404	0.727
DDD3	0.535	**0.704**	0.324	0.655
DDD4	0.506	**0.768**	0.394	0.504
DON1	0.368	0.384	**0.624**	0.240
DON10	0.387	0.424	**0.762**	0.309
DON11	0.342	0.357	**0.731**	0.290
DON12	0.322	0.381	**0.708**	0.249
DON13	0.319	0.344	**0.703**	0.229
DON14	0.312	0.345	**0.674**	0.205
DON15	0.372	0.366	**0.748**	0.259
DON2	0.481	0.402	**0.657**	0.380
DON3	0.320	0.315	**0.699**	0.133
DON4	0.331	0.352	**0.727**	0.213
DON5	0.352	0.359	**0.711**	0.293
DON8	0.362	0.429	**0.664**	0.243
YA1	0.598	0.610	0.342	**0.801**
YA2	0.552	0.535	0.227	**0.825**
YA3	0.642	0.597	0.329	**0.883**
YA4	0.617	0.578	0.233	**0.803**
YA5	0.648	0.670	0.333	**0.882**
YA6	0.616	0.682	0.351	**0.822**

Source: Hair, J. H. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Second Edition. Los Angeles: Sage

Henseler, J., Hubona, G. & Ray, P. 2016. Using PLS path modeling in new technology research: updated guidelines. Industrial management & data systems, 116, 2-20

Items with factor loadings below 0.5 were excluded from the analysis. The remaining items had factor loadings above 0.5, ensuring item reliability. As seen in the tables above, since the Cronbach's Alpha values for the variables are higher than 0.7 and the Composite Reliability values are higher than 0.7, internal consistency reliability is ensured, and since the explained average variance values are higher than 0.5, convergent validity is ensured. Additionally, as seen in Table, according to the cross-loading results from the discriminant validity tests, the factor loading of the variable under which an expression is located is higher than the factor loading it receives in other variables. Furthermore, as seen in Table, according to the Fornell-Larcker criterion, discriminant validity is ensured because the diagonal values are the largest.

Table 6. Fornell-Larcker Criterion Values (Square Root of AVE)

	AOE	DDD	DON	YA
AOE	0.771			
DDD	0.724	0.774		
DON	0.515	0.535	0.713	
YA	0.734	0.739	0.371	0.837

Source: Fornell, C., & Larcker, D. (1981). Structural equation models with unobservable variables and measurement error. Journal of Marketing Research, s. 18(1), 39–50.

Within the scope of the research, the HTMT (Heterotrait-Monotrait Ratio) coefficients proposed by Henseler et al. (2015) were also used to demonstrate the validity of differentiation. According to this criterion, the average of the correlations of all variables included in the research represents the average ratio of the correlations of the same variable. In this sense, depending on the theoretical relationships between the structures, the HTMT coefficients must be below 0.90 or 0.85 (Henseler et al., 2015). When examining the HTMT coefficients, it is observed that all values are below 0.90 (see Table 5). In this sense, it is possible to state that the discriminant validity of the study has been established. The HTMT values are shown in the table below.

Table 7. HTMT Values

	AOE	DDD	DON	YA
AOE				
DDD	0.872			
DON	0.563	0.617		
YA	0.816	0.886		

Source: Fornell, C., & Larcker, D. (1981). Structural equation models with unobservable variables and measurement error. Journal of Marketing Research, s. 18(1), 39–50.

Structural Equation Model Hypothesis Tests

As summarized in Table and Figure below, hypotheses H1, H2, and H3 of the study were supported.

Table 8.

		B	S.S.	T value	P value	Conclusion
H1	DON -> AOE	0.515	0.041	12.625	0.000	Supported
H2	DON -> YA	0.371	0.044	8.388	0.000	Supported
H3	DON -> DDD	0.535	0.039	13.795	0.000	Supported

Source: Ringle, C. M., & Becker, J.-M. (2022). SmartPLS 4. Oststeinbek: SmartPLS GmbH. http://www.smartpls.com.

The reasons for playing digital games positively affect the sub-dimension of digital game addiction, "excessive focus and procrastination" ($\beta = 0.515$, $t = 12.625$, $p < 0.01$). Therefore, H1 hypothesis is accepted. The reasons for playing digital games positively affect the sub-dimension of digital game addiction 'withdrawal and seeking' ($\beta = 0.371$, $t = 8.388$, $p < 0.01$). Therefore, H2 hypothesis is accepted. Reasons for playing digital games positively affect the sub-dimension of digital game addiction 'emotional change and immersion' ($\beta = 0.535$, $t = 13.795$, $p < 0.01$). Therefore, H3 hypothesis is accepted.

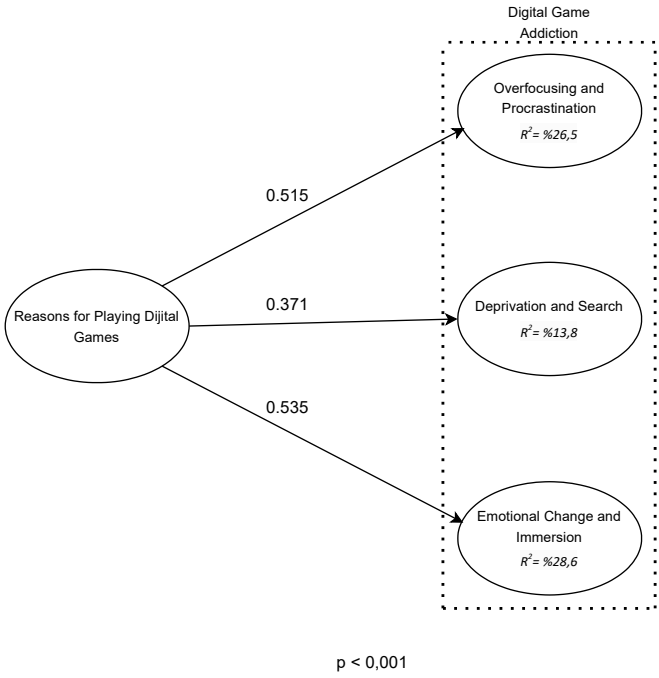

Figure 2. PLS Results of the Structural Model

Source: Henseler, J., Hubona, G. & Ray, P. 2016. Using PLS path modeling in new technology research: updated guidelines. Industrial management & data systems, 116, 2-20.

Hair, J. H. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Second Edition. Los Angeles: Sage

DISCUSSION

In this study, the relationship between digital game addiction and attitude change was analyzed using a structural equation model, and the validity and reliability analyses of the scales used ensured psychometric adequacy.

Our findings show that digital game addiction causes significant changes in individuals' attitudes. Studies in the literature also reveal that digital games have an effect on user behavior and attitudes (Yalçın Irmak & Erdoğan, 2015; Anderson & Bushman, 2001). In particular, it has been observed that increases in addiction levels lead to deterioration in individuals' social relationships and a decline in their academic performance . In addition, digital game addiction leads to social isolation and withdrawal from real life, directing individuals' attitudes more toward the digital environment, which negatively affects users' social adaptation . At the same time, attitude changes associated with addiction can cause an increase in stress, anxiety, and aggressive behavior in individuals . Digital game addiction is a phenomenon with multidimensional effects, causing significant changes not only in individual behavior and attitudes but also in social and psychological areas. Therefore, awareness programs and intervention strategies need to be developed to ensure balanced and controlled use of digital games.

As an important stage of the validity analyses conducted within the scope of the research, HTMT (Heterotrait-Monotrait) ratios were used to evaluate the construct-discriminant validity. This method, proposed by Hensler et al. (2015), is considered to be an analysis technique with higher discriminatory power compared to the traditional Fornell-Larcker criterion. HTMT values not exceeding the threshold of 0.85 or 0.90 indicate that discriminant validity is established. The fact that all HTMT ratios obtained in this study remain below 0.90 demonstrates that the variables are sufficiently discriminated from one another (see Table 7). Kuss and Griffiths (2012) have pointed out that in some studies conducted in the field of internet and digital game addiction, the distinction between structures in the measurement tools is not clear. From this perspective, the application of HTMT analysis in this study and the positive results obtained demonstrate that the model is based on a strong theoretical foundation.

The low and moderate correlations observed between digital gaming tendencies, digital gaming addiction, and attitudinal variables indicate that there is limited overlap between the structures, but that each structure has meaningful integrity within itself. In particular, the correlations between the tendency to play digital games and attitudinal variables (0.816) and between digital game addiction and attitudinal variables (0.886) indicate that attitudinal changes are strongly related to the level of addiction, but that theoretical boundaries between variables are also maintained. These findings can be evaluated in parallel with the causal relationships established in the literature between digital game addiction and social, academic, and cognitive attitude changes. Attitudes are found to be significantly related to addiction levels, but there is no measurement confounding between variables. This confirms the statistical integrity and discriminant validity of the study at the scale level.

All of the H1, H2, and H3 hypotheses tested in the study were found to be statistically significant and supported. According to the findings, the reasons for playing digital games significantly and positively affect the three different dimensions of digital game addiction. Therefore, it can be considered that the reasons for playing digital

games directly affect the dynamics of addiction and that digital games play a decisive role in individuals' psychological, behavioral, and emotional processes.

Within the scope of the H1 hypothesis, it has been observed that the reasons for playing digital games significantly affect the dimensions of "excessive focus and procrastination." Accordingly, games change the individual's perception of time and reinforce the tendency to put daily life responsibilities on the back burner. Similarly, , emphasizes that digital games are associated with behaviors such as procrastination and distraction, especially when used as an escape strategy from stressful life events. In other words, games are not only played for entertainment but also as a means of escaping reality, and this can negatively affect an individual's functionality.

Hypothesis H2 reveals that the reasons for playing digital games positively affect the "deprivation and search" dimension. This shows that when access to games is restricted or playing time is limited, individuals exhibit signs of deprivation and tend to fill this void by returning to gaming. Lemmens et al. (2011) also note that gaming addiction can be defined by withdrawal symptoms and that individuals continue to play games within a "reward cycle.".

In the H3 hypothesis, it is seen that the reasons for playing digital games contribute significantly to the "emotional change and immersion" dimension. This result reveals that individuals disconnect from real life during the game and become intensely involved in the game, and that this process serves as a temporary emotional regulation function. Ryan et al. (2006) state that digital games increase high intrinsic motivation and immersion levels in individuals as long as they meet personal competence and autonomy needs..

In this context, the findings of the study are consistent with the literature in terms of explaining both the psychological dimensions of addiction and how the reasons for playing games trigger addiction. Particularly in studies on problematic digital game use (Kuss and Griffiths, 2012; Pontes & Griffiths, 2014), it is emphasized that individuals' need for emotional regulation is a key determinant in their orientation toward games, which is consistent with the current findings.

CONCLUSION AND EVALUATION

In this study, the relationship between digital game addiction and attitude change was examined using a structural equation model; in addition, the validity and reliability analyses of the scales used were performed, confirming their psychometric adequacy. The results obtained from the analyses revealed that individuals' reasons for playing digital games significantly and positively influenced the three core dimensions of digital game addiction ("excessive focus and procrastination," "withdrawal and seeking," and "emotional change and immersion"). These findings show that motivations for playing digital games play a decisive role in both the formation process and the continuity of digital game addiction. Therefore, it can be suggested that intervention programs to be developed for behavioral addictions such as digital game addiction should be designed in a way that takes into account the internal and external motivational factors that drive individuals to play games.

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DIGITAL MATURITY OF PUBLIC ADMINISTRATION AND ITS IMPACT ON COUNTRIES' ECONOMIC PERFORMANCE: A COMPARATIVE ANALYSIS BASED ON THE EGDI, DIGITAL DEVELOPMENT SCORE, AND THE OECD DIGITAL GOVERNMENT INDEX

Zoran Milosavljević | Assistant Professor, Research Associate, Institute for Political Studies, Belgrade, Serbia, bigz40@hotmail.com; ORCID 0009-0003-9127-142X

Nina Uremović | Associate Professor, PhD in Economics, Pan-European University Apeiron, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, nina.d.uremovic@apeiron-edu.eu; ORCID 0000-0001-5445-2262

Mirjana Landika | Full Professor, PhD in Economics, Pan-European University Apeiron, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, mirjana.f.landika@apeiron-edu.eu; ORCID 000-0002-1495-2462

Abstract: *The digital maturity of public administration and its impact on countries' economic performance has become an increasingly important topic in contemporary research on public policy, digital transformation, and macroeconomics. In the context of global digitalization, countries seek to modernize public services, enhance transparency and efficiency, and stimulate economic growth through the use of digital tools and investments in digital infrastructure. The objective of this study is to empirically examine how different dimensions of digital maturity in public administration influence key economic indicators. The analysis is based on three internationally recognized indices: the E-Government Development Index (EGDI), the Digital Development Score (DDS), and the OECD Digital Government Index. Four research hypotheses are formulated to explore the relationship between digital maturity and GDP per capita, employment in the ICT sector, the efficiency of public–private digital services, and differences between developed and developing countries. The study relies on secondary data obtained from international databases and applies descriptive statistics, correlation analysis, and simple linear regression analysis to assess the relationships between digital maturity indicators and selected economic variables. The empirical results indicate a statistically significant positive relationship between higher levels of digital maturity in public administration and improved economic performance. Countries with higher EGDI and DDS values tend to achieve higher GDP per capita and stronger ICT sector development, while higher OECD Digital Government Index scores are associated with more efficient public–private digital services. The findings confirm that the digitalization of public administration reduces administrative burdens, shortens processing times, lowers operational costs, and improves the overall efficiency and quality of public services.*

In conclusion, the study demonstrates that the digital maturity of public administration represents a key determinant of contemporary economic development and a strategic instrument for enhancing national competitiveness, particularly in the context of global economic and technological transformation.

Keywords: *digitalization, public administration, countries' economic performance, GDP, national economy*

JEL classification: *O33, H83, O47, E01, E60*

INTRODUCTION

The concept of e-government refers to the use of information and communication technologies (ICT) in the field of public administration. The primary objective of ICT adoption is to enhance accountability and transparency in public governance, as well as to enable more effective and efficient delivery of public services (Bedeković, 2024). Public services encompass not only services provided to citizens and individuals, but also those delivered to the business sector, including faster responsiveness to change and more efficient communication with enterprises and the wider business community.

The contemporary concept of e-government further entails strengthening institutional interoperability, ensuring digital accessibility of administrative procedures, and reducing costs through process automation. These activities contribute to the establishment of a more predictable business environment, the strengthening of public trust in institutions, and an overall increase in economic efficiency.

All of the above exerts a positive influence on multiple factors, particularly in terms of supporting entrepreneurship, which ultimately affects macroeconomic indicators such as GDP, labour market performance, and the efficiency of services and communication with the business sector. The aim of this research is to examine how different dimensions of digital maturity in public administration influence countries' economic performance. The analysis is based on three key indices: the E-Government Development Index (EGDI), the DDS, and the OECD Digital Government Index.

Taking into account the identified challenges and potentials of digital transformation in public administration, there is a clear need for an empirical examination of how varying levels of digital maturity affect key macroeconomic indicators. This provides the basis for formulating the following hypotheses:

H1: Countries with higher EGDI scores exhibit higher GDP per capita.

H2: Higher DDS are correlated with higher employment levels in the ICT sector.

H3: Countries with stronger performance on the OECD Digital Government Index demonstrate more efficient public–private digital services.

H4: There is a significant difference in digital maturity between developed and developing countries, which is reflected in their economic indicators.

The remainder of the paper presents graphical representations, statistical analyses, and a discussion of results that illuminate these relationships.

LITERATURE REVIEW

The digitalisation of public administration is a gradual process that brings with it numerous benefits. Digital transformation in the public sector generally unfolds

through incremental changes that cumulatively generate broader societal effects, such as improved service delivery and reduced levels of corruption (Hauga, 2024). While digital transformation enhances efficiency, citizen engagement, and government accountability in the provision of public services, it simultaneously raises important concerns related to inclusiveness, data privacy, and the digital divide (Latupeirissa, 2024).

At its core, the advancement of digitalisation would not be possible without adequate support from the ICT sector. The impact of the ICT sector on societal economic indicators has been the subject of extensive scholarly research, offering diverse perspectives on this issue. This study places particular emphasis on three key contributions and their scientific relevance.

Baltezarević (2023), in the paper *"The Impact of Artificial Intelligence on the Global Economy"*, analyses how AI technologies are reshaping labour market structures, increasing productivity, and contributing to sustainable development. The author highlights the need for new educational models and workforce reskilling in response to these changes (Baltezarević, 2023).

Nadkarni and Prügl (2021), in *"Digital Transformation: A Review, Synthesis and Opportunities for Future Research"*, provide a systematic review of the literature on digital transformation. Their study identifies key success factors as well as challenges related to the integration of digital technologies into business models (Swen Nadkarni, 2021).

Kirchberger and Pohl (2016), in *"Technology Commercialization: A Literature Review of Success Factors"*, focus on the determinants of successful technology commercialisation, emphasising collaboration between universities, start-ups, and industry as a critical factor (Kirchberger, 2016).

All three studies address the role of the ICT sector and its influence on economic performance. Baltezarević examines a more recent phenomenon by analysing the impact of artificial intelligence on macroeconomic indicators, particularly labour market dynamics, and underscores its strong implications for educational reform and workforce reskilling. Although predating Baltezarević's work, Kirchberger (2016) similarly emphasises the importance of close cooperation between universities and labour markets, highlighting its relevance for economic development and innovation capacity.

DIGITALISATION AS A STRATEGY FOR COMPETITIVE ADVANTAGE OF THE NATIONAL ECONOMY

Digitalisation and digital transformation exert a direct influence on the formation of new strategic directions within society. Digitalisation was preceded by globalisation, a process aimed at reducing barriers created by national borders in international trade. In his book *Runaway World: How Globalization is Reshaping Our Lives*, Anthony Giddens argues that, in order to benefit from the process of globalisation, societies have had to relinquish a certain degree of sovereignty. He emphasises the growing importance of institutions such as the European Union, the World Trade Organization, and the United Nations, as well as the need for societies to adapt to global economic and political dynamics (Giddens, 1999).

Giddens articulated these views in the late 1990s, highlighting the necessity for states to adapt to globalisation processes if they wish to secure advantages at the level of national economies. Globalisation has affected every society worldwide, and

digitalisation has emerged as its successor, elevating national economies that were able to adapt their structural capital to emerging global trends, while leaving behind those that failed to do so.

Thus, while the process of digitalisation brings numerous advantages, it also introduces challenges that must be addressed. Digitalisation at the national level requires the comprehensive digital transformation of industrial sectors and all participants within those sectors. This implies that enterprises, as well as all actors within a national economy, must continuously adapt to digitalisation processes. The development of a digital economy necessitates appropriate infrastructure, encompassing physical and technological, institutional and regulatory, educational, security, and business–entrepreneurial components (Kahrović, 2021). This transformation does not occur overnight; rather, it gradually permeates all spheres of economic activity, both at the microeconomic and macroeconomic levels.

Digitalisation does not merely transform the information structure of society and the economy or modes of business operation; it also requires changes in legal frameworks and standards, which must be adapted to new forms of economic activity and, more broadly, to evolving lifestyles.

Digitalisation entails both advantages and limitations. Among its primary benefits are faster and significantly simplified data processing, the shortening of administrative procedures, improved detection and elimination of errors, enhanced control mechanisms, and increased satisfaction among users, whether citizens or businesses. Digitalisation reduces waiting times not only in terms of data processing but also in a physical sense, as requests from citizens and businesses are handled through telecommunications devices without requiring physical presence. One of the key disadvantages of digitalisation and digitally managed procedures is excessive reliance on network infrastructure, electrical power, and digital devices, all of which are vulnerable to technical failures, cyberattacks, and similar risks.

The potential of mathematical models represents an inexhaustible source of opportunities for exploring the unknown and integrating seemingly random factors into structured systems that enhance the performance of business processes and, consequently, public sector operations. Research in the field of optimising the operations of public enterprises includes the optimisation of public investments while accounting for non-economic factors, in order to maximise their contribution to local communities (Landika, *Modeliranje konkurentskog prioriteta investicionih alternativa u funkciji strategije globalnog razvoja*, 2011).

An innovative research approach is presented in a study that conducts a model-based comparison of satisfaction with service quality in the public sector from both the provider's and the user's perspectives (Landika et al., *Stochastics aspects of continuous improvement of the business results performance of the public administration*, 2017). Another contribution applies a modelling approach to analysing communication needs with users in primary healthcare as a key element of perceived service quality, using rank correlation analysis to generate valuable insights and recommendations for proactive action (Landika et al., *Stohastički aspekti marketing strategije usluga zdravstvene zaštite na teritoriji RS/BiH*, 2019).

THE ICT SECTOR AND ITS ROLE IN THE ECONOMY

Information and communication technologies (ICT) as a field of knowledge emerged through the convergence of information technologies and communication technologies. They encompass technical knowledge related to physical processes such as hardware, as well as the execution of analytical, coded, machine-readable instructions known as software, used for organising and managing information (Sarangi, 2021). The ICT sector includes all areas concerned with technologies for the transmission, processing, and storage of information and data. Given that it covers activities related to information storage, transfer, and processing, the ICT sector occupies a central position in contemporary business practices.

The development, production, procurement, distribution, and numerous other business activities would not be possible without the support of the ICT sector. Its scope spans the software industry, telecommunications, electronic equipment manufacturing, digital services, and innovations in the field of artificial intelligence. In modern economic systems, the ICT sector plays a pivotal role, as its presence enables business digitalisation, the modernisation of public administration, increased access to education, and the development of digital infrastructure, among other functions.

The ICT sector is a key driver of global economic growth. On average, it recorded growth of 6.3% between 2013 and 2023, which is approximately three times faster than overall economic growth across the 27 analysed OECD member countries (*Growth of digital economy outperforms overall growth across OECD*, 2025). According to the OECD, the ICT sector is also regarded as a horizontal driver of economic development, as it influences all sectors of the economy. Its integration into public administration has a direct impact on GDP growth, labour market dynamics, and the overall quality of life of citizens.

Stojanović and Regodić analyse the impact of information and communication technologies on economic growth, emphasising that ICT contributes to productivity gains, innovation, and structural changes within the economy. Their findings indicate that countries investing more heavily in ICT achieve stronger economic outcomes compared to those with lower levels of investment in this sector (Milan Stojanović, 2016).

RESEARCH METHODOLOGY

For the purposes of this study, the following statistical methods were employed:

- Descriptive analysis, used to describe the basic characteristics of the digital indices and economic indicators.
- Simple linear regression analysis, applied to examine the impact of digital processes on the efficiency of public services.
- Correlation analysis, used to assess the relationships between the E-Government Development Index (EGDI), the DDS, the OECD Digital Government Index (DGI), and key economic indicators such as GDP and employment in the ICT sector.

The data used in this research are secondary data obtained from international databases. Specifically, EGDI data were sourced from the UN E-Government Survey (UNDESA), the DDS was obtained from the ITU ICT Regulatory Tracker, while additional data were drawn from OECD Digital Government Policy Papers and the World

Bank databases[1]. The data were processed and analysed using Microsoft Excel, applying regression-based statistical techniques.

The sample includes 193 countries covered by the UN E-Government Survey, 33 countries included in the OECD Digital Government Index, as well as additional observations from the ITU DDS, representing countries at different levels of economic development.

The analysis is conducted at the national level and includes the following indicators:

- E-Government Development Index (EGDI)
- Digital infrastructure and capacities (DDS)
- Institutional maturity of digital government (OECD Digital Government Index)
- GDP per capita and employment in the ICT sector

To test Hypothesis 1, data from the E-Government Development Index (EGDI) sourced from the UN E-Government Survey (UNDESA, 2025) and GDP per capita data from the World Bank (2025) were used. The applied analytical methods include descriptive statistics, Pearson correlation analysis, and linear regression analysis, with EGDI specified as the independent variable and GDP per capita as the dependent variable.

To test Hypothesis 2, simple linear regression analysis was applied, with the DDS as the independent variable and employment in the ICT sector as the dependent variable. Correlation analysis and linear regression analysis were applied, with DDS treated as the predictor variable for GDP per capita.

To test Hypothesis 3, data from the OECD Digital Government Index (OECD, 2025) and GDP per capita data from the World Bank were used. Correlation and regression analyses were conducted on a restricted sample consisting exclusively of OECD member countries.

To test Hypothesis 4, data from the B-READY Index (UNDP, 2025) and GDP per capita data from the World Bank were employed. Correlation and regression analyses were used to examine differences in digital maturity and their reflection in economic indicators.

For the purposes of this study, indicators related to digital infrastructure and regulatory capacity are jointly referred to as the DDS.

Descriptive statistics were used to examine the basic characteristics of digital maturity indicators and economic variables. Pearson correlation analysis was applied to assess the strength and direction of relationships between digital maturity indices and economic performance indicators. Simple linear regression models were employed to evaluate the impact of digital maturity indicators as independent variables on GDP per capita, ICT employment, and public–private digital service efficiency as dependent variables.

RESEARCH RESULTS

Descriptive Statistics

Table 1 presents the descriptive statistics of the digital process index and public service efficiency. The mean value of the Digital Process Index is 6.13, while the

1 Accurate web addresses referenced later in the text

average efficiency of public services is 5.73. The standard deviations (2.16 and 2.10) indicate moderate variability across countries. The range of values suggests substantial differences in digital maturity and service efficiency, which is relevant for testing Hypothesis H4.

Table 1. Descriptive Statistics

Indicator	Digital Process Index	Public Service Efficiency
Count	7	7
Mean	6.13	5.73
Std deviaton	2.16	2.10
Min	3.2	2.9
25%	4.55	4.15
50% (Median)	6.3	5.9
75%	7.55	7.15
Max	9.2	8.7

Source: Authors (2025)

Figure 1 illustrates the DDS for six countries. Brazil, Argentina, and Indonesia exhibit relatively high scores, while Nigeria and Kenya lag behind. This highlights differences in digital maturity among developing countries. The DDS values represent an author-compiled dataset based on the methodological principles of the BCG Digital Acceleration Index (DAI), using a 0–100 scale.

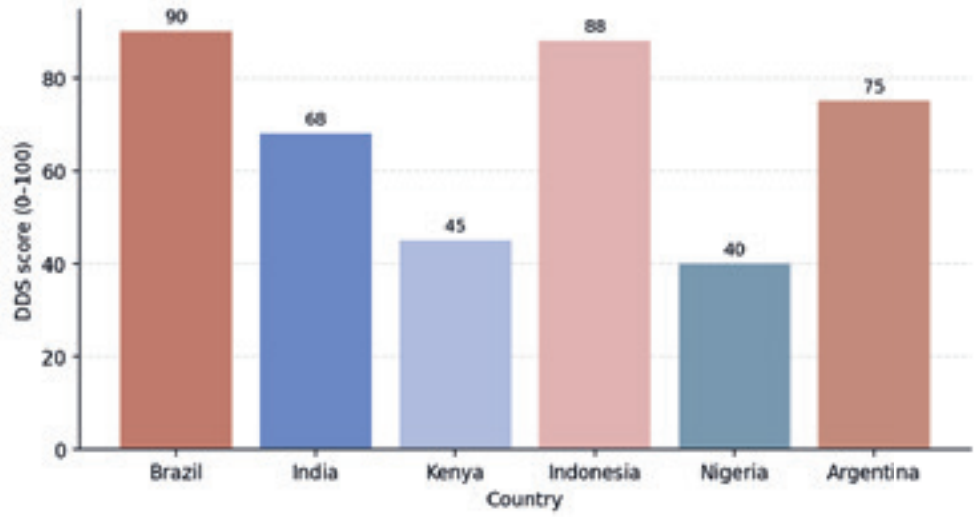

Figure 1. DDS by country

Source: Authors' compilation based on BCG Digital Acceleration Index (DAI) methodology; scale 0–100. (2025).

Correlation Analysis

Table 2 presents data for 193 countries, including the EGDI, E-Participation Index, Online Service Index, Human Capital Index, and Telecommunication Infrastructure Index, enabling a global analysis of digital maturity in public administration. High EGDI values observed in countries such as Singapore, the United Arab Emirates, and the United Kingdom illustrate the general pattern that countries with more advanced levels of e-government development tend to exhibit stronger economic performance, thereby supporting the expectations outlined in Hypothesis H1.

The correlation coefficients show positive associations among the analyzed indices, meaning that increases in one dimension of digital maturity are generally accompanied by increases in the others. The relationship between the DDS and the OECD Digital Government Index is particularly strong ($r = 0.964$), while the correlations involving the EGDI are moderate ($r \approx 0.59$ and $r \approx 0.51$). These patterns suggest that although the indices measure different aspects of digital development, they reflect similar cross-country trends.

Table 2. Correlation Analysis

	EGDI_2024	DDS	OECD_Digital_Government_Index
EGDI_2024	1.0	0.5915343423571162	0.5061366753560136
DDS		1.0	0.9641089191635362
OECD_Digital_ Government_Index			1.0

Source: Authors' calculation based on UNDESA EGDI dataset (2024), DDS data (BCG, 2025), and OECD Digital Government Index (2023).

Regression Analysis

Table 3 presents the regression results showing that the Digital Process Index has a strong and statistically significant positive association with public service efficiency. The coefficient value of 0.972 ($p < 0.001$) indicates a highly robust relationship. These findings suggest that higher levels of digital process maturity are closely linked to more efficient public-private digital services, thereby supporting Hypothesis H3.

Table 3 illustrates the impact of increased digital maturity on the efficiency of public-private digital services.

Table 3. Regression Analysis

Predictor	B	Std. Error	t	Sig.	Lower CI	Upper CI
Const	-0.22850553 50553531	0.10666807 06685263	-2.1422111 94251742	0.08507899 447123952	-0.5027045 399582377	0.04569346 984753148
Digital_ Process_Index	0.972017220 1722018	0.016549837 20961763	58.7327360 3001557	2.707414318 25225e-08	0.92947450 92584208	1.01455993 1085983

Source: Authors, 2025

The EGDI index indicates a high level of digital maturity for Brazil and Indonesia, while Kenya records the lowest score. These differences may affect the efficiency of public services and overall economic performance. In other words, it cannot be

assumed that the EGDI index is the sole determinant of digital maturity in public administration.

Figure 2 presents EGDI values for selected countries in 2024, revealing substantial disparities in the level of e-government development. Countries such as Argentina, Brazil and Indonesia achieve high levels of digital maturity, whereas Kenya and Nigeria lag behind. These results confirm that differences in digital infrastructure directly affect the overall efficiency of public administration.

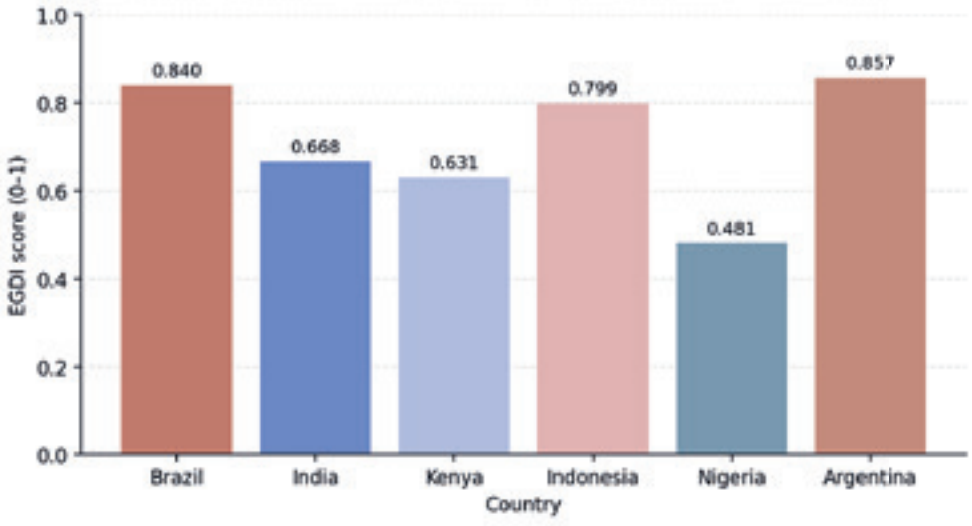

Figure 2. EGDI values by country (2024)

Source: Authors' calculations based on UN DESA – UN E-Government Survey 2024

Comparative Index Analysis

Table 4 summarizes the available distributional characteristics for the three key indices: the EGDI, the DDS, and the OECD Digital Government Index (DGI). For the EGDI and DGI, the table reports the mean and the approximate minimum and maximum values. For the DDS, publicly available sources do not consistently provide global mean, minimum, or maximum values on a unified scale, and therefore only the standard deviation (SD = 17.42) is included. The relatively high variability of the DDS, compared with the narrower ranges of the EGDI and DGI, indicates pronounced cross-country disparities in digital infrastructure and regulatory capacity. These patterns are particularly relevant for assessing Hypothesis H4, which concerns differences in digital maturity between developed and developing countries.

Table 4. Comparative Index Analysis

Index	Average	Minimum	Maximum	Standard deviation
EGDI – E-Government Development Index (193 zemlje)	0.638	≈ 0.00	≈ 1.00	n/p[1]
DDS	n/p[2]	n/p[2]	n/p[2]	17.42
OECD Digital Government Index (33 countries)	0.605	≈ 0.45[3]	≈ 0.85[3]	n/p[3]

Source: Authors' synthesis based on UNDESA EGDI dataset (2024), BCG/ITU DDS(2025), and OECD Digital Government Index (2023).

[1] UNDESA (UN E-Government Survey 2024) publishes the global average EGDI value (0.638) and the distribution of values, while the aggregate standard deviation is not tabulated in the executive summary.

[2] In publicly available summaries of ITU and partner indicators for the DDS, the global mean and minimum/maximum values are not consistently reported on a unified scale. Accordingly, the study explicitly emphasizes SD = 17.42 as an indicator of high variability.

[3] OECD DGI 2023 reports the sample mean (0.605) and country rankings (e.g. Korea, Denmark, the United Kingdom, and Norway at the top). However, exact minimum/maximum values and standard deviation are not tabulated in the summary; therefore, approximations are presented for the purpose of interpreting the observed range.

The OECD Digital Government Index (DGI) indicates a high level of digital maturity in countries such as Norway and Japan, which is reflected in the quality of public–private digital services. These findings suggest that developed countries tend to have more advanced digital public services.

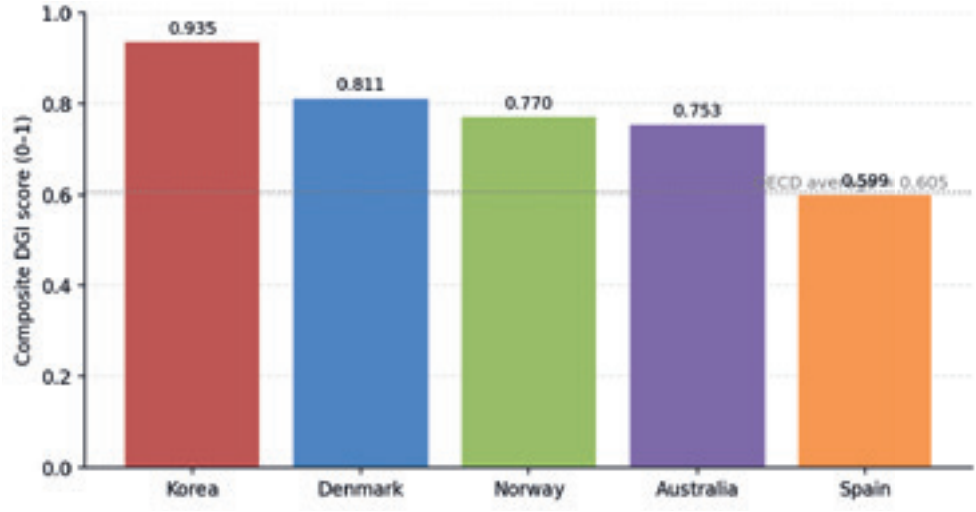

Figure 3. OECD Digital Government Index by country

Source: Authors' calculations based on: Republic of Korea MOIS press release for 2023 OECD DGI results (Korea 0.935; Denmark 0.811); Digdir Norway (Norway 0.770); Australia DTA (Australia 0.753); Spain PAe (Spain 0.599); OECD overall average reported in OECD summaries/media (0.605).

Figure 3 presents a comparison of OECD Digital Government Index (DGI) values for the selected countries (Korea, Denmark, Norway, Australia, and Spain). The results illustrate clear differences in institutional digital maturity within the OECD context. Countries with higher composite DGI scores demonstrate more advanced foundations for digital government, which is associated with greater stability, interoperability, and efficiency in the delivery of public services. This comparison further emphasizes the role of institutional digital capacity in shaping overall public-sector performance.

DISCUSSION

This section discusses the research findings in relation to the proposed hypotheses.

The results of the empirical analysis offer clear support for all four proposed hypotheses. Regarding Hypothesis **H1**, the descriptive and correlational findings show that countries with higher EGDI scores tend to achieve higher levels of GDP per capita. This pattern is consistent with the moderate positive correlation observed between the EGDI and other dimensions of digital maturity, suggesting that more advanced e-government capabilities are generally aligned with stronger economic performance.

Hypothesis **H2** is also supported. Countries with higher DDS values exhibit higher levels of ICT sector employment, indicating that stronger digital infrastructure and regulatory capacity coincide with more dynamic ICT labour markets. Although this study does not test causality, the observed positive association reinforces the notion that digital readiness at the national level is linked to broader economic and labour-market outcomes.

The regression analysis provides strong evidence for Hypothesis **H3**. The Digital Process Index shows a strong and statistically significant positive association with public-private digital service efficiency ($B = 0.972$, $p < 0.001$), indicating that countries with more advanced digital processes also tend to deliver more efficient digital services. These findings are consistent with OECD assessments that institutional digital maturity underpins service quality and interoperability.

Finally, Hypothesis **H4** is supported by the substantial cross-country variability observed in all three indices. The wide ranges of EGDI and DGI values, together with the high standard deviation of the DDS ($SD = 17.42$), point to pronounced structural differences between developed and developing countries. These disparities reflect uneven levels of digital infrastructure, institutional capacity, and human-capital development, all of which shape the broader economic implications of digital maturity.

Taken together, the findings confirm that digital maturity in public administration is closely linked with key indicators of economic performance, administrative efficiency, and institutional development. While the analysis does not establish causality, it demonstrates robust and consistent associations that highlight the strategic importance of digitalization for national competitiveness.

CONCLUSION

The findings of this study demonstrate that digital maturity in public administration represents a critical determinant of contemporary economic performance. By integrating three internationally recognized indices—the EGDI, the DDS, and the OECD Digital Government Index—the research provides a multidimensional assess-

ment of national digital capacities and their economic implications. The results offer clear support for all four proposed hypotheses. Countries with higher EGDI scores tend to achieve higher GDP per capita (H1); higher DDS levels coincide with stronger ICT labour-market performance (H2); higher DGI values are associated with more efficient public-private digital services (H3); and substantial differences in digital maturity between developed and developing economies are reflected in structural disparities across all three indices (H4).

Methodologically, the study applies a transparent and replicable analytical framework based on descriptive statistics, correlation analysis, and simple linear regression, enabling robust cross-country comparisons. The empirical evidence confirms that digital maturity reduces administrative burdens, enhances efficiency, lowers transaction costs, and strengthens the institutional foundations needed for effective public service delivery.

Beyond statistical relationships, the results underline the strategic importance of continuous investment in digital infrastructure, human capital, and institutional capacity. These elements enable governments to adopt advanced digital tools, support innovation, foster interoperability, and create a more predictable and efficient environment for business and society. At the same time, differences in digital maturity contribute to widening economic gaps between countries, emphasizing that digital transformation is not only an economic priority but a developmental imperative.

Overall, the study highlights that digital government is a cornerstone of modern economic competitiveness. Strengthening digital maturity offers measurable benefits for public administration, the private sector, and society as a whole, positioning it as a central driver of long-term national development.

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ORIGINALNI NAUČNI RAD / ORIGINAL SCIENTIFIC PAPER

CROSS-SECTIONAL ANALYSIS OF ECONOMIC, SOCIAL AND TECHNOLOGICAL FACTORS OF COUNTRIES DEVELOPMENT USING THE I-DISTANCE METHOD

Željko V. Račić | Full Professor, University of Banja Luka, Faculty of Economics, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, zeljko.racic@ef.unibl.org; ORCID ID: 0000-0002-5937-3528

Marko Lajić | Student, University of Applied Sciences BFI Vienna, Vienna, Austria, lajic96kv@gmail.com; ORCID ID: 0009-0008-1760-5088

Abstract: *Quantitative ranking of countries according to the level of development is conducted using the I-distance method through four models with different sets of selected variables. The analysis covers economic dimensions (GDP per capita in PPS, real GDP growth rate, inflation, public debt, current account balance), labour market and investment indicators (unemployment rate, gross fixed capital formation, foreign direct investment flows), as well as socio-technological dimensions (HDI index and internet usage). The research includes 27 European Union countries in 2024, with the addition of Japan, Russia, the United States, Canada, the United Kingdom, and Bosnia and Herzegovina. The results indicate a high degree of ranking stability, particularly for countries at the top and bottom of the list, while the middle segment shows greater sensitivity to changes in the defined variables. Countries with the highest rankings are characterized by stable macroeconomic performance, high human capital, and developed digital infrastructure, whereas lower-ranked countries indicate structural weaknesses in economic and socio-technological dimensions. The constructed ranking list enables differentiation of countries by the level of development and provides a basis for analysing convergence and structural heterogeneity. The paper contributes to contemporary economic research by applying a transparent, objective, and precise quantitative methodology for country comparison and provides relevant guidelines for economic analysis and development policy.*

Keywords: *I-distance, country ranking, economic indicators, socio-technological factors, level of development*

JEL classification: *C38, O11, O15, F43*

INTRODUCTION

The development of countries represents a complex process that encompasses not only economic but also social, institutional, and technological factors. A unique and permanent classification of countries is impossible, as macroeconomics includes

a large number of indicators that assume different values and mutual influences across countries and over time. At the same time, each country is exposed to additional influences, such as culture, tradition, habits, and the size and structure of the population, under whose impact two numerically identical macroeconomic indicators in two countries may have different meanings. Traditional comparisons and rankings of countries according to the level of development rely primarily on GDP per capita, often neglecting factors such as the quality of human capital, institutional stability, process digitalization, and investment activity, which may lead to incomplete and/or misinterpreted results and conclusions.

In this paper, the I-distance method is applied to rank countries according to the level of development. The method enables the integration of various quantitative factors into a single composite index, while simultaneously quantifying the relative "distance" between countries. I-distance is particularly suitable for comparative country analysis, as it considers factor heterogeneity and enables precise ranking even in the presence of multiple development dimensions.

The aim of the research is to rank countries according to their level of development using four variants of variable sets, to identify stable and sensitive positions within the ranking list, and to provide a quantitative basis for the analysis of convergence and structural heterogeneity among countries. This research advances scientific knowledge by combining macroeconomic, social, and technological variables within a methodology that enables objective and precise country ranking.

LITERATURE REVIEW

Partial development indicators, such as GDP per capita or the unemployment rate, do not provide a complete picture of a country's development. Therefore, multivariate methods are applied that integrate heterogeneous indicators into a unified framework. Ivanović's I-distance method stands out for its objectivity and the ability to rank without subjective weights. The literature review emphasizes the methodological advantages of existing approaches and justifies the application of this method in economic research.

Authors (Graovac, P., Radojičić, M., Đoković, A., 2025) apply a hybrid approach in predicting the NBA draft, combining machine learning methods with the I-distance statistical method. This approach demonstrates that I-distance can be effectively integrated with modern algorithms for analysis and prediction, thereby increasing ranking accuracy. Authors (Đurić, D., Vico, G., Bodiroga, R, 2024) apply multivariate statistical techniques and multi-criteria decision-making methods to rank EU countries by the development of organic production, using Ivanović's I-distance and MABAC methods. The authors emphasize that it is advisable to use multiple methods to validate results and increase the reliability of conclusions.

The selection of variables in the model and ranking using the I-distance method was addressed by authors (Račić, Ž., Kovačević, S., 2022) in a 2022 study. Principal Component Analysis was used as a "precursor" to the I-distance method. The authors argue that, although a single universal classification does not exist, with precisely defined indicators applicable to any country, it is possible to obtain relevant data and a reliable picture of the level of development of world countries. The aim of the study was to determine a ranking list of selected countries in 2021 based on a set of macro-

economic indicators. The analysis showed that the I-distance method, in combination with factor analysis models, leaves no room for subjective influence on the formation of the ranking list, assuming that the set of indicators is known and relevant to the nature of the problem.

Statistical models, such as time series analysis and regression models, significantly contribute to projecting the values of random variables into the future. Authors (Landika, M., Uremović, N., Sredojević, V., 2022) emphasize that supplementing these models with experience and expertise further aligns projected results with actual outcomes. The degree of adaptation of the theoretical model to the real system depends on the availability and quality of empirical data, covering input variables and factors that cannot be predicted or included in the model. The authors also point out that modeling results are neither fixed nor universal and that continuous verification is justified to ensure optimal contribution.

The I-distance method has demonstrated wide application in country ranking. In earlier studies (Račić, Ž., Kovačević, S., Babić, N., 2022), the authors used the I-distance method to achieve research objectives. The decision to apply the method stems from the fact that it satisfies all conditions characteristic of the notion of distance, i.e., for the multidimensional phenomenon of development. Based on the ranking list of G8 countries, the United States occupies the first position, followed by Germany, France, the United Kingdom, Italy, Canada, the Russian Federation, and Japan. Considering the prominence of the countries at the top of the list in terms of economy and social order, it is difficult to identify another country that could achieve equivalent success.

The author (Račić, 2018) demonstrated that I-distance is an adequate ranking method that does not require the additional application of other methods to determine variables. The ranking list obtained using I-distance, with or without prior factor analysis, provides identical results and clearly ranks countries according to their level of development. The method does not provide a quantitative difference between countries but serves to form a reliable ranking list that functions as a "compass" in analyzing relative development.

The analysis of countries' socio-economic development requires a combination of economic and social indicators, as individual measures, such as GDP per capita and HDI, often do not provide a complete picture. Multivariate analysis methods, applied in the study (Jednak, S., Kragulj, D., Bulajić, M., 2015), enable the integration of multiple heterogeneous indicators into a single synthetic measure and country ranking. The results show that these methods produce rankings similar to those of international organizations while better highlighting differences among countries, providing a more detailed and accurate picture of their relative development.

The socio-economic development of countries is a complex phenomenon that requires consideration of both economic and social factors. Internet connectivity and the development of the healthcare system are highlighted as key indicators, while the I-distance statistical method enables the quantitative ranking of countries according to their overall well-being (Milenković, N., Vukmirović, J., Bulajić, M., Radojičić, Z., 2014).

METHODOLOGY

The analysis covers 33 countries, with variables selected based on their economic, social, and technological relevance for the growth and development of countries.

Economic development represents a complex and multidimensional phenomenon that cannot be adequately quantified by a single indicator.

To analyze the global level of regional development and interdependencies in the growth process, it is necessary to define a growth matrix based on indicators that synthetically express the levels of development of the observed countries (Račić, Ž., Stanić, S., 2019). Considering that no mathematical-statistical model simultaneously provides synthetic cardinal information, eliminates duplication of information, and satisfies the condition of asymmetry, non-weighted index models are applied in empirical research. These models yield results expressed in relative values, which allows their comparability and interpretative relevance. Previous research indicates that contemporary development processes require the inclusion of technological dimensions. The study (Lukić Nikolić, 2024) demonstrates that digital technologies and communication tools significantly shape business communication and enable continuous information exchange. Within the framework of multidimensional analyses, these findings confirm the relevance of indicators related to internet usage as a measure of a country's modern business and technological capacities. In addition to technological factors, international capital flows play a significant role. Previous studies show that foreign direct investment (FDI) has a statistically significant impact on macroeconomic indicators, including GDP, employment, long-term interest rates, and the balance of payments (Sokčević, S., Pupić, M., Rudančić, A., 2023). Time series analyses indicate a moderate correlation between FDI and economic growth, with their impact also reflected in improved employment, interest rate stability, and balance of payments sustainability. The research emphasizes that FDI inflows positively affect GDP and indirectly contribute to improvements in employment, interest rate stability, and the balance of payments of the Republic of Croatia. In empirical studies of growth and development, analyses often start from a conventional set of variables, which can lead to a loss of model realism and reduce its analytical value. The choice of variables should depend on the specific research problem rather than predefined templates. Addressing this issue, authors (Račić, Ž., Mikić, Đ., 2021) emphasize that national economies are not exposed to rates of change requiring a shift from deterministic to stochastic modeling, but it is necessary to mobilize all methodological resources so that the model concept does not become a theoretical fallacy leading to quasi-decision-making. Decision-makers often face personal preferences that may affect the model structure and interpretation of results. Approaches based on mathematical programming and objective statistical methods allow the reduction of subjective influence in the decision-making process (Landika & Račić, 2021). In this context, the labor market represents an important dimension of economic development. Findings by Dević (Dević, 2024) indicate a statistically significant correlation between the unemployment rate and structural characteristics of the labor market in the observed countries. These results justify the inclusion of the unemployment rate as a relevant indicator in the country ranking process, as it contributes to a more complete assessment of their relative economic position. Previous research applying the I-distance method has focused on the construction of composite indices and the ranking of countries according to macroeconomic and social indicators, while connections with theoretical frameworks such as Okun's law and cyclical fluctuations are less frequently established. Authors (Bilas, V., Franc, S., Radoš, T., 2025) analyze empirical relationships between economic growth and unemployment in Croatia using

output gap and unemployment gap models, emphasizing the importance of distinguishing between trend and cyclical components, as well as the existence of asymmetries and instability in the relationship between growth and unemployment. These findings confirm that isolated indicators are insufficient for a comprehensive assessment of the labor market and the overall economic position of a country.

For the cross-sectional analysis of economic, social, and technological determinants of countries' development using the I-distance method, a set of variables was selected to enable comparative assessment and ranking of countries. The choice of variables is based on their theoretical relevance, empirical presence in literature, and data availability for the observed period. Economic variables include gross domestic product per capita expressed in purchasing power parity (GDP per capita in PPS), GDP growth rate, gross public debt, current account balance, unemployment rate, gross fixed capital formation, inflation rate, and the convergence criteria of the European Monetary Union. These indicators allow assessment of macroeconomic stability, fiscal sustainability, investment activity, and the dynamics of economic growth. The social dimension of development is represented by the Human Development Index (HDI), which integrates indicators of living standards, education, and health, as well as the unemployment rate as an indicator of social stability and labor market participation. The technological dimension of development includes indicators of internet usage and foreign direct investment (FDI). Internet usage reflects the degree of digital inclusion of the population and technological infrastructure, while FDI represents an indicator of a country's international attractiveness and its capacity for the transfer of capital, knowledge, and technology.

This set of variables enables a comprehensive understanding of different aspects of development and provides a reliable basis for ranking countries using the I-distance method. A presentation of all variables, together with their meaning in the context of country ranking, is given in table 1.

Table 1: Variables in the model

Variable	Meaning
GDP per capita in PPS	Expresses the relative value of GDP per capita and enables international comparisons of economic well-being by eliminating price differences between countries, with the EU average normalized to 100.
Human Development Index (HDI)	A composite indicator of human development; includes economic standard (GDP per capita), education (mean and expected years of schooling), and life expectancy (long and healthy life).
GDP growth rate (%)	Measures the dynamics of the economy; indicates how much the economy grows each year. It does not duplicate GDP per capita as it measures change (percentage change relative to the previous year) rather than the level.
General government gross debt (% of GDP)	The share of total public debt in GDP; indicates fiscal sustainability and the government's ability to service its obligations.
Current account (net balance - annual data, % of GDP)	Represents the annual difference between total exports and imports of goods and services, expressed as a share of GDP. Used to analyze international economic-financial relations and the sustainability of the country's external balance.
Unemployment rate (%)	The share of unemployed individuals in the total working-age population; indicates labor market conditions and social stability.

Gross fixed capital formation (GFCF)	Represents total investments in infrastructure, machinery, and buildings; GFCF measures the level of capital investments in the economy and is used to assess production capacity and economic development.
HICP Inflation rate	Annual change in the average level of consumer prices; an indicator of macroeconomic stability and living standards.
EMU convergence criterion	Long-term government bond interest rates; reflects fiscal stability (deficit and public sector debt) and country credit risk (exchange rate stability).
Individuals' internet use	Represents the percentage of the population aged 16–74 who used the internet in the last 12 months; indicates digital inclusion and technological development.
Foreign direct investment (FDI)	Investments by residents of one country in business entities in another country with the aim of achieving long-term interest and control over that entity. Used to monitor international capital flows and assess the country's attractiveness for foreign investors.

Source: Authors

The empirical analysis is based on data obtained from relevant international statistical databases, including Eurostat, the International Monetary Fund (IMF), the United Nations Development Programme (UNDP), and the World Bank. The analysis focuses on available data for 2024, providing a contemporary and comparable framework for ranking countries. The sample includes 33 countries, encompassing European Union member states as well as selected developed economies, allowing for a broader comparative perspective. For each country, data were collected for the defined set of economic, social, and technological variables, in accordance with the previously defined model structure. All indicators were standardized to eliminate differences in measurement units and to enable comparison across different dimensions of development. Standardization ensures that no variable dominates the ranking procedure solely due to differences in measurement scale.

Table 2 presents the analyzed indicators, the countries included in the sample, and their values for 2024. This table serves as the basis for the subsequent application of the I-distance method and the construction of a composite development indicator.

The ranking of countries according to the level of development was carried out using the I-distance method. The I-distance method represents a metric distance in an n-dimensional space, where each dimension corresponds to a socio-economic or technological indicator. Each country in the model is represented by a vector of indicators, and the ranking is based on the relative distance of each country from a reference object, which represents the country with the most favorable values of the observed indicators. In this way, all indicators are integrated into a single synthetic measure, which quantitatively reflects the relative position of a country in relation to the other countries in the sample.

The application of the I-distance method allows for the simultaneous integration of multiple heterogeneous indicators with minimal loss of information, thereby ensuring an objective and transparent ranking of countries according to their level of development. The obtained results allow the identification of groups of countries according to their development level, classified in this study as: very developed countries, highly developed countries, moderately developed countries, and less developed countries.

The basic form of the I-distance method was defined by Professor Branislav Ivanović. The fundamental form of the I-distance method is defined as follows. According

to their significance (the information they provide), the I-distance between P_r and P_s is defined as:

$$D(r,s) = \sum_{i=1}^{n} \frac{|d_i(r,s)|}{\sigma_i} \prod_{j=1}^{i-1} (1 - r_{ji.12\ldots j-1}),$$

Source**: (**Ivanović, 1977)

where:

- $d_i(r,s)$, is the distance between the values of indicator X_i for P_r and P_s, i.e. $d_i(r,s) = x_{ir} - x_{is}, i = (1,2,\ldots,n),$
- σ, is the standard deviation of X_i,
- $r_{ji.12\ldots j-1}$, is the partial correlation coefficient between variables X_i and X_j, $(j < i)$.

Formula 1. I-distance

This formula enables a transparent, objective, and precise assessment of the relative position of each country. The I-distance method integrates all indicators into a composite index, minimizing information redundancy and accounting for interdependencies among variables. By applying this method, quantitative synthetic measures are obtained that clearly rank countries according to their level of development, facilitating comparative analysis and the identification of country groups: very developed, highly developed, moderately developed, and less developed countries. The transparency of the method and its ability to eliminate subjective weights make it suitable for empirical research in the field of economic and social development.

The application of the I-distance method through four model variants allowed for the ranking of 33 countries according to their level of development based on the selected variables. Each model variant differs in the inclusion of specific indicators or their combinations, which allows testing the stability of the ranking and assessing the sensitivity of the results to the choice of variables.

Variant I: GDP per capita in PPS, GDP growth rate (%), General government gross debt, Current account (net balance – annual data, % of GDP), Unemployment rate, Gross fixed capital formation (GFCF), HICP Inflation rate, EMU convergence criterion, Individuals - internet use.

Variant II: HDI index, GDP growth rate (%), General government gross debt, Current account (net balance - annual data, % of GDP), Unemployment rate, Gross fixed capital formation (GFCF), HICP Inflation rate, EMU convergence criterion, Individuals - internet use.

Variant III: HDI index, GDP growth rate (%), General government gross debt, Current account (net balance – annual data, % of GDP), Unemployment rate, HICP Inflation rate, EMU convergence criterion, Individuals – internet use, Foreign direct investment (FDI).

Variant IV: GDP per capita in PPS, GDP growth rate (%), General government gross debt, Current account (net balance – annual data, % of GDP), Unemployment rate, HICP Inflation rate, EMU convergence criterion, Individuals – internet use, Foreign direct investment (FDI).

Table 2: Analyzed variables, countries, and their values for 2024.

Number/Country	GDP per capita in PPS	GDP growth rate	General government gross debt	Current account	Unemployment rate	GFCF	Inflation rate	EMU CC	Internet use	HDI index	FDI
1. Austria	119.00	-0.70	79.90	2.40	5.20	22.50	2.90	2.84	96.46	0.93	2.00
2. Belgium	117.00	1.10	103.90	-0.40	5.70	21.80	4.30	2.92	96.69	0.95	3.50
3. Bosnia and Herzegovina	66.00	3.40	23.80	2.50	2.60	22.00	2.60	3.93	92.14	0.85	3.80
4. Bulgaria	35.00	2.50	34.00	-4.50	12.60	22.30	1.70	4.23	86.82	0.80	3.00
5. Canada	143.00	1.50	108.00	-1.50	17.00	22.70	2.40	3.30	94.30	0.94	1.80
6. Croatia	78.00	3.80	57.40	-4.60	5.00	22.20	4.00	3.31	89.18	0.89	2.50
7. Cyprus	99.00	3.90	62.80	3.60	4.90	18.50	2.30	3.13	97.19	0.91	6.50
8. Czech Republic	91.00	1.20	43.30	6.50	2.60	24.10	2.70	3.98	97.85	0.92	2.50
9. Denmark	127.00	3.50	30.50	10.20	6.20	20.30	1.30	2.30	100.00	0.96	1.50
10. Estonia	79.00	-0.10	23.50	0.30	7.60	24.50	3.70	3.55	93.47	0.91	3.00
11. Finland	102.00	0.40	82.50	0.40	8.40	21.00	1.00	2.85	99.27	0.95	1.20
12. France	98.00	1.20	113.20	-0.10	7.40	22.00	2.30	2.97	96.07	0.92	2.00
13. Germany	116.00	-0.50	62.20	3.80	3.40	21.50	2.50	2.32	94.57	0.96	1.80
14. Greece	69.00	2.10	154.20	-5.50	10.10	18.90	3.00	3.35	92.48	0.91	1.00
15. Hungary	76.00	0.60	73.50	4.30	4.50	25.00	3.70	6.50	96.60	0.87	2.70
16. Ireland	221.00	2.60	38.30	41.80	4.30	23.50	1.30	2.72	98.40	0.95	10.00
17. Italy	98.00	0.70	134.90	2.30	6.50	20.50	1.10	3.71	90.60	0.92	1.50
18. Japan	111.00	0.50	255.00	4.20	5.00	21.20	2.70	1.30	87.00	0.93	0.80
19. Latvia	68.00	0.00	46.60	-1.60	6.90	23.80	1.30	3.29	94.47	0.89	2.80
20. Lithuania	87.00	3.00	38.00	5.50	7.10	24.00	0.90	2.88	93.55	0.90	2.50
21. Luxembourg	245.00	0.40	26.30	38.30	6.40	22.50	2.30	2.76	99.50	0.92	25.00
22. Malta	110.00	7.00	46.20	18.60	3.20	20.00	2.40	3.37	93.43	0.92	15.00

23. Netherlands	134.00	1.10	43.70	11.00	3.70	20.80	3.20	2.62	99.62	0.96	5.00
24. Poland	78.00	3.00	55.10	4.00	2.90	24.50	3.70	5.53	93.62	0.91	3.50
25. Portugal	82.00	2.10	93.60	2.30	6.50	19.80	2.70	5.53	92.61	0.89	1.20
26. Romania	77.00	0.90	54.80	-6.00	5.40	23.00	5.80	6.32	97.64	0.85	3.00
27. Russia	100.00	4.10	21.00	2.50	3.50	21.50	9.50	7.00	94.40	0.83	1.00
28. Slovakia	75.00	1.90	59.70	-0.30	5.30	25.00	3.20	3.47	94.44	0.88	4.00
29. Slovenia	90.00	1.70	66.60	6.10	3.70	23.00	2.00	3.11	95.27	0.93	2.50
30. Spain	91.00	3.50	101.60	4.20	11.40	20.00	2.90	3.15	97.29	0.92	1.50
31. Sweden	111.00	0.90	34.00	3.30	8.40	21.50	2.00	2.20	98.45	0.96	1.80
32. UK	128.00	1.10	104.00	-3.50	4.20	21.00	2.50	5.00	97.80	0.95	2.00
33. USA	200.00	2.80	123.00	-3.20	3.70	22.00	2.89	4.00	93.10	0.94	1.50

Source: Eurostat, IMF, UNDP, World Bank.

In variants I and IV, the variable GDP per capita in PPS is included, while in variants II and III, the HDI index is used, as the HDI integrates economic standard (GDP per capita in PPS). Including both variables in the same model would result in duplication of information. Similarly, in variants I and II, Gross Fixed Capital Formation (GFCF) is included, whereas in variants III and IV, Foreign Direct Investment (FDI) is included. GFCF reflects the total investment potential, while FDI focuses on foreign investments; their simultaneous inclusion would create redundancy. This approach ensures that each model provides a clear and coherent picture of development dimensions while eliminating data duplication and maintaining methodological precision.

The next step of the analysis involves calculating the I-distance for each country and model variant, thereby forming country rankings according to their level of development. The obtained results allow for the identification of very developed, highly developed, moderately developed, and less developed countries, as well as the analysis of ranking stability and the impact of individual variables on final positions. The following section presents the results of applying the four model variants, including tabular representations, grouping of countries by development level, and key statistical findings, providing the basis for further discussion and interpretation in the context of economic and socio-technological determinants of development.

RESULTS

By applying the I-distance method across four model variants, the ranking of 33 countries according to their level of development was performed. The variants differ in the set of included variables, allowing for the testing of ranking stability and the sensitivity of the results to the choice of indicators. The results are presented in table 3.

Table 3: Country rankings according to the four model variants

I variant	I-distance	II variant	I-distance	III variant	I-distance	IV variant	I-distance
Japan	37.42	Japan	36.52	Japan	35.32	Japan	37.44
United States	18.14	Greece	13.58	Greece	13.70	United States	18.20
Greece	11.73	Italy	11.15	Italy	10.73	Greece	11.63
Italy	11.19	United States	9.09	United States	7.86	Italy	11.18
Canada	10.24	France	7.56	Luxembourg	7.65	Canada	9.95
Ireland	8.98	Canada	7.11	France	6.52	Ireland	9.05
Luxembourg	8.66	Belgium	5.85	Belgium	5.85	Luxembourg	8.74
United Kingdom	7.19	Spain	4.92	Canada	5.31	United Kingdom	7.24
Belgium	6.97	United Kingdom	4.54	Spain	4.66	Belgium	6.98
France	6.73	Portugal	2.67	United Kingdom	4.17	France	6.69
Spain	4.57	Hungary	2.01	Malta	3.07	Spain	4.43
Austria	2.38	Austria	1.46	Portugal	2.47	Austria	2.39
Portugal	1.56	Finland	0.58	Ireland	1.60	Portugal	1.55

Finland	0.71	Slovenia	-0.68	Austria	0.19	Finland	0.65
Germany	-1.48	Ireland	-1.24	Hungary	-0.29	Germany	-1.41
Netherlands	-2.33	Slovak Republic	-1.51	Finland	-0.37	Netherlands	-2.26
Hungary	-2.68	Poland	-2.12	Cyprus	-0.62	Hungary	-2.66
Slovenia	-2.86	Germany	-2.68	Slovenia	-1.91	Slovenia	-2.81
Cyprus	-3.02	Romania	-3.95	Slovak Republic	-3.07	Cyprus	-2.96
Malta	-3.26	Croatia	-4.06	Germany	-3.43	Malta	-3.13
Denmark	-6.09	Cyprus	-4.32	Poland	-3.62	Denmark	-6.10
Slovak Republic	-6.30	Luxembourg	-4.47	Netherlands	-4.17	Poland	-6.27
Poland	-6.33	Czech Republic	-4.62	Croatia	-4.86	Slovak Republic	-6.29
Croatia	-6.94	Malta	-4.76	Romania	-4.93	Croatia	-6.92
Czech Republic	-7.34	Latvia	-5.38	Czech Republic	-6.46	Czech Republic	-7.27
Romania	-7.38	Netherlands	-5.68	Latvia	-6.98	Romania	-7.37
Sweden	-7.67	Lithuania	-6.08	Lithuania	-7.98	Sweden	-7.73
Lithuania	-9.13	Sweden	-8.39	Sweden	-9.27	Lithuania	-9.17
Latvia	-10.15	Estonia	-8.89	Denmark	-9.36	Russian Federation	-10.11
Russian Federation	-10.16	Bosnia and Her	-8.92	Bosnia and Her	-9.68	Latvia	-10.19
Estonia	-13.00	Denmark	-9.06	Bulgaria	-10.26	Estonia	-13.05
Bulgaria	-14.32	Russian Federation	-9.83	Estonia	-10.80	Bulgaria	-14.23
Bosnia and Her	-16.02	Bulgaria	-10.40	Russian Federation	-11.05	Bosnia and Her	-16.19

Source: Calculations by the authors using I-distance computation software.

The results demonstrate a high degree of ranking stability at the top of the list. Japan occupies the first position across all four variants, confirming its consistent ranking regardless of the choice of variables. Countries such as the United States, Greece, and Italy consistently appear among the leaders, although their relative positions vary slightly depending on the inclusion of certain indicators. These fluctuations indicate some sensitivity in the middle part of the list, while the top and bottom positions remain stable. The middle segment of the ranking shows greater oscillations. Canada, Ireland, Luxembourg, and the United Kingdom shift positions between variants, reflecting a moderate impact of variable selection on their overall rank. At the bottom of the ranking, countries such as Bulgaria, Estonia, Bosnia and Herzegovina, and Russia retain low positions across all variants, confirming their relatively unfavorable standing.

Based on the four ranking variants (I–IV), four groups of countries were formed according to their level of development. Grouping was based on a comparative analysis of all rankings, thereby reducing the potential bias associated with using only one set of variables:

- Group I - Very highly developed countries: Japan, United States, Greece, Italy, Canada, Ireland, Luxembourg, United Kingdom.
- Group II - Highly developed countries: Belgium, France, Spain, Austria, Portugal, Finland, Germany, Netherlands.
- Group III - Moderately developed countries: Hungary, Slovenia, Cyprus, Malta, Denmark, Slovakia, Poland, Croatia, Czech Republic, Romania.
- Group IV - Less developed countries**:** Sweden, Lithuania, Latvia, Estonia, Russia, Bulgaria, Bosnia and Herzegovina.

This grouping confirms the stability and reliability of the I-distance method: countries at the top of the ranking remain in Group I, while countries at the bottom remain in Group IV, although minor fluctuations are observed in the middle segment.

Comparative analysis of the four rankings shows that the I-distance method provides stable and reliable results, even when the set of variables is changed. The largest changes occur in the middle part of the list, where countries such as Hungary, Slovenia, Malta, Slovakia, and Poland exhibit more pronounced fluctuations. This is a consequence of unbalanced development - high values in some indicators are offset by weaker values in other variants.

In conclusion, the analysis of the four ranking variants confirms a high level of stability and reliability of the results. Although changes in the set of variables may affect the relative position of individual countries, the overall structure of the ranking and the assignment of countries to specific development groups remain unchanged.

DISCUSSION

The highest-ranked countries demonstrate strong macroeconomic performance, including high GDP per capita in PPS, stable growth, low unemployment, and controlled inflation, along with significant investments and high levels of human capital and digital inclusion (HDI and internet usage). These factors confirm their stable position among the most developed nations.

Countries in the middle and lower segments of the ranking exhibit greater sensitivity to the choice of variables, indicating structural imbalances in development. Investment activity and human capital are key limiting factors for convergence toward more developed economies. Structural reforms, strengthening labor markets and institutional frameworks, and attracting foreign direct investment are recommended as priority measures for countries in the convergence phase.

For less developed countries, the priority must be to establish macroeconomic stability and create a foundation for growth, including controlling inflation, rationalizing public finances, investing in infrastructure, and enhancing education and digital inclusion.

The results confirm that development is not solely an economic category but a multidimensional phenomenon, in which social and technological indicators significantly contribute to the stability of country rankings according to their level of development.

CONCLUSION

The conducted study demonstrates that the I-distance method represents an adequate and analytically reliable tool for ranking countries according to their level of

development, particularly when heterogeneous sets of variables are used. The comparison of four ranking variants confirms the stability of the results, with changes in the structure of variables most affecting the ranking of countries in the middle segment of the list. The results highlight the multidimensional nature of development and the necessity of integrating macroeconomic performance, investment activity, human capital, and digital inclusion in empirical assessment.

The proposed approach contributes to economic research by providing a comprehensive quantitative method for comparing countries and serves as a basis for the analysis of convergence and structural heterogeneity. The obtained classification allows not only the identification of the relative position of individual countries but also the formulation of differentiated economic policy recommendations. The results confirm that long-term development requires simultaneous improvement in economic performance, investment activity, and the quality of human capital. Based on the I-distance method and the four ranking variants, it is shown that a country's development cannot be assessed solely through GDP levels, but through a combination of macroeconomic, social, and structural indicators. The stability of rankings indicates the reliability of the I-distance method as a tool for comparative analysis of countries' development levels. Countries with higher levels of digital inclusion, human development, and investment activity achieve more stable and higher positions in the ranking, whereas countries with pronounced structural weaknesses require comprehensive reform measures aimed at enhancing competitiveness, productivity, and social welfare. Although this study does not provide direct policy recommendations, the results carry clear economic implications. For highly developed countries, maintaining macroeconomic stability and promoting long-term productivity remains a key priority. Ensuring fiscal sustainability and fostering innovation and digital transformation aligns with theories of endogenous growth and convergence. Countries with medium development levels can benefit from policies that increase investment efficiency, improve institutional frameworks and labor markets, thereby accelerating convergence toward more developed economies. Strengthening conditions for FDI inflows can further contribute to technology transfer and human capital accumulation. For lower-ranked countries, the results indicate the need to establish fundamental prerequisites for development, including macroeconomic stability, investment in physical and human capital, and improvement of digital infrastructure. Without progress in these areas, the potential for moving to higher levels of development remains limited.

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PRETHODNO SAOPŠTENJE / PRELIMINARY REPORT

SOCIOLOGICAL DETERMINANTS OF THE BUSINESS DECISION-MAKING PROCESS IN BOSNIA AND HERZEGOVINA

Mirjana Čeko | Assistant Professor, University of Business Studies Banja Luka, Republic of Srpska, Bosnia and Herzegovina, miraceko@gmail.com; ORCID ID: 0009-0006-6527-3423

Abstract: *This paper examines the sociological factors that influence the business decision-making process in Bosnia and Herzegovina, with particular emphasis on ethnic affiliation, the role of local communities, social networks, and the level of trust in institutions. In the context of prolonged transition and pronounced social fragmentation, business decisions in this country often do not stem solely from economic criteria but are strongly shaped by broader social circumstances, informal rules, and personal relationships.*

The paper starts from the assumption that economic actors in Bosnia and Herzegovina are significantly conditioned by the social environment in which they operate, which is particularly evident in phenomena such as clientelism, reliance on personal connections, and selective trust in institutions. To better understand these processes, an empirical study was conducted on a sample of organizations from the private, public, and non-governmental sectors. The analysis of the collected data seeks to determine how sociological factors influence business behavior and decision-making. The paper highlights the need for an approach that goes beyond purely economic models and takes into account the social and cultural specificities of doing business in Bosnia and Herzegovina.

Keywords: *business decision-making, sociological determinants, Bosnia and Herzegovina, institutional trust, clientelism*

JEL classification: *Z13, D91, P20, D73*

INTRODUCTION

Significance of the topic

Business decision-making in transitional societies such as Bosnia and Herzegovina requires an understanding of the complex interaction between sociological and institutional determinants that shape the strategic orientations and partnership relations of actors within the business sphere. Bosnia and Herzegovina, burdened by the challenges of the post-conflict period and ethnic fragmentation, faces specific obstacles that transcend the boundaries of conventional economic decision-making models. In such a context, business decisions are rarely the result of purely rational economic

calculations; rather, they are significantly conditioned by social norms (Fahrati, 2023), ethnic loyalties (Dyer & Ross, 2000), personal ties (Davidrajuh, 2008) and informal power networks (Norbom & Lopez, 2016).

Social divisions and political tensions, which are inherent to Bosnian-Herzegovinian society, create an environment characterized by a lack of trust in formal institutions. According to Fukuyama (Fukuyama, 1996), this represents a major obstacle to the development of a transparent and predictable market framework. The erosion of institutional trust encourages the emergence of alternative modes of business organization, in which entrepreneurs and managers primarily rely on informal social networks, often within homogeneous ethnic or clientelist structures (Nekmahmud & Patwary, 2023); (Efendic & Williams, 2025) This phenomenon is particularly pronounced in societies where clientelism and ethnic affiliation become significant criteria in the selection of business partners, access to markets, and resource allocation, thereby reinforcing existing social divisions and reducing the potential for creating an inclusive business environment (Dolenec, 2013).

Scientific research into the relationships between ethnic affiliation, social networks, clientelism, and the business decision-making process in Bosnia and Herzegovina holds substantial theoretical and practical relevance. Such analytical efforts contribute to a deeper understanding of local patterns of economic behavior and offer broader insights into the complexities faced by transitional societies in their efforts to establish functional market and democratic institutions (Brinkerhoff, 2007). A systematic understanding of these dynamics is essential for formulating sustainable public policies aimed at reducing the influence of informal practices and strengthening trust in formal decision-making mechanisms.

Research subject, problem and objectives

The subject of this research is the set of sociological factors that shape business decision-making in Bosnia and Herzegovina, with a particular focus on the influence of ethnic affiliation, clientelist networks, social ties and the level of institutional trust. The study concentrates on understanding how these factors affect the selection of business partners, access to markets, and the formulation of business strategies within the specific post-conflict and transitional context of Bosnia and Herzegovina.

Given the complex socio-political framework of Bosnia and Herzegovina, the research problem is articulated through the following question: *How do ethnic affiliation, social networks, clientelism and the level of trust in institutions shape the business decision-making of entrepreneurs and managers in Bosnia and Herzegovina?* **The objective** of the research is to analyze how sociological factors—including ethnic affiliation, social networks, clientelism, and institutional trust—affect business decision-making, partner selection, and market strategy among entrepreneurs and managers in Bosnia and Herzegovina.

Hypotheses

Main hypothesis

H0: In Bosnia and Herzegovina, business decision-making is significantly shaped by ethnic affiliation, clientelist practices and reliance on informal social networks, a dynamic further reinforced by distrust in state institutions.

Auxiliary hypotheses

H1: Ethnic affiliation and social networks have a significant influence on business decision-making in Bosnia and Herzegovina.

H2: Distrust in state institutions leads to an expansion of informal social networks that affect business decisions.

H3: Clientelist ties often dominate the processes of selecting business partners and accessing markets in Bosnia and Herzegovina.

METHODOLOGY

Given the complexity of the research problem and the need for a comprehensive examination of the influence of sociological factors on business decision-making in Bosnia and Herzegovina, the study employs a mixed-methods approach integrating both qualitative and quantitative methods.

The **qualitative component** is based on the analysis of secondary sources, including academic literature and other relevant documents. **Qualitative content analysis** will be used to identify patterns and relationships among ethnic affiliation, social networks, clientelism, and institutional trust, with the aim of gaining a deeper understanding of the context and processes of business decision-making. To empirically test the hypotheses, a quantitative survey will be conducted on a micro-sample of entrepreneurs, managers, and decision-makers from various sectors in Bosnia and Herzegovina. The questionnaire will consist of closed-ended items structured according to the Likert scale, focusing on perceptions of clientelism, trust in institutions, the importance of ethnic and personal ties in business decision-making, and assessments of the influence of social networks on business dynamics.

The collected data will be analyzed using descriptive and inferential statistical methods, enabling the identification of statistically significant relationships among variables and the confirmation or rejection of the proposed hypotheses.

Sample characteristics

The research was conducted as a case study on the territory of Bosnia and Herzegovina, encompassing the Federation of BiH, the Republic of Srpska and the Brčko District. Data collection took place during May and June 2025 in order to capture the current context of the business environment in a transitional and post-conflict society. The sample consisted of 14 enterprises and organizations selected through purposive sampling. Particular attention was given to the inclusion of micro, small, medium-sized, and large enterprises, as well as representation from the private, public, and non-governmental sectors. This sample structure enables insight into diverse perspectives and practices of business decision-making within the complex institutional framework of Bosnia and Herzegovina.

Data were collected using a structured survey questionnaire, and respondents evaluated three key research dimensions: perceptions of the influence of ethnic affiliation on business decisions; the role of social networks and personal ties in business operations; and trust in institutions alongside attitudes toward clientelism and market practices.

The instrument was designed to quantitatively capture basic patterns of perceptions and attitudes, using standardized response formats that allow for systematic analysis within the selected sample.

The research is partially limited by the availability and representativeness of the sample in the quantitative segment, as well as by the constraints inherent to qualitative analysis of secondary sources. As a case study, the research provides an indicative and illustrative overview of specific patterns in business decision-making, which may serve as a foundation for future, more extensive studies. Additionally, the combination of methodological approaches enables data triangulation and enhances the reliability and validity of the findings.

ANALYSIS OF SECONDARY DATA

Contemporary sociological frameworks of business decision-making

Business decision-making has traditionally been viewed through the lens of economic theories that emphasize rationality, risk calculation and utility maximization. However, in contemporary social contexts, there is an increasing need for a multidimensional approach to this phenomenon, whereby the sociological perspective offers a deeper understanding of decision-making processes within business environments. Decisions within economic organizations depend less on purely rational calculations and increasingly on the social context, cultural patterns, and normative frameworks within which organizations operate (Yin, Li, Li, Ren, & Wang, 2023); (Vila-Henninger, 2021); (Beckert, 2003).

Social norms, value systems and the degree of trust among actors emerge as significant variables influencing how organizations in Bosnia and Herzegovina make business decisions. Although many decisions may initially appear to be the product of pure market logic, in practice they are often infused with community expectations, social obligations and the specificities of the institutional environment. Belás and colleagues (Belás, Smrcka, Gavurova, & Dvorsky, 2018) emphasize that in transitional societies, where the institutional framework is not fully consolidated, social factors become even more pronounced and often decisive. In such contexts, business decisions are not merely responses to economic pressures but also reflections of local power relations, family expectations, political stability and ethnic affiliation. This dynamic becomes particularly evident when the legal system fails to provide a predictable and stable environment for business operations, creating space for parallel, informal mechanisms of coordination and decision-making. In such circumstances Burt (Burt, 2018) argues that social capital becomes a key resource for managing uncertainty. Networks of trust, interpersonal ties, and informal structures increasingly assume the role of "guarantors" of stability, loyalty and efficient exchange in business relations. Reliance on these sources, rather than exclusively on formal institutional mechanisms, does not stem from a disregard for rules but from adaptation to the real social conditions in which organizations operate, where personal ties are often more reliable than legal frameworks.

The sociological approach to business decisions rests on the assumption that organizations do not operate in a vacuum but within concrete social environments that shape their behavior, perceptions of goals, and acceptable means of achieving them. The structure of society, through norms, value patterns, and institutional expectations, determines not only *what* can be achieved but also *how* it is achieved. In this sense, business decision-making involves the continuous interpretation of social signals and the adaptation of strategies to local cultural patterns. For example, the concept of cor-

porate social responsibility (CSR) increasingly reflects the effort of organizations to respond to the specific expectations of the local community, rather than merely optimizing public image or fulfilling regulatory requirements. CSR thus becomes a social reflex rather than solely a managerial marketing instrument. According to Yin and colleagues (Yin, Li, Li, Ren, & Wang, 2023), the success of innovation, flexibility in changing environments, and long-term sustainability of enterprises are increasingly linked to the ability of organizations to understand and interpret social patterns and cultural changes within the communities in which they operate.

In this context, globalization further complicates the decision-making process, as organizations operate in a space that requires simultaneous sensitivity to local social values and alignment with universal market standards. Granovetter (Granovetter, 2018) i (McKeever, Anderson, & Jack, 2014) argue that contemporary organizations function at the intersection of market and society, where economic rationality must be in dialogue with social legitimacy. This tension between economic and social orders opens space for sociological analysis of business decision-making as a process deeply embedded in local culture, identity, and networks of social relations.

Modern management approaches increasingly emphasize the importance of participatory decision-making, which includes various social actors: employees, communities, and consumers. The trust built through such involvement not only enhances the legitimacy of decisions but also increases their effectiveness and sustainability. In this way, business decision-making becomes a reflection of broader social consensus and responsibility toward the community. This transformation can also be observed through the shift from rigid, hierarchical decision-making structures toward networked and horizontal forms of decision-making, where not only formal roles but also informal authorities and social networks play a significant role. Business decision-making is not an isolated economic activity but a socially conditioned process formed and developed within a complex system of social interactions, cultural patterns, and normative frameworks. Ignoring these factors leads to strategic errors, while understanding and integrating them into decision-making can represent a comparative advantage in contemporary business. The sociological approach thus opens space for a holistic understanding of organizations as social actors, positioning business decision-making as a process that serves not only profit maximization but also the pursuit of socially relevant goals.

Ethnic affiliation, social capital and clientelism in Business Practices in Bosnia and Herzegovina

In countries marked by institutional instability and social fragmentation, such as Bosnia and Herzegovina, business decisions are often intertwined with deeply rooted social factors, including ethnic affiliation, informal networks, clientelist patterns, and the general perception of trust in institutions. These factors interact and jointly create a specific social and institutional dynamic that forms an inseparable part of the business environment in Bosnia and Herzegovina.

Ethnic affiliation in Bosnia and Herzegovina represents more than an identity marker; it has a concrete functional role in shaping business relations and decisions. In an environment where social resources are frequently distributed along ethnic lines and where access to markets and institutional support is uneven, ethnic identity can serve

both as an asset and as a constraint. Belás and colleagues (Belás, Smrcka, Gavurova, & Dvorsky, 2018) note that in post-conflict and transitional societies, belonging to a particular group often plays a decisive role in business interactions, whether through networks of solidarity or through selective institutional support.

Social networks, whether formal or informal, further complicate business behavior in unstable institutional contexts. Burt (Burt, 2018) and Horak and colleagues (Horak, Klein, Ahlstrom, & Li, 2024) emphasize that organizations positioned within dense social networks enjoy strategic advantages, as such networks facilitate faster information exchange, strengthen mutual trust, and ease access to resources. In environments characterized by institutional weaknesses, interpersonal ties often serve as alternative mechanisms of coordination and control, compensating for deficiencies in formal structures and reducing operational risks. In the Bosnian-Herzegovinian context, such networks are frequently formed based on prior school, political, or ethnic affiliations, reinforcing the logic of "closed circles" in business. These networks function as informal regulatory mechanisms, creating forms of social closure that may facilitate exchange but also exclude "outsiders" from market flows (Portes, 2010).

The issue of institutional trust is particularly pronounced in societies where the legal framework is perceived as uncertain or ineffective. Hurley (Hurley, 2006) argues that when trust in institutions is eroded, individuals increasingly rely on personal judgments, acquaintances, and informal channels, as these offer a sense of security and control that formal structures no longer provide. This dynamic is clearly visible in the business environment of Bosnia and Herzegovina, marked by weak institutional capacities and insufficient legal protection, where entrepreneurs often rely on personal ties and informal authorities as key sources of security and support in business operations (Ateljevic, O'Rourke, & Todorovic, 2004). A similar pattern is present in the public sector, where hiring processes show a strong dominance of political influence and non-transparent practices. According to Transparency International BiH (Transparency International BiH, 2025), as many as 78.6% of citizens believe that political connections, personal acquaintances, and the absence of clear criteria are the main obstacles to fair employment, further confirming deeply rooted distrust in formal institutional mechanisms.

In this context, employee motivation cannot be understood outside the broader social framework. Šijaković (Šijaković, 2015) shows that motivation in organizations in Bosnia and Herzegovina often depends on subjective factors such as personal relationships with superiors, a sense of belonging, and perceptions of fairness and security, rather than on formal procedures or professional standards. When employees do not trust institutional mechanisms of reward and promotion, their motivation increasingly relies on informal sources of power and support networks, which further legitimizes clientelism as a dominant behavioral pattern.

Clientelism, as a pattern of business-political relations, represents an institutionalized form of social networking in which trust is not based on professional norms but on loyalty and reciprocal benefit. Granovetter (Granovetter, 2017) warned that "excessive social embeddedness" can lead to market closure and limit innovation. In the context of Bosnia and Herzegovina, this type of social embeddedness is further reinforced by weak institutional capacities, contributing to the formation of parallel decision-making structures in which access to public resources and opportunities is

regulated through informal channels, political loyalty, and personal ties (Ferjan, 2014). Clientelism thus becomes not only a mechanism of distribution but also a filter of motivation and advancement within enterprises (Šijaković, 2015).

Understanding business behavior in Bosnia and Herzegovina requires a broader analytical framework that goes beyond standard economic models. Ethnic dynamics, networks of social capital, the erosion of trust in formal institutions, and clientelist practices jointly shape a specific business environment in which rationality is defined locally rather than universally. To strengthen institutional capacities and foster a more inclusive business environment, it is essential to understand these factors as highly significant components of market dynamics rather than anomalies that can be ignored.

Characteristics of the business environment in Bosnia and Herzegovina during the transition period

The transition period in Bosnia and Herzegovina, formally beginning after the signing of the Dayton Peace Agreement in 1995, represents a complex and multidimensional process of profound social, political, and economic transformation. The shift from a planned to a market economy did not occur in a stable or socially homogeneous context, but within a post-conflict society marked by deep ethnic divisions, political instability and an erosion of trust in institutions. One of the most significant sociological characteristics of the business environment in Bosnia and Herzegovina during the transition is the pronounced fragmentation of the institutional framework and political decentralization (Blagovčanin, 2024); (Bošnjak, 2020). The Dayton structure, consisting of two entities and the Brčko District, created a complex governance system with multiple layers of authority and overlapping competencies. This institutional complexity reflects and deepens social divisions, complicates the formulation and implementation of coherent economic policies and enables the formation of local political-business elites who instrumentalize resources to maintain power (Krunić, 2020). Such an institutional framework has resulted in slow and uneven economic development across regions, as well as differentiated access to markets and investments, thereby reinforcing social inequality (APOSO, 2022); (Papić & Fetahagić, 2019).

Privatization, envisioned as a central mechanism for transitioning to a market economy, was carried out without a clear strategy and with numerous irregularities and corrupt practices. Instead of creating a competitive private sector, privatization often resulted in the concentration of ownership in the hands of narrow interest groups, the closure of enterprises, and workforce layoffs (Čaušević, 2014) process weakened the economic base and social capital, undermined trust in market institutions and generated a sense of collective injustice, further widening the gap between citizens and the state.

At the macroeconomic level, the transition period was characterized by a combination of slow and unstable growth. Although international financial institutions such as the European Bank for Reconstruction and Development (EBRD) and the International Monetary Fund (IMF) provided substantial support through loans and technical assistance, the effects were limited due to the lack of structural reforms and insufficient political will to implement them (EBRD, 2017). Low levels of foreign direct investment, a high share of the informal economy, and weak rule of law continuously constrained the development of a competitive and sustainable business environment (Krunić, 2020).

Consequently, the transition period in Bosnia and Herzegovina produced ambivalent outcomes. On the one hand, the transition enabled trade liberalization, modernization of the banking sector, and the establishment of basic market mechanisms, opening opportunities for new entrepreneurial dynamics and regional integration. On the other hand, without deeper institutional reforms and the development of a functional legal system, the positive shifts of the transition period remained limited and often uneven. In this context, Čaušević (Čaušević, 2014) argues that the economic landscape in Bosnia and Herzegovina has been shaped by informal networks and clientelist patterns, while Šijaković (Šijaković, 2015) highlights the importance of interpersonal relations and loyalty in organizational behavior, further complicating transparency and market efficiency. Given these conditions, the business environment in Bosnia and Herzegovina during the transition period cannot be understood solely through economic indicators or institutional reforms. It is the product of a specific social configuration marked by ethnic divisions, institutional fragmentation, and an erosion of trust in public institutions. Without addressing these sociological challenges, future economic reforms and development programs will face limited effectiveness and a high likelihood of reproducing existing inequalities.

ANALYSIS OF RESEARCH RESULTS

The research sample consisted of 14 organizations and was conducted across the territory of Bosnia and Herzegovina during May and June 2025, using a closed-ended survey questionnaire within a case study design. The purposive sample included enterprises and organizations of different sectors and sizes, with the aim of capturing the diversity of the business environment. Women accounted for 71.4% of respondents, while men represented 28.6%. This predominance of female participants indicates a notable presence of women in managerial or leadership positions across various sectors in Bosnia and Herzegovina, which may be relevant for examining perceptions of institutional trust and informal networks, as different social and professional identities can shape attitudes and experiences in business settings.

The largest share of respondents (50%) belonged to the 41–50 age group, followed by those aged 31–40 (28.6%) and respondents up to 30 years of age (14.3%). Only 7.1% of participants were older than fifty. This age structure suggests that most participants are experienced professionals actively involved in shaping business decisions, which further enhances the relevance of their perceptions.

The sample included participants from the private sector (50%), the non-governmental sector (28.6%), and the public sector (21.4%). This diversity enables comparisons of perceptions and experiences across different institutional settings, particularly when analyzing phenomena such as clientelism, ethnic affiliation, and the role of informal networks. The largest number of respondents came from small enterprises (35.7%) and micro-enterprises (28.6%), while medium-sized and large organizations were represented with 14.3% and 21.4%, respectively. This structure reflects the reality of the business landscape in Bosnia and Herzegovina, where small and medium-sized enterprises dominate. Such enterprises are often the most exposed to informal market rules, making this distribution analytically significant.

Perceptions of the Influence of Ethnic Affiliation on Business Decisions

The results regarding the statement that ethnic affiliation of partners is considered when making business decisions indicate a strong predominance of negative attitudes toward considering ethnicity in professional decision-making. Specifically, 71.4% of respondents (10 out of 14) stated that they do not take ethnic affiliation into account at all, assigning the lowest possible score on a 1–5 scale. An additional 14.3% (2 respondents) selected a score of 2, which still reflects an exceptionally low level of importance attributed to this dimension in business relations. Only one respondent (7.1%) selected scores 3 and 4, respectively, while no participant considered ethnic affiliation to be fully relevant in business decision-making.

These findings clearly show that most participants distance themselves from the idea that the ethnic identity of a partner should play any role in professional decisions. Such a stance suggests a high degree of professional neutrality and potentially a mature awareness of the importance of inclusivity and equality in business relations.

Graph 1: Perceptions of ethnic affiliation in business decisions

Source: author

The results for the statement that ethnic affiliation plays a key role in selecting business partners show a clear orientation toward ethnic neutrality. As many as 78.6% of respondents rated this statement with the lowest possible value, thereby clearly expressing the view that ethnic affiliation does not play a significant role in choosing business collaborators. An additional 14.3% (2 respondents) selected a score of 2, suggesting only a minimal influence of this factor. Notably, no respondent selected options 3 or 5, while only one participant chose the value 4 ("agree"), indicating that ethnic selection in business relations is extremely rare among the surveyed participants.

Taken together, these findings show that ethnic affiliation is entirely irrelevant for most respondents when it comes to selecting business partners. This further confirms a professional orientation and a low prevalence of bias based on ethnic identity.

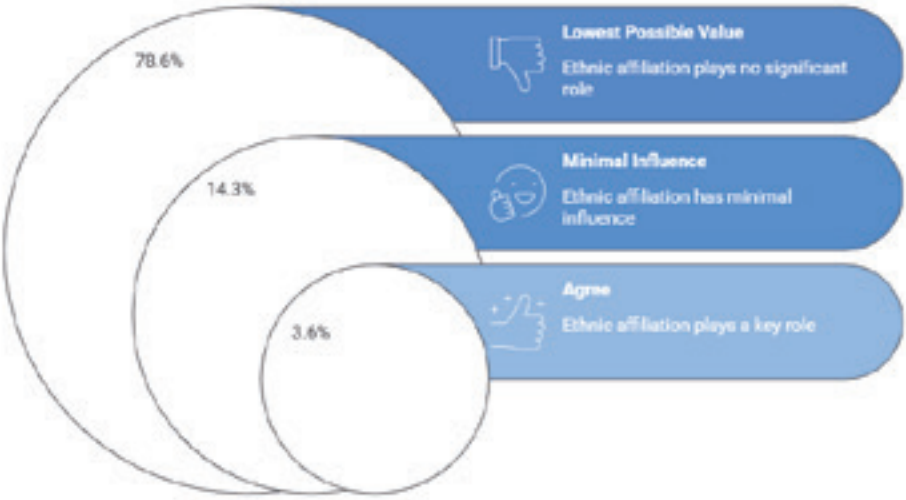


Figure 1: Ethnic affiliation in business partner selection

Source: author

The attitudes regarding the statement that ethnic solidarity facilitates business processes are diverse. The majority of respondents (60%) disagreed with this statement, while 21.4% remained neutral. A smaller number partially or fully agreed: 7.1% selected a score of 2, another 7.1% selected a score of 4, and 14.3% fully agreed. These findings indicate that, although skepticism predominates, a smaller portion of respondents still perceive ethnic solidarity as potentially beneficial for business cooperation and mutual understanding.

The role of social networks and personal connections in business

The analysis of attitudes regarding the role of personal connections and social networks in business in Bosnia and Herzegovina reveals a high awareness of the importance of informal networks within the business environment. Responses to the statement that personal contacts are crucial for business success were dispersed, yet the largest share of respondents (28.6%) fully agreed, while 21.4% remained neutral and 14.3% expressed strong disagreement. This distribution indicates a considerable influence of personal ties but also highlights differences in how respondents perceive their importance.

Similarly, the statement that access to important business information and resources is difficult without strong social networks received substantial support: 35.7% fully agreed, and an additional 14.3% selected a score of 4. Although a portion of respondents expressed disagreement (14.3% selecting 1), the prevailing view confirms the significant role of social networks in the business environment.

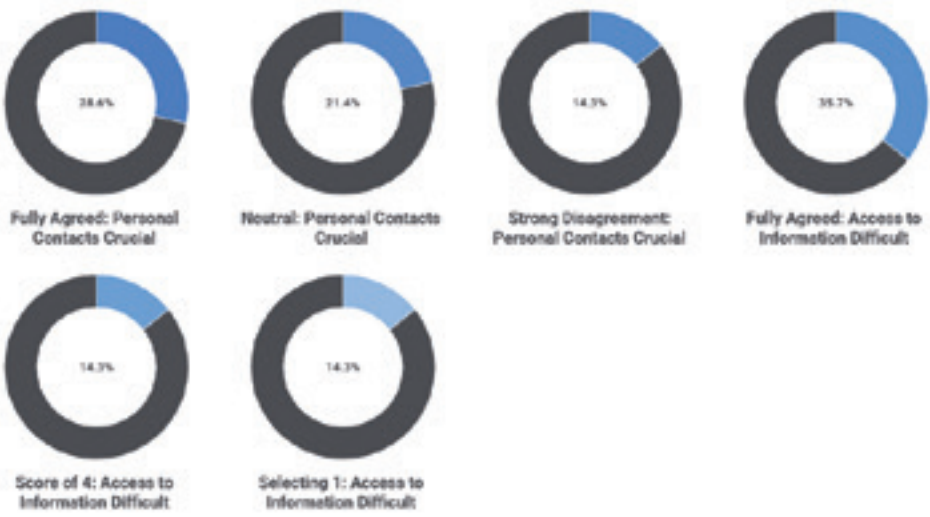
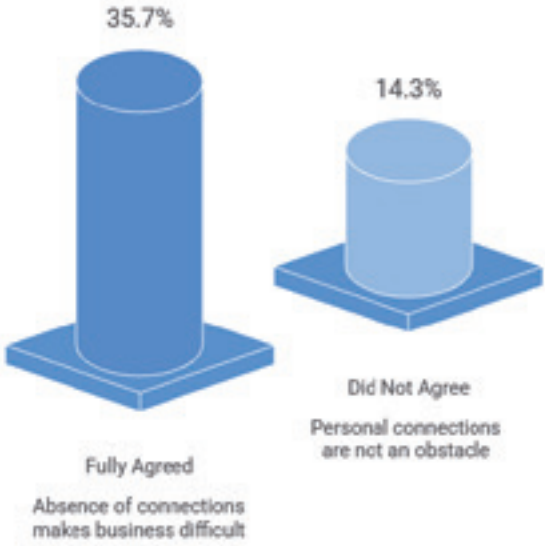


Figure 2: Attitudes towards personal connections in business

Source: author

The third statement, which concerns the impact of personal acquaintances on securing business with public institutions, reinforces the previous findings. The largest share of respondents (35.7%) fully agreed that the absence of personal connections makes it more difficult to conduct business with the public sector, while only 14.3% did not view this factor as an obstacle at all. These results point to a deeply rooted perception that personal ties play a significant role not only in the private sector but also in interactions with public institutions in Bosnia and Herzegovina.



Graph 2: Impact of personal acquaintances on business with public institutions

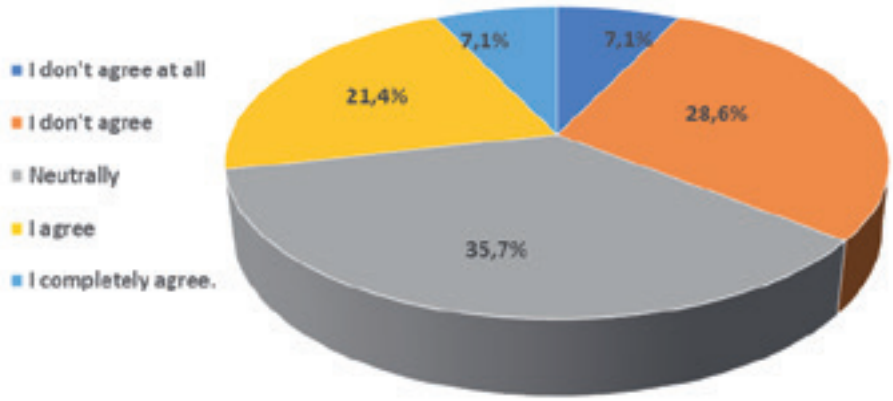
Source: author

Trust in public institutions and attitudes toward clientelism and market practices

The analysis of respondents' views on institutional trust indicates a low level of confidence in public institutions in Bosnia and Herzegovina when it comes to adhering to business rules. Opinions are divided: the largest share of respondents (35.7%) selected a score of 3, suggesting a neutral or moderately distrustful stance. At the same time, 28.6% expressed a low level of trust (score 2), while an elevated level of trust (score 5) was recorded for only one respondent. These findings suggest that most entrepreneurs approach public institutions with caution and reservation.

Even more pronounced distrust emerges in responses to the statement that the institutional framework forces entrepreneurs to seek alternative, informal ways of solving problems. Nearly three-quarters of participants confirmed this with high scores: 60% selected 4, and an additional 14.3% selected 5. This indicates that most respondents perceive institutional mechanisms as insufficiently functional and predictable.

Clientelism in public procurement and dealings with the state is also recognized as a widespread issue. The largest share of respondents (35.7%) agreed (score 4), and an additional 21.4% fully agreed (score 5) with the statement about its prevalence. Only a small percentage (7.1%), represented by a single respondent, did not perceive this as a problem (score 1). This pattern points to a widely shared impression that doing business with the public sector requires informal networking and negotiated arrangements.

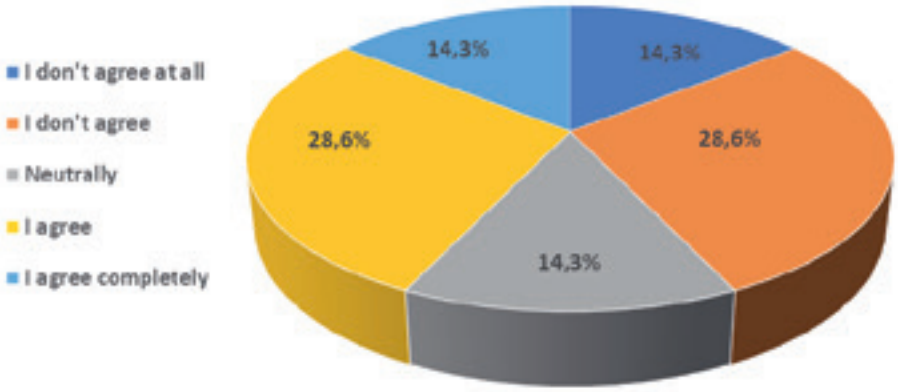


Graph 3 - Degree of trust in public institutions in Bosnia and Herzegovina

Source: author

The responses to the statement regarding the presence of clientelism across nearly all spheres of business in Bosnia and Herzegovina further confirm the seriousness of the issue. As many as 60% of respondents selected a score of 4, while 21.4% chose the highest score of 5, meaning that over 80% perceive clientelism as highly widespread. Conversely, only an exceedingly small share (7.1%), represented by a single respondent, believed that this phenomenon is not present at all. Regarding the statement that business opportunities are difficult to obtain without political support, opinions were more divided. Scores 4 and 5 together account for 49.9% (28.6% and

21.4%, respectively), while 28.6% selected a score of 2. This distribution suggests that many entrepreneurs do not believe in equal market competition and instead view political backing as crucial for success. A similar pattern appears in responses to the statement that reliance on political connections is more important than the quality of a product or service. A majority of respondents supported this view: 28.6% rated it with a 4, and 14.3% with a 5, amounting to more than 40% expressing strong agreement. With an additional 28.6% selecting a score of 2, it is evident that respondents acknowledge the relevance of this problem.



Graph 4 - The importance of political connections in relation to market factors

Source: author

When asked to what extent sociological factors such as ethnic affiliation, background and personal connections limit the development of a fair and transparent market environment in Bosnia and Herzegovina, half of the respondents (50%) selected a score of 4 ("agree"), while 28.6% expressed a neutral stance and 21.4% rated these factors with a score of 2. Only 7.1%, represented by a single respondent, believed that these factors do not impose any limitations. This clearly indicates that most entrepreneurs perceive strong social divisions and personal networks as obstacles to equal market competition. A common pattern runs through all these findings: low trust in institutions, a widespread perception of clientelism and a pronounced influence of social and political ties on business operations. The data show that market norms are largely overshadowed by informal rules and political calculations, which restrict competition and slow down economic development based on quality and innovation.

Discussion of research findings

The research findings provide a complex picture of the dynamics of business decision-making in Bosnia and Herzegovina, partially or fully confirming several of the proposed hypotheses while simultaneously challenging others. The main hypothesis (**H0**), which posits that *ethnic affiliation, clientelist practices, and informal social networks are key factors in business decision-making, further reinforced by distrust in institutions*, is largely supported, though with important nuances, particularly regarding the role of ethnic affiliation. The data indicate a pronounced degree of ethnic neutrality among respondents. The vast majority reject the relevance of ethnic affil-

iation in business decisions and in the selection of partners. These findings directly contradict the portion of **H1** suggesting a significant influence of ethnicity on business decision-making. At least at the declarative level, there appears to be a strong orientation toward professional criteria and equality, which is a positive signal in a post-conflict and ethnically fragmented society. However, the somewhat more varied responses to the statement on ethnic solidarity in business suggest that, for a smaller subset of respondents, ethnic ties may still play a role, particularly in facilitating communication and cooperation. Nevertheless, this tendency is not dominant and does not support the claim of a widespread influence of ethnicity. **H2** is fully confirmed. The results clearly show that distrust in public institutions generates reliance on informal channels, personal connections, and social networks, which become alternatives to formal business procedures. The high level of agreement with statements concerning the importance of personal contacts for business success, especially in interactions with the public sector—confirms a deeply rooted belief that the formal institutional framework is neither reliable nor sufficient. Moreover, the fact that most respondents consider informal networks essential for accessing information and business opportunities further reinforces the perception of institutional inefficiency. This creates an environment in which business activities unfold "parallel" to formal structures, often through networks of trust, acquaintances, and reciprocal exchanges. **H3** also receives strong support. The prevailing attitudes indicate a widespread belief that clientelism, particularly in dealings with the public sector—is not only present but nearly unavoidable. A large majority of respondents perceive clientelist practices as the norm rather than the exception, as reflected in high agreement with statements about the importance of political support, personal connections, and the disproportionate influence of these factors compared to the quality of products or services. More than 80% of respondents believe that clientelism is present in nearly all spheres of business, confirming that market competition is not based on merit but on informal arrangements and political patronage. This creates an unequal business environment and discourages innovation, investment, and long-term planning.

Overall, the findings confirm the existence of structural weaknesses in the business environment of Bosnia and Herzegovina, where distrust in institutions, clientelism, and informal networks dominate over transparent, fair, and formal business rules. At the same time, the rejection of ethnicity as a relevant factor in decision-making suggests a significant shift toward the professionalization of the business sphere. However, an open question remains as to the extent to which these attitudes reflect actual practices, and how much they represent socially desirable responses.

CONCLUSION

The research highlights the complexity of business decision-making in Bosnia and Herzegovina. While ethnic affiliation, contrary to expectations, was not identified as a dominant factor in selecting business partners or making strategic decisions, the findings clearly confirm that informal social networks, personal connections, and clientelist practices are deeply embedded in everyday business operations. Distrust in public institutions further motivates actors to rely on alternative mechanisms to achieve business goals, undermining the principles of transparency, equality, and market predictability. Such an environment hinders professional development, discourages

fair competition, and creates conditions in which political connections often outweigh quality and competence.

However, the limitation of a sample consisting of only 14 organizations requires caution when generalizing the conclusions. Although the sample was carefully selected to include different sectors, entrepreneurial profiles and organizational sizes, it does not allow for fully representative claims at the national level. Therefore, **the findings of this study should serve as a starting point for future, more extensive quantitative and qualitative research on larger and more demographically diverse samples**, in order to further clarify the patterns observed here and confirm the identified tendencies.

Despite the concerning trends that point to systemic market capture, the research also identifies several positive signals, such as professional orientation, ethnic neutrality and the strong presence of women in decision-making roles, which may serve as foundations for future reforms and the democratization of the business environment in Bosnia and Herzegovina.

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PRETHODNO SAOPŠTENJE / PRELIMINARY REPORT

APPLICATION OF GLOBAL INTERNAL AUDIT STANDARDS FOR SUSTAINABLE FINANCIAL REPORTING

Vesna Novaković | Associate Professor, Pan-European university Apeiron, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, vesna.p.novakovic@apeiron-edu.eu; ORCID ID: 0000-0002-9495-7940

Miloš Grujić | Associate professor, Independent University Banja Luka, Banja Luka, Bosna i Hercegovina, milos.grujic@nubl.org; ORCID ID: 0000-0001-5566-5921

Vedrana Vuković Perduv | Associate Professor, University of Business Studies, Banja Luka, Faculty of Business and Financial Studies, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, vedrana-vukovic@hotmail.com; ORCID ID: 0009-0005-4684-3577.

Vanja Sredojević | Associate Professor, Pan European University Apeiron, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, vanja.b.sredojevic@apeiron-edu.eu; ORCID ID 0000-0001-8064-9923

Abstract: *This paper explores the application of Global Internal Audit Standards, focusing on the challenges and opportunities associated with their implementation. By examining the current landscape of internal audit regulations, this study aims to identify key issues and propose guidelines for successfully adopting global standards in support of sustainable financial reporting. The primary issue under investigation is the interplay between legal regulations governing internal auditing and the perspectives of internal auditors regarding the integration of these new global standards. The hypothesis posits that the adoption of global internal audit standards will lead to significant improvements in business performance; however, there is also a concern that these standards may be too broadly defined.*

To substantiate this hypothesis, the paper presents empirical evidence derived from a survey conducted via a structured questionnaire. While the survey provided valuable insights, it also faced limitations, particularly in terms of participant recruitment. Many potential respondents exhibited a lack of interest, leading to a lower response rate, which may have impacted the representativeness and reliability of the findings.

Keywords: *internal audit, internal controls, international standard, sustainability*

JEL classification: *H51*

INTRODUCTION

Global internal audit standards provide a structured approach to evaluating a company's adherence to both financial and sustainability reporting guidelines. By en-

forcing these standards, companies are more likely to ensure that their financial reports reflect a true and fair view of not only their economic performance but also their environmental and social impacts. This transparency boosts investor confidence and reinforces stakeholder trust, ultimately fostering long-term stability. A major aspect of internal auditing is identifying risks—whether financial, operational, or reputational. When applied to sustainability, internal audits can pinpoint potential risks in a company's environmental or social policies, helping organizations mitigate long-term risks that could threaten their viability. This proactive risk management is crucial in ensuring businesses stay resilient and adaptable to changes in the marketplace, regulatory environment, and societal expectations. Internal audit helps ensure that companies comply with these standards and demonstrate a credible commitment to sustainability in their financial disclosures. Internal audits play a crucial role in ensuring that companies fulfill their CSR commitments. By examining both the environmental and social dimensions of corporate behavior, internal auditors can recommend improvements in areas like resource management, supply chain sustainability, and community engagement. These audits create a foundation for companies to develop more sustainable business practices and improve their reputation in the eyes of both regulators and consumers. Financial sustainability is key to a company's long-term success, and internal audit is integral to assessing whether organizations are focusing on sustainable growth. Audits help ensure that decisions made today do not compromise future generations' ability to meet their needs—be it through resource management or transparent, ethical financial practices. There may be resistance within organizations to adopt comprehensive internal auditing frameworks that include sustainability considerations. Some organizations may prioritize short-term financial gains over long-term sustainability, making it harder for auditors to push for changes. Overcoming this resistance requires strong leadership and a shift in organizational culture towards valuing sustainability alongside profitability. Bearing in mind all these factors, it is important to consider how global standards of internal auditing contribute to sustainable financial reporting and what are the challenges in their application.

APPLICATION OF THE COSO FRAMEWORK

Establishing a system of internal financial controls contributes to improving business and more successful financial management, proper, economical, efficient and effective use of funds, all with the aim of protecting assets and resources. (Novaković, Milovanovic, et al., 2024; Novaković, Mujkić, et al., 2024) COSO's framework became part of a worldwide movement to enhance periodic accounting and reporting of financial results. Coupled with the global convergence to IFRS, this should provide for a new age of financial information reliability and comparability. In the past few years, COSO has remained active, providing new guidance regarding monitoring, enterprise risk management (ERM), enhanced board oversight, and quantifying risk appetites (Austin, 2012)

Financial management and control is a system of internal controls in a business entity. The management is responsible for establishing the system, as well as for its functioning. The specificity of the financial management and control system is reflected in the fact that this system is embedded in all business processes and activities that take place in one entity (Novaković et al., 2022). The basis for the establishment of

this system is international internal control standards, i.e. five elements of the COSO standard:

- Control environment,
- Risk management,
- Control activities,
- Information and communication
- Monitoring and evaluation of the system.

Control Environment

The control environment represents the professional attitude about internal control set by managers. This attitude is shared by managers as well as employees. The control environment is the standard of internal control and the basis of the entire internal control system. If the control environment is not set up to respect integrity and ethical values, and if employees are not familiar with these values and do not apply them through their own actions, the internal control system will not be effective and efficient. Management promotes integrity by establishing standards of conduct through a code of conduct and ethical values. Because employees act in accordance with personal and professional integrity, while their main role model is the management.

One of the key elements of the control environment is the professional expertise and competence of employees. In addition to professional integrity, it is extremely important that employees have sufficient knowledge and expertise in order to successfully perform assigned tasks. With adequate competence and expertise of the employees, we come to the next element, which is the organizational structure and the delegation of authority and responsibility. The organizational structure of a business entity can be established in such a way as to ensure the realization of the basic functions and goals of the business. When authorities and responsibilities are delegated, business activities are expected to be carried out in accordance with the entity's goals.

To conclude, the control environment consists of the personal and professional integrity and ethical values of the manager and all employees, then the way and style of management and the organizational structure, determining the mission, vision and goals of the business entity, then written rules for human resource management, as well as the competence of employees.

Risk management

Managing risks means thinking in advance about potential events that may occur, and the effects and consequences that institutions may face in the future. At the same time, it is necessary to take measures in a timely manner in order to minimize the risks, and thereby avoid or reduce unfavorable effects. Effective risk management makes it possible to make better decisions, better planning and optimization of available funds, dealing with priorities, and avoiding future problems that may arise. Spotting key risks in a timely manner and taking appropriate measures means avoiding all those financial effects that will necessarily occur in order to remedy the problems, that is, the consequences of activated risks.

Risk management is a process designed to identify, assess, and address risks while aligning with the strategic objectives of the entity. It involves evaluating potential risks that could impact the organization's goals, as outlined in its strategic

documents. The process includes identifying risks, analyzing their potential impact, and implementing strategies to mitigate or manage these risks. Follow-up actions are essential to ensure that risks are continuously monitored and addressed as the organization progresses toward its objectives. Effective risk management supports informed decision-making and helps protect the organization from unforeseen challenges.

Control activities

Control activities represent policies, procedures and activities adopted by the head of the entity with the aim of reducing risks, and in order to achieve the organization's goals. Control activities should be efficient, economical and functionally linked to planning documents. Written policies and procedures must be aligned with applicable laws, regulations and decisions. They represent more detailed procedures, more precisely defined competences and responsibilities.

One of the standards included in control activities is documenting and recording financial and other transactions. It is necessary that all financial transactions and activities are recorded in a timely, complete and accurate manner, that the documentation follows the transactions from beginning to end so that there is an audit trail. Also, written procedures define what is controlled, which phases of the business process, as well as which documentation is required for control activities. Separation of duties is a key internal control mechanism that helps reduce the risk of errors, fraud, or unethical behavior within an organization. By dividing tasks and responsibilities among multiple employees, it ensures that no single individual has control over all aspects of a critical process. This approach not only reduces the chance of errors but also enables oversight and accountability at each stage of business operations. It acts as a safeguard by creating checks and balances, making it more difficult for mistakes or malicious actions to go unnoticed. This system is vital for maintaining integrity and transparency within the organization's operations.

The last standard that is included in the control activities is the protection of resources, i.e. the protection of assets, so that the right to access resources and records is reserved exclusively for authorized persons who are responsible for the protection and use of assets.

Information and communications

When making decisions, it is extremely important that information is transmitted in a timely manner, that it is of good quality, that it is accurate and available. Information should flow in all directions, so that all employees are informed and adequately involved in the activities in which they participate. As for executors to managers, there should be a smooth flow of information in the reverse direction as well.

Communication represents the exchange of useful information between employees and provides support for the internal control system. Communication can be internal and external, internal communication is the transfer of important information within a business entity, while external communication is communication with the environment, which is consistent, transparent and effective. The standard that is included in the framework of information and communication is also business correspondence, storage and archiving of documentation. These standard mandates the establishment of

internal procedures, internal acts that regulate the management of documentation, its storage, which maintains the appropriate level of security and confidentiality.

Monitoring and evaluation

Monitoring means reviewing the activities and transactions of an entity for the purpose of assessing the quality of business operations over a certain period and determining the effectiveness of the internal control system. The assessment of the internal control system is a prerequisite for identifying and correcting deficiencies in the functioning of internal controls. Management should focus on monitoring and assessing internal controls, and their compliance with legal regulations and the entity's objectives.

All employees in the company are to a certain extent responsible for monitoring and assessing the system. The degree of responsibility depends on the assigned authorities and responsibilities of the employees in the entity, and all employees perform tasks related to monitoring internal controls during regular business operations. If they notice weaknesses or deficiencies, employees should promptly report to the person responsible about the observed weaknesses, irregularities and risks in the internal control system.

INTERNAL AUDIT AS A PART OF INTERNAL FINANCIAL CONTROLS

A special segment of the system of internal financial controls is internal audit. Internal auditing is performed in accordance with internationally accepted standards of internal auditing. The business entity is obliged to ensure the implementation of an internal audit. Etymologically, the word revision comes from the Latin word "revidere" which means to see again. The role of internal audit is to ensure the achievement of goals in accordance with positive legal solutions. At the same time, auditing is one of the key elements of management tools in public sector organizations. We define an internal audit as an independent and objective opinion, which is a long - term activity aimed at, for example, the business entity. (Fayi, 2022)

Functional independence of internal audit refers to the obligation to organize the internal audit unit independently of other organizational parts of the entity. Through the work of internal audit, the business entity achieves its goals by systematically and disciplinedly approaching management processes, evaluating and improving the efficiency of risk management and internal controls (Grujic & Novakovic, 2025). Internal auditing ensures that business activities comply with relevant laws, regulations, and decisions. It verifies the accuracy and reliability of information, ensures resources are used efficiently and economically, and helps safeguard property and information. Additionally, internal auditing promotes the responsible management of the organization by fostering accountability and protecting assets.

The internal audit process is carried out through three stages:

- Audit work planning, risk assessment of all activities
- Assessment of the financial management and control system in terms of its efficiency and effectiveness, and
- Consultative phase in order to improve the business of the entity.

Audit is one of the basic elements of the structure of strong management of the organization. Audit planning achieves goals, establishes priorities and ensures that resources are used efficiently. Planning is done at two levels:

- at the level of the internal audit unit and
- at the level of the individual audit process.

The next step is risk management. Risk management is the responsibility of the manager of the business entity. Internal audits bear the responsibility in that part to determine whether the risk management process is sufficient to protect the business entity's assets, reputation and ongoing operations. The risk assessment is a subjective assessment of the internal auditors, which they keep as a separate document. The essence of risk assessment is to determine those processes which have the highest risk, and which are prioritized for auditing.

When planning the audit, both in the strategic plan, as well as in the annual plan and in the individual plan, the key activities and processes that should be audited are listed. An individual audit begins with an annual plan or an order from the head of the entity. The manager of the organizational part in which the audit will be conducted is notified by the letter of announcement. After the audit is completed, a draft report is submitted to that organizational unit, which states the findings of the audit and recommendations for eliminating the observed irregularities. On the draft report itself, the manager of that organizational part has a legal deadline of five days to object and document certain evidence, so that the final audit report excludes some of the audit findings. The internal auditor can change his findings, conclusions or recommendations if he judges that the remarks of the person responsible of the audited organizational unit are justified. The internal auditor submits the final audit report to the head of the internal audit unit and the head of the entity. The head of the internal audit unit submits the final report to the head of the entity.

The recommendations stated in the audit report must be followed. Monitoring recommendations is done by monitoring the activity plan prepared by the manager of the audited organizational unit.

The head of the internal audit unit monitors the implementation of the recommendations given in the internal audit report, with the aim of determining whether the recommendations have been implemented in the audited matter.(Novakovic et al., 2025)

The role of internal audit in an organization does not end with the business audit but also has a consulting role. The advice of internal auditors can significantly improve the operations of the entity. In this way, some of the potential irregularities that occur in the performance of daily duties would be prevented. (Jokić et al., 2024)

GLOBAL STANDARDS OF INTERNAL AUDITING

The new Standards are proposed in a significantly more comprehensive form in terms of their content compared to the current ones, which significantly facilitates their understanding and thus their application. The new standards contain all five binding elements of the valid international framework for the professional practice of internal auditing: mission of internal auditing, definition of internal auditing, key principles for the professional practice of internal auditing, code of ethics for internal auditors and International standards of internal auditing (Vuković Perduv et al., 2025).

The existing structure of the Standard has been significantly changed. Instead of the previous division into two basic categories: "Standards of characteristics", which set requirements regarding the organizational establishment of the internal audit func-

tion within the organization and the required competencies of individuals who perform the function of internal audit, and "Performance standards", which describe the way of performing audit engagements and ensure the criteria on the basis of which the performance of services can be measured, the new Standards are structured as follows:

They consist of five basic units - domains:

- Domain I - Purpose of internal audit,
- Domain II - Ethics and professionalism,
- Domain III - Management of the organization of the internal audit function,
- Domain IV - Management of the internal audit function and
- Domain V - Performing internal audit tasks;

Each domain is associated with corresponding principles, 15 of them in total, which describe the essential elements of internal audit and serve as the basis for Internal Audit Standards.

Standards are classified within their respective domains and principles. Within each standard, there is also a part that provides general and desirable practices for the application of the requirements specified in each standard by those who are required to apply them. It also contains a part in which examples are given that prove and confirm that the requirements of the relevant standard have been applied. Valid implementation standards, which refer to assurance services and advisory services, are incorporated into the text of the "basic" standard to which they belong and are not separated as separate standards. The numerical system of marking standards has been completely changed.

The effectiveness of Internal Audit is largely determined by "soft factors." (Lenz et al., 2024) Drašček introduces the purpose-driven theory of internal audit, emphasizing its role in enhancing organizational efficacy and alignment with strategic goals. By leveraging theories of the theory of work passion, competitive advantage, core competencies, and public interest, he redefined internal auditing's contribution to organizational success and public interest, urging future research to build on this foundational theory. (Drašček, 2024) In January 20205, new internal audit standards entered into force, which instead of the previous name "International Standards for the Professional Practice of Internal Audit" were called "Global Internal Audit Standards". The new Standards were adopted in a significantly more comprehensive form in terms of their content compared to the previous ones, which significantly facilitates their understanding and thus their application. The new standards contain all five binding elements of the International Framework for the Professional Practice of Internal Auditing:

- internal audit mission,
- definition of internal audit,
- key principles for the professional practice of internal auditing,
- code of ethics for internal auditors i
- International standards of internal auditing. (Beke-Trivunac, 2023)

The existing structure of the Standard has been significantly changed. Instead of dividing into two basic categories: "Standards of characteristics", which set requirements regarding the organizational establishment of the internal audit function within the organization and the required competencies of individuals who perform the function of internal audit, and "Performance standards", which describe the way of performing audit engagements and provide criteria on the basis of which the performance

of services can be measured, the new Standards are structured as follows to consist of five basic entities - domains, namely:

Domain I - Purpose of internal audit,
Domain II – Ethics and Professionalism,
Domain III - Management of the organization of the internal audit function,
Domain IV - Management of the internal audit function i
Domain V - Carrying out internal audit work;

Each domain is associated with corresponding principles, 15 of them in total, which describe the essential elements of internal audit and serve as the basis for the Internal Audit Standards. The standards are classified within their respective domains and principles. Each standard also contains a section that provides general and preferred practices for applying the requirements specified in each standard by those who are required to apply them. It also contains a part in which examples are given that prove and confirm that the requirements of the relevant standard have been applied. Through the work, we will try to show the views of internal auditors who are obliged to apply internal audit standards.

Legislation can be key in strengthening the legitimacy of internal audit, especially in less mature contexts. Currently, regulators generally do not require or enforce an effective internal audit function. In Denmark, internal audit functions are mandatory in banks with more than 125 employees, but the function is left to decide on resources. In practice, it is common for the internal audit function to consist of one person, which is a clear sign that the internal audit has a function to comply with regulations, and not because of the value it can add to the company (Lenz & Jeppesen, 2022)

Murdock beautifully delivers internal audit content via storytelling: the transformative journey from an underperforming Internal Audit Function (IAF) to a value adding, and respected service in the eyes of key stakeholders. (Lenz et al., 2024) In this paper the authors suggest that the Global Internal Audit Standards (the IIA's Standards) issued in January 2024 resemble the placing of old wine in new bottles. (Rainer Lenz, 2024)

RESEARCH RESULTS

To verify the set hypotheses, we used the descriptive method and the Amirian method in the paper. Descriptive mainly related to the implementation of desk research through the analysis of legal solutions and the comparison of new ones with the previous internal review standards. On the other hand, the empirical method was reflected in the creation of a questionnaire that was submitted to authorized internal auditors to get the opinion of people from practice on questions about the possibilities of applying global internal audit standards. The research was conducted during February 2025. Out of 55 submitted questionnaires, we received answers from 32 internal auditors.

Table 1. shows that a total of 32 responses were received to both questions: Are you familiar with the Global Internal Audit Standards and In your opinion, are the Global Internal Audit Standards too broad?

Table 1. Number of responses received

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percentage	N	Percentage	N	Percentage
4. Are you familiar with the Global Internal Audit Standards? * 6. In your opinion, are the Global Internal Audit Standards too broad?	32	100.0%	0	0.0%	32	100.0%

Source: author's analysis in SPSS

Cross-tabulation gives us a cross-view of the answers to the question: Are you familiar with the Global Internal Audit Standards and in your opinion, are the Global Internal Audit Standards too broad?

Table 2. Number of responses received

Are you familiar with the Global Internal Audit Standards? * In your opinion, are the Global Internal Audit Standards too broad? Crosstabulation				
Count				
		6. In your opinion, are the Global Internal Audit Standards too broad?		Total
		NO	YES	
4. Are you familiar with the Global Internal Audit Standards?	NO	2	4	6
	YES	15	11	26
Total		17	15	32

Source: author's analysis in SPSS

Table 3. gives us data on the value of the Pearson Chi square test. Given that the Pearson Chi-Square value is 1.162, we can conclude that the connection between the questions that internal auditors are familiar with global standards and what their opinion is about the possibility of applying them in practice, i.e. whether they are set too broadly, shows that the thesis is true.

This will disprove the hypothesis that the application of global standards will improve business opportunities

Table 3. Chi square test

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.162 [a]	1	.281		
Continuity Correction [b]	.389	1	.533		
Likelihood Ratio	1,172	1	.279		
Fisher's Exact Test				.383	.267
N of Valid Cases	32				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.81.
b. Computed only for a 2x2 table

Source: author's analysis in SPSS

CONCLUSION

During the analysis, it was noticed that the internal audit in many organizations is carried out to comply with legal norms, but without a deeper strategic impact on business processes. Some of the recommendations that can be implemented in the process are: Increasing the autonomy of the internal audit through which the internal auditors should have unhindered access to all relevant information and the support of the management in carrying out their tasks. Strengthening the capacity of audit teams enables the continuous education of auditors to ensure their competence and the application of modern audit methods. The next recommendation is to increase regulatory supervision, because it is necessary to set up mechanisms for evaluating the effectiveness of audit functions and preventing abuses resulting from formal implementation without real audit value.

The application of global internal audit standards is crucial for sustainable financial reporting, as it ensures transparency, credibility and accountability of organizations. Although there are implementation challenges, the benefits of standardized internal auditing outweigh the obstacles. Organizations that adopt and apply these standards have a greater chance of long-term stability and sustainability in the global market.

In addition, alignment with global internal audit standards enables companies to better identify and manage risks, thereby improving corporate governance and the efficiency of operational processes. (Grujić & Vojinović, 2024) This not only increases the confidence of investors and regulatory bodies but also strengthens the reputation of the organization on the market. Also, the transparency and accountability that these standards promote contribute to strengthening sustainability and long-term economic stability.

Finally, the implementation of global internal audit standards should be a continuous process, with constant adaptation to new challenges and regulatory changes. Through training staff, improving audit methodologies and adopting best practices, organizations can ensure that their internal audit remains relevant and effective in supporting sustainable financial reporting.

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INSTRUCTIONS TO AUTHORS

Pan-European University Apeiron, College of modern management
„Economy and Market Communication Review –
Časopis za ekonomiju i tržišne komunikacije"
Pere Krece 13, 78102 Banja Luka, Bosnia and Herzegovina
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IV. professional paper, which contains useful contributions from and for the profession but does not necessarily represent an original research.

Upon the positive decision on publishing, and following proofreading and editing, the paper shall be submitted to the authors for their opinion and check prior to publication.

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COVER PAPER

Must include the title of paper, name of author, his/her academic title, name and address of institution where the author works, position and contact details in both Bosnian/Croatian/Serbian and English (if the paper is written in languages of the people of Bosnia and Herzegovina).

FIRST PAGE

Must include the title of paper, abstract, key words and JEL classification.

Abstract

a. If the paper is written in the languages of the people of BiH, the abstract will contain between 150 and 300 words. At the end of the paper, an extended summary (English version) is written behind the list of references, which should be 400-500 words long. The abstract is written in the third person, in one paragraph and must contain: (1) the aim of the research, (2) research methods, (3) the basic result of the research, and (4) the conclusion of the research.

a. If the paper is written in English it is not necessary to write a summary at the end of the paper, while the other rules for writing the abstract are the same as under a)

Key words

Key words are written in both languages of the people of BiH and English (if the paper is written in the languages of the people of BiH) and must contain the gist of the paper. Up to 5 key words should be provided.

JEL classification

JEL classification is provided under the key words in both languages of the people of BiH and English (if the paper is written in languages of the people of BiH) in accordance with the Journal of Economic Literature classification (available at https://www.aeaweb.org/econlit/jelCodes.php?view=jel).

RECOMMENDED STRUCTURE OF PAPER[1]

1. Introduction

It should define the problem, subject matter and aim of research, as well as the motive for undertaking such research. The Introduction should also offer one or several hypotheses of the paper, which should be developed in the final chapter of the paper – the Conclusion. The Introduction ends with the description of the paper's structure.

[1] Depending on the specifics of the topic, and in agreement with the Editorial Board, the paper may be conceptualized differently.

2. Literature overview

Literature Overview involves the overview of relevant literature in the area of the paper, with key knowledge available to date or relevant results of research conducted to date. Exceptionally, the author may include Literature Overview in the Introduction.

3. Methodology

Methodology must be described clearly and precisely, the methodological contribution of authors (if available) must be established and it must all be done in a fashion that it allows for its testing by other authors.

4. Empirical evidence

Empirical evidence represents the documentation background to the research conducted.

5. Results and discussion

Results and discussion represent part of the paper in which results of the research conducted are explained and compared to similar research, the limits of the interpreted results are analysed, as are their significance and potential implications.

6. Conclusion

Conclusion is the final chapter of the paper. It should not be confused with the paper's abstract. It should contain the elaboration of the original hypothesis, the evaluation of the results of research, its contri- bution, the overview of limitations and problems relative to research implementation, the guidelines for future research, the recommendations stemming from the results of research etc. As is the case with abstract, the Conclusion should be contained in one paragraph.

LITERATURE

The list of literature should be provided at the end of paper, and it should only contain those titles which are referred to by the author throughout the text. It should be provided in the alphabetical order of the last name of authors of the mentioned works with no classification per types, and data on the work must be complete, in accordance with the standards of bibliography. If several works of the same author have been published in the same year, the year should be accompanied by designations "a,b,c".

The used literature should have at least 15 sources for review scientific papers, while for all other papers there should be at least 10 sources. The bibliography should be of a recent date.

It is recommended that the authors refer to sources of papers previously published in the EMC Review (http://www.emc-review.com), as well as those referenced by the Institute of Science Information.

Use **APA** style (http://www.apastyle.org) to write references for text and literature references.

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Books: last name, initials of the author's first name. (year) Title. Place of publication: name of publishers. (if there are two or three authors, their last names and initials should be listed in order, separated by a comma)

Christensen, C. M. (2012). The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Boston, M. A.: Harvard Business School Press.

Mieg, H. A., Töpfer, K. (ur.) (2013). Institutional and Social Innovation for Sustainable Urban Development. Oxon i New York: Routledge.

Chapters in books/papers in the collections of papers: last name, initials of the first name. (year) Title of chapter/section'. In: Title of book, last name, initials of the first name of author/editor. Place of publication: publisher: pages. (if there are two or three authors, their last names and initials should be listed in order, separated by a comma).

Braun, G. O., Scott, J. W. (2013). Smart Growth: sustainability innovations. In: Institutional and Social Innovation for Sustainable Urban Development, Mieg, H. A., Töpfer, K. (ur.). Oxon i New York: Routledge: 44-57.

Peter, C. (2013). Privatization, urban fragmentation, and sustainable development. In: Institutional and Social Innovation for Sustainable Urban Development, Mieg, H. A., Töpfer, K. (ur.). Oxon i New York: Routledge: 130-146.

Doctoral dissertations: last name, initials of the author. (year) Title of work, type of work and the institution where the dissertation was defended.

Hall, R. P. (2006). Understanding and Applying the Concept of Sustainable Development to Transportation Planning and Decisi- on-Making in the U.S., doktorska disertacija Massachusetts Institute of Technology,

Articles in journals: last name, initials. (year) Article title. Name of journal, volume (number): pages. (if there are two or three authors, their last names and initials should be listed in order, separated by a comma)

Giddings, B., Hopwood, B., O'Brien, G. (2002). Environment, economy and society: fitting them together into sustainable develop- ment. Sustainable Development, 10(4): 187-196.

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Series of articles/official publications:

Heal, G. (2011). Sustainability and its measurement. NBER Working Paper 17008, National Bureau of Economic Research, Cambridge, MA. Dostupno na: http://www.nber.org/papers/w17008.pdf.

Papers presented at conferences:

Moylan, K. (2009). The Future of EU Cohesion Policy and its implications for Irish Regional Policy. Rad prezentovan na Regional Science Association International Conference, Irska, 3.9.2009. Dostupno na: http://cua.ie/gorm/publications/The_Future_of_EU_ Cohesion_Policy_and_its_Implications_for_Irish_Regional_Policy_Sept%202009.pdf [13.1.2015.].

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McMaster, I., Bachtler, J. (2005). Implementing Structural Funds in the New Member States: Ten Policy Challenges. European Policies Research Centre. Dostupno na: http://www.eprc.strath.ac.uk/eprc/Documents/pdf_files/12A07_McMaster-Bachtler_paper. pdf [24.11.2014.].

TECHNICAL INSTRUCTIONS

- The paper should be written in Microsoft Office Word programme (MS Office Word 95 and later versions).
- Page format is A4 with single line spacing (including footnotes and references). The margins are 2.5 cm.
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- The text should be justified and a single line spacing must separate paragraphs.
- The paper should be between 30.000 characters or 16 pages. If agreed with the Editorial Board, the paper can be up to 50.000 characters long.
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„Economy and Market Communication Review –
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Pere Krece 13, 78102 Banja Luka, Bosna i Hercegovina
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Naučni međunarodni časopis *„Economy and Market Communication Review – Časopis za ekonomiju i tržišne komunikacije"* (ISSN 2232-8823 print; 2232-9633 online) pokrenut je 2011.godine. Ekonomija, održivi ekonomski i društveni razvoj, kao i tržišne komunikacije predstavljaju centralna mjesta interesa savremenih društava. S fokusom na region Jugoistočne Evrope časopis objavljuje naučne i stručne radove koji pokrivaju široki raspon tema iz područja globalne ekonomije, poslovne ekonomije, društvenog razvoja, tržišta i konkurencije, potrošača, medija i poslovne komunikacije, novih tehnologija, menadžmenta, marketinga, a sve u cilju širenja i unapređivanja postojećih saznanja, podsticanja rasprava i razmišljanja o savremenim temama iz navedenih područja. Časopis je usmjeren na navedene teme s aspekata različitih teorija, politika i praksi, te promoviše interdisciplinarni pristup. Časopis za ekonomiju i tržišne komunikacije (EMC Review) je međunarodni recenzirani časopis s otvorenim pristupom (OA) i posvećen je najvišim profesionalnim i etičkim standardima, uključujući nultu toleranciju plagijarizma i drugih neprihvatljivih oblika rada.

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Obvezno je navesti naslov rada, ime autora, akademsku titulu, naziv ustanove i adresu u kojoj je autor zaposlen, radno mjesto, te kontakt na jezicima naroda u BiH i engleskome jeziku (ako je rad pisan na jezicima naroda u BiH).

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1. Uvod

Sadržava definisanje problema, predmeta i ciljeva istraživanja, te motiv za provođenje istraživanja. U uvodu se navodi i hipoteza rada, ili više njih, o kojima se autor očituje u zadnjem poglavlju rada – zaključku. Uvod završava opisom strukture rada.

2. Pregled literature

Pregled literature sadržava pregled relevantne literature iz područja rada s ključnim dosadašnjim spoznajama, odnosno relevantnim rezultatima provedenih istraživanja. Izuzetno, autor može pregled literature uključiti u uvod.

3. Metodologija

Metodologiju je važno prikazati jasno i precizno, utvrditi metodološki doprinos autora ako je prisutan, te njenim prikazom omogućiti testiranje i drugim autorima.

4. Empirijski podaci

Empirijski podaci predstavljaju dokumentacionu podlogu provođenja istraživanja u radu.

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Rezultati i rasprava dio su rada u kojem se objašnjavaju rezultati provedenog istraživanja, uspoređuju sa sličnim istraživanjima, analiziraju ograničenja navedenih rezultata u njihovu tumačenju, značenje rezultata i njihove implikacije.

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Zaključak je posljednje poglavlje rada. On se ne smije poistovjetiti sa sažetkom rada. Potrebno je da sadrži očitovanje o polaznoj hipotezi, ocjenu rezultata istraživanja, doprinosa provedenog istraživanja, osvrt na ograničenja i probleme u provođenju istraživanja, smjernice za buduća istraživanja, preporuke proizišle iz rezultata

[1] U zavisnosti od specifičnosti teme, a u dogovoru s Uredničkim odborom, rad se može i drugačije koncipirati.

istraživanja i drugo. Kao i sažetak, zaključak se piše u jednom odlomku.

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Doktorske disertacije: navodi se prezime, inicijali autora. (godina) Naslov rada, vrsta rada te institucija gdje je rad obranjen.

Hall, R. P. (2006). Understanding and Applying the Concept of Sustainable Development to Transportation Planning and Decisi- on-Making in the U.S., doktorska disertacija Massachusetts Institute of Technology,

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