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PREFACE

It is with great pleasure that we present the proceedings of the REDETE 2025 conference, “Researching Economic Development and Entrepreneurship in Transition Economies,” held in Banja Luka in 2025. For over a decade, the REDETE platform has served as a critical meeting point for scholars, policymakers, and practitioners seeking to understand the unique and often complex dynamics of economies navigating systemic transformation. This volume reflects the continued relevance and evolution of that mission. The transition paradigm has shifted. While earlier debates focused on privatization, stabilization, and institutional catch-up, the contributions in this 2025 edition confront a new generation of challenges and opportunities. From the digital transformation of public money and the integration of artificial intelligence in firm-level strategies, to the imperatives of sustainable institutions and the nuanced realities of migration policy, the papers gathered here demonstrate that transition economies are not merely passive recipients of global trends but active laboratories for innovative solutions.

Several key themes emerge from this year’s proceedings. First, digitalization and financial inclusion take center stage, with studies exploring everything from taxpayers’ perceptions of digital administration in Slovenia to the role of microcredit in empowering excluded populations in the Western Balkans, alongside a critical analysis of Central Bank Digital Currencies. Second, sustainability—in its economic, social, and environmental dimensions—permeates the volume. Authors examine sustainability reporting in Serbia, renewable energy applications in the oil industry of Bosnia and Herzegovina, and a new paradigm of “Susthonomics” for tourism development. Third, the human dimension of transition is powerfully represented through research on labor market duality in Central and Southeastern Europe, the attitudes of the academic community toward national competitiveness, and the behavioral factors shaping household price sensitivity.

We are also proud to include methodologically diverse works, from comparative factor analyses and ARDL modeling to structured literature reviews and focus group insights, reflecting a mature and pluralistic research community. The geographical scope—spanning Croatia, Serbia, Slovenia, Bosnia and Herzegovina, Montenegro, Moldova, Greece, and Pakistan (in the context of EU-Western Balkan migration strategies)—underscores the interconnectedness of transition experiences. We extend our deepest gratitude to the authors for their rigorous contributions, to the reviewers for their diligent and constructive feedback, and to the publisher for their continued support. Special thanks go to the editorial board and the local organizing committee in Banja Luka for their hospitality and professionalism. Finally, we thank the many conference participants whose questions and discussions enriched every session. We hope that these proceedings will not only document the state of research at the intersection of development, entrepreneurship, and transition but also inspire further inquiry and evidence-based policy action. The journey of transition is far from complete; the research contained herein illuminates the path forward.

The Editors

Banja Luka, 2025/2026

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MARKETING COMMUNICATION STRATEGY FOR INCREASING ATTENDANCE IN CROATIAN THEATERS

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Abstract

This article analyzes marketing communication strategies as a means to increase attendance at Croatian theatres. The study aimed to identify key communication channels and methods that effectively contribute to attracting and retaining audiences, with particular emphasis on integrating traditional and digital approaches in the marketing of cultural institutions. A mixed-methods approach was employed, comprising a theoretical literature review and an empirical survey of 125 participants from Croatia. Demographic characteristics of respondents, theatre attendance habits, audience motivations, and the use of communication channels for information about performances were analyzed. The results confirm a tripartite structure of communication channels: word-of-mouth remains the dominant information source (61.6%), while digital channels such as theatre websites (57.6%) and social media (56%) are also important. Nevertheless, 74.4% of respondents believe that Croatian theatres have underdeveloped digital marketing, indicating substantial untapped potential for digital tools in program promotion. Financial incentives were clearly identified as a strong motivator for attendance, with 83.2% of respondents valuing discounts and ticket promotions positively. Although the COVID-19 pandemic had a limited effect on interest in theatre, the adaptation to online formats was judged insufficient, revealing a need for greater digital transformation. The study confirmed the importance of combining traditional and contemporary communication channels and emphasized the need to professionalize digital marketing, including the development of specialized teams and the allocation of adequate resources. It also highlighted the importance of a flexible, segmented approach to different demographic groups, particularly the younger audience that was dominant in the sample. Despite certain sample limitations, the research offers valuable guidance for theatre managers and cultural policymakers aimed at increasing attendance and ensuring the long-term sustainability of the Croatian theatre scene through contemporary marketing practices.

Keywords: Marketing Communication Strategies; Theatre Attendance; Digital Tools

1. INTRODUCTION

In the dynamic environment of the twenty-first century, where cultural institutions compete for attention within an increasingly saturated media landscape, the theatre faces the challenge of redefining its role in maintaining existing audiences and attracting new ones. Traditionally regarded as a bastion of artistic expression and social reflection, theatre today must actively communicate its value and relevance in order to secure its sustainability and vitality. This need for adaptation is particularly pronounced in the Republic of Croatia, where theatres—despite a rich history and artistic tradition—must devise innovative strategies to increase attendance amid rapid digital transformation and shifts in audience habits.

Although recent data from the Croatian Bureau of Statistics (DZS; KUL Press Release, 2025) record a positive trend in theatre attendance, reaching almost two million visitors in the 2023/2024 season, this growth should not obscure the fundamental challenges confronting the performing arts. Even superficial analyses show that Croatian theatres have not yet fully exploited the potential of digital communication tools, revealing a significant gap between available capabilities and their practical application. This problem becomes even

more evident considering that traditional marketing approaches increasingly show limitations, particularly in attracting younger audiences who are accustomed to two-way, interactive communication via digital channels (Leko Šimić & Biloš, 2017).

Financial sustainability further complicates the situation. Given the predominantly public budget financing (Bestvina Bukvić, Mihaljević & Tokić, 2015), Croatian theatres are vulnerable to changes in public policy. This dependence necessitates the implementation of entrepreneurial management approaches, including effective marketing strategies capable of generating additional revenues and enhancing the cultural autonomy of institutions. Furthermore, the generational gap in theatre audiences represents a challenge that cannot be ignored. Research (Buljubašić, Mijoč & Jobst, 2020) indicates that Croatian theatres have not adequately adapted their promotional activities to Generation Y, despite the considerable potential of unconventional marketing, including digital platforms, to reach this demographic. Therefore, the digital transformation of marketing communication is not merely an option but an imperative for the future of Croatian theatre.

This article seeks to explore these challenges and opportunities in greater depth by identifying effective marketing communication strategies that can substantially improve attendance at Croatian theatres. Through the integration of traditional and digital communication channels, the aim is to provide a comprehensive overview of the current state, analyze key success factors, and offer practical guidance for theatre managers. Two principal research questions are posed: first, whether there is significant potential to increase theatre attendance in the Republic of Croatia through better-designed marketing activities, particularly those leveraging digital channels; and second, how word-of-mouth relates to digital channels in informing theatre audiences.

Methodologically, the study combines a theoretical review with an empirical approach. The theoretical component relies on general scientific methods for analyzing the existing literature on marketing communication in the performing arts, including works by Walmsley, Bernstein, Hausmann and Poellmann, as well as relevant Croatian authors. The empirical component was conducted via a quantitative, descriptive online survey of a sample of 125 respondents, with the objective of collecting data on audience attitudes, habits and preferences regarding theatres' marketing communication. This approach enables an in-depth analysis of audience perceptions and the identification of key communication channels.

The study's findings revealed a tripartite structure of communication channels: (1) word-of-mouth, (2) theatre websites and (3) social media. Although word-of-mouth retains primacy, the high representation of digital channels clearly signals their indispensable role. Particularly indicative is respondents' perception of insufficiently developed digital marketing within theatres,

pointing to a significant yet underutilized potential. Moreover, the research confirmed the importance of financial incentives, since monthly income affects the likelihood of theatre attendance, opening space for strategic consideration of pricing policies and promotional actions. Generational aspects, with a predominance of younger participants in the sample, further emphasize the need to adapt communication strategies to the digital habits and expectations of this demographic group.

The discussion chapter offers a detailed interpretation of these findings in the context of existing literature, comparing them with international studies and highlighting specificities of the Croatian context. Special attention is given to implications for the marketing communication of Croatian theatres, providing operational recommendations for implementing digital strategies and strategic guidance for balancing traditional and digital approaches. Practical implications for theatre managers are also analyzed, including the prioritization of marketing activities and budget allocation. In the context of the COVID-19 pandemic, the study provides insight into the resilience of public interest in theatre, while critically assessing theatres' weak adaptation to online formats. In conclusion, the article validates the stated hypotheses, acknowledges the study's limitations (such as the convenience sample and demographic bias), and proposes directions for future research, thereby contributing to both theoretical understanding and practical application of marketing communication in the theatre sector. Through a comprehensive analysis, this paper offers a roadmap for Croatian theatres in their mission to attract and engage audiences in the digital age, thereby securing their vital role in the cultural life of society.

2. LITERATURE REVIEW

Traditional marketing approaches employed by Croatian theatres reveal their limitations, particularly in attracting younger audiences. Leko Šimić and Biloš (2017) emphasise that Croatian theatres underutilise the potential of their websites as an effective communication tool for younger age cohorts, who expect two-way online interaction rather than one-way information provision. This shortcoming is compounded by the fact that communication through traditional media is insufficient for younger audiences, who prefer virtual information search.

The problem of financial sustainability further burdens and complicates the situation of Croatian theatres. Bukvić, Mihaljević and Tokić (2015) report that Croatian theatres are predominantly financed from public budgets (62.14%), which renders them vulnerable to changes in public cultural funding policies. This dependence on public financing requires theatres to implement entrepreneurial management approaches, including effective marketing strategies capable of generating additional revenues and enhancing institutional sustainability.

The generational gap within theatre audiences constitutes another significant challenge. Buljubašić, Mijoč and Jobst (2020) stress that Croatian theatres have not adapted their promotional activities adequately to Generation Y, despite the considerable potential of unconventional marketing to reach this group. This indicates the need for a strategic approach that combines traditional and contemporary communication methods.

Nielsen (2019) presents Theatre Talks as a method that seeks to combine three domains of audience development: marketing (increasing and diversifying audience segments), cultural policy (inclusion of marginalised groups) and theatrical communication (supporting better understanding of theatrical codes and conventions). This methodology foregrounds the spectator's experience, valuing the experience itself rather than only its cognitive understanding, regardless of the type of experience. The Theatre Talks method has proven effective in lowering several barriers for non-attenders—financially, for example by providing free tickets, but perhaps more importantly culturally, by influencing public conceptions of what it means to be a theatregoer. The

method is particularly significant because it enables theatres to get to know their audiences, listen to their needs, and provide what those audiences require.

Lindelof and Hansen (2015) propose a focus on the theatrical experience from the audience's perspective, a topic hitherto underdeveloped in Nordic cultural-policy debates on audience development. Through qualitative audience research, their study demonstrates how dialogue about theatre offers a method for exploring theatrical experiences from the audience's viewpoint. One merit of this method is that it affords participants a deeper understanding of the theatrical experience. Comprehension of a performance should be accessible while the performance is taking place but ought to be further complemented afterwards through dialogue with fellow participants. The Theatre Talks method can render the theatrical experience more constructive and less frustrating, since the exchange of thoughts and impressions can produce a shared framework for a fuller theatre experience; social media may serve as an appropriate platform for its application.

Shi's (2024) research on the importance of social media for European museums provides insights that are applicable to theatrical institutions as well. Facebook played a significant role in increasing visitor numbers to European museums during and after the pandemic.

The Royal Shakespeare Company (RSC) offers a valuable example of digital marketing used to connect with a global audience. Their strategy includes live streaming of performances, social media campaigns (Instagram, Twitter, Facebook) that share rehearsal footage, actor interviews and live Q&A sessions, and the development of interactive educational content such as quizzes, discussion forums and behind-the-scenes videos. Results indicate that their online performances attracted viewers worldwide, substantially expanding their audience base. Social media campaigns yielded higher engagement rates—more likes, shares and comments—and interactive content helped educate audiences about Shakespeare's works, fostering a deeper appreciation of the theatre (Tain, 2023).

Manukonda (2013) highlights theatre as one of the oldest and most effective modes of communication globally. In a developing country such as India—where some 65 percent of the population still resides in rural areas with limited mass-media reach—the relevance of theatre for development (TfD) initiatives and programmes is particularly pronounced. Theatre for development goes beyond merely producing and performing plays: it enables representatives of target communities—who often develop and perform the pieces—to tell their stories, engage with relevant issues and address topics of import to their communities. This participatory approach is one of the most effective ways for people to engage in dialogue about significant and sometimes controversial local matters.

Ursić (2023) analyses culture as an integral aspect of everyday life and examines how culture is actualised through cultural participation. Her research shows that

during the pandemic a substantial majority of respondents (72%) followed visual arts content via online platforms, indicating sustained interest in cultural and artistic events. One quarter of respondents evaluated their online content experience as extremely positive, while 38.9% regarded it as predominantly positive. These results suggest that interactive participation was well received by participants and served as a satisfactory model for engaging in cultural activities during the pandemic. Statistically significant differences ($p < 0.01$) in the frequency of following artistic and cultural content online were recorded across age groups: older adults (65+) followed virtual events and participated in online activities significantly less often than their younger counterparts.

Cornwell (n.d.) investigates the use of artificial intelligence in audience engagement within the performing arts. Museums have taken the lead in exploring intersections between art and audience-engagement strategies with projects such as the Met and Iris+. AI continues to penetrate mainstream and industrial sectors, and the arts are no exception. Theatre for development may be understood as an evolution from less interactive theatrical forms toward a more dialogical process, in which theatre is practiced with or by people as a means of empowering groups and communities. This represents a progression toward technologically supported forms of audience engagement.

Walmsley (2013) examines core aspects of audience engagement in the theatrical context, emphasising the fundamentally observant nature of theatre that has persisted despite the rise of interactive and immersive formats. He notes that the vast majority of theatre audiences still engage with performances in a traditional, observational manner. Walmsley's insights importantly illuminate the foundational relationship between audience and theatrical experience, which underpins the selection of marketing-communication strategies: effective marketing must recognise and harness this fundamental dynamic. His findings are particularly relevant to the development of communication strategies that resonate with the intrinsic motivations of theatregoers, focusing on the unique value proposition of live performance. Such understanding helps shape messages that both attract and retain audiences by appealing to their inherent desire for the theatrical experience.

In a 2016 article, Walmsley shifts focus from traditional arts marketing to the concept of audience enrichment, particularly through digital engagement. He explores how digital platforms can deepen and democratise artistic exchange with audiences, moving beyond mere transactional marketing. Walmsley argues that digital engagement can facilitate audience context and anticipation, thereby enhancing the overall artistic experience. This work is highly pertinent to understanding the changing landscape of marketing communication in the arts in the digital age; it suggests that effective strategies should employ digital tools not only for promotion but

also to foster a richer, more interactive relationship between audience and art form. The article provides a framework for how theatrical organisations can use digital engagement to build stronger audience ties, leading to increased participation and loyalty—an imperative for Croatian theatres seeking to modernise their marketing approaches and attract digitally native audiences.

Building on his earlier work, Walmsley (2019) offers a comprehensive review of audience engagement from multiple complementary perspectives, including cultural value, marketing and established theatrical etiquette. This volume delivers a critical analysis of what audience engagement truly entails in the performing arts and how it may be encouraged. Walmsley explores the complexities of audience behavior and motivation, offering a nuanced understanding that goes beyond simple attendance metrics. The book is highly relevant for devising sophisticated marketing-communication strategies, since it stresses the importance of understanding intrinsic motivations and cultural values. It suggests that effective communication should aim to create meaningful and enriching experiences for audiences rather than merely promoting a product. This holistic approach to audience engagement is crucial for theatres seeking to establish long-term relationships with patrons and secure sustained attendance. For Croatian theatres, Walmsley's work provides a valuable framework for transitioning from transactional marketing to a more relational model.

Pap, Dlačić and Ham (2017) investigate factors that contribute to audience retention in the theatre, with particular focus on the role of engagement in predicting future attendance behaviour. The authors hypothesise that audience engagement is a key predictor of whether a theatre visitor will return. They apply customer-engagement theory to the context of nonprofit marketing, especially within the performing arts. This research is highly relevant for understanding how to cultivate a loyal theatre audience. It suggests that marketing communication should not only target the acquisition of new audiences but also deepen engagement among existing ones, transforming occasional visitors into regular patrons. Findings imply that strategies encouraging strong emotional and intellectual connection to the theatrical experience are more likely to result in long-term audience relationships.

Bernstein (2011) provides an in-depth account of the challenges and strategies in marketing the performing arts. Bernstein contends that traditional marketing approaches that were effective in the past can no longer be relied upon and that performing-arts marketers face new complexities in attracting and retaining audiences. He emphasises that effective marketing communication must appeal to the core values, lifestyles and motivations of targeted consumers. This work is highly relevant to understanding the evolving landscape of arts marketing and the need for more sophisticated, audience-centered approaches. Bernstein's insights are par-

ticularly valuable for developing communication strategies that resonate with the emotional and intellectual needs of prospective theatregoers, and for building and maintaining a loyal audience base by addressing their fundamental desires.

Hausmann and Poellmann (2013) provide a theoretical analysis and empirical insights into the use of social media for arts marketing, particularly for performing-arts organisations. They highlight the rapid increase in social-media use among these organisations and its significant role in promotion and communication. The authors examine how social media can be leveraged to build brand awareness, engage audiences in a more informal and authentic way, and generate excitement around productions. This research is highly pertinent to the practical application of digital marketing in the theatre sector. It offers a framework for integrating social media into an overall marketing-communication strategy to reach broader audiences and foster a sense of community. For Croatian theatres, this study provides useful guidance for optimising social-media presence to increase visibility and attract younger, digitally literate audiences. It stresses the importance of developing a coherent social-media strategy that goes beyond simple announcements and focuses on interactive content and community building to encourage engagement and, ultimately, attendance.

The works reviewed here underscore the multidimensional nature of marketing in the performing arts, spanning traditional marketing mixes to contemporary digital and guerrilla tactics. A central conclusion is that successful marketing communication in theatre transcends mere promotion of productions; it entails deep audience understanding, the cultivation of long-term relationships and the creation of enriching experiences. Croatian literature highlights the need to adapt marketing tools to the specificities of the cultural sector, the necessity of professionalising digital marketing, and the potential of guerrilla marketing to attract attention with limited resources. The pronounced importance of word-of-mouth and personal recommendation—especially among younger cohorts (Generation Y)—suggests that theatres should prioritise creating exceptional experiences that prompt audiences to share positive impressions.

For Croatian theatres, synthesising these insights provides a roadmap for future development: invest in the professionalisation of marketing teams, adopt contemporary digital tools and strategies, and continuously research and understand audience needs and preferences. The focus should be on community building around the theatre, fostering interaction, and creating memorable experiences that ensure long-term attendance and loyalty. Ultimately, the success of marketing communication in theatre depends on the ability to present art in a manner that resonates with audiences, inspiring not only attendance but also active participation and advocacy for the theatrical arts.

3. RESEARCH METHODOLOGY

This study applies a quantitative, descriptive approach conducted as a cross-sectional survey. Its purpose was to examine audience attitudes, habits and preferences in the context of theatre marketing communication. The interpretation of empirical findings was supported by general scientific methods, including analysis, synthesis, description, compilation and comparison.

Primary data were collected by means of an anonymous online questionnaire designed using Google Forms. The questionnaire comprised thirteen items with mixed measurement scales (nominal, ordinal and interval), covering demographic information, frequency of theatre attendance, motivations for attendance, preferred types of performances, information channels, ticket-purchase methods and attitudes toward a range of marketing activities. The survey was available to adult respondents (aged 18+) resident in the Republic of Croatia with Internet access and was conducted from 9 to 16 August 2024.

The sample was obtained via a convenience (self-selected) sampling procedure. While this sampling approach provides contextual insight for interpreting the results, it limits the generalisability of the findings to the wider population.

Survey data were analysed using descriptive statistics, including frequencies and percentage distributions. The analysis focused on identifying trends and associations between demographic characteristics, information channels and the reported preferences and attitudes toward marketing activities. Presentation of results is primarily descriptive, accompanied by an interpretative discussion of the findings.

Respondents completed the questionnaire voluntarily and anonymously, with the purpose of data collection

clearly stated; consequently, ethical risks to participants were minimal. Study limitations include the convenience sampling method, the brief data-collection period and the geographic scope limited to the Republic of Croatia.

The general objective of the research was to establish which communication channels theatre audiences use to obtain information about theatre offerings and to determine the potential of marketing communication to bring theatres closer to prospective visitors—an outcome crucial for cultural production and social wellbeing. Specific objectives included comparing theatre attendance in the Republic of Croatia, assessing public awareness of theatrical productions, identifying factors affecting attendance and uncovering the ways visitors learn about performances.

Based on these objectives, the following core research hypotheses were formulated:

H1: There exists significant potential to increase theatre attendance in the Republic of Croatia through better-designed marketing activities, particularly those that exploit digital channels.

H2: Word-of-mouth remains an important information source for theatre audiences, but the growing presence on social media and active use of theatre websites significantly contribute to improved audience awareness and increased attendance.

These hypotheses frame the empirical investigation, whose results will provide deeper insight into the dynamics of marketing communication in the theatre sector and identify the most effective strategies for attracting and retaining audiences in Croatian theatres.

4. RESULTS

The following section presents the results of the empirical study conducted via an online questionnaire. The aim was to collect data on audience demographics, theatre-going habits and preferences, and attitudes towards theatres' marketing activities in the Republic of Croatia. Results were analysed using descriptive statistics and are presented as frequencies and percentages, organised into the following groups: (1) demographic structure of the sample, (2) audience habits and preferences, (3) information channels and ticket purchase, and (4) attitudes towards marketing activities and attendance.

4.1. Demographic structure of the sample

The survey comprised $N = 125$ respondents resident in the Republic of Croatia. The demographic profile shows a pronounced predominance of female respondents (65.6%, $n = 82$) compared with male respondents (34.4%, $n = 43$). Age distribution is concentrated in younger adult cohorts: 25–34 years (44.8%, $n = 56$), 18–24 years (24.0%, $n = 30$), 35–44 years (12.0%, $n = 15$), 45–54 years (8.8%, $n = 11$), 55–64 years (6.4%, $n = 8$) and 65+ (4.0%, $n = 5$).

Educational attainment is relatively high: bachelor/undergraduate (32.8%, $n = 41$), secondary school (30.4%, $n = 38$), master's degree (29.6%, $n = 37$), postgraduate (4.0%, $n = 5$) and other (3.2%, $n = 4$).

Regarding employment status, the majority of respondents are employed in the private sector (44.0%, $n = 55$), students constitute 27.2% ($n = 34$) and 16.0% ($n = 20$) work in the public sector or administration. Monthly income analysis indicates that the largest single group (26.4%, $n = 33$) reported net monthly earnings between €901 and €1,200, suggesting a substantial representation of respondents from the middle-income social stratum.

4.2. Audience habits and preferences

Responses concerning frequency of theatre attendance reveal relatively low engagement: the largest proportion of respondents (45.6%, $n = 57$) attend theatre only once a year, 24.8% ($n = 31$) attend two to three times per year, 21.6% ($n = 27$) do not attend theatre at all, and only 6.4% ($n = 8$) attend more than three times per year.

Changes in attendance over the past three years indicate that for 50.4% ($n = 63$) attendance remained unchanged,

for 21.6% (n = 27) it declined, and for 12.0% (n = 15) it increased.

Motivational factors for attending theatre were dominated by social gathering and entertainment (60.0%, n = 75), followed by invitation or recommendation from friends/family (44.0%, n = 55), and the artistic experience itself (43.2%, n = 54). Less frequently reported motives included support for the local artistic community (8.8%, n = 11) and professional interest (3.2%, n = 4).

Genre preferences show a clear dominance of comedy (87.2%, n = 109). Musicals are preferred by 34.4% (n = 43), drama by 32.8% (n = 41) and ballet by 26.4% (n = 33), indicating a diversity of interests within the theatre audience.

4.3. Information channels and ticket purchase

Analysis of communication channels through which respondents learn about theatrical performances reveals a tripartite structure of primary information sources: (1) word-of-mouth recommendations from friends/family is the leading source (61.6%, n = 77), confirming the importance of personal recommendation; (2) theatre websites (57.6%, n = 72), indicating the significance of digital platforms; and (3) social media (Facebook, Instagram, Twitter) (56.0%, n = 70), which confirms the growth of digital communication. Traditional channels such as posters, TV and radio retain moderate importance (31.2%, n = 39), while newspapers and magazines (15.2%, n = 19), newsletters (7.2%, n = 9) and TV advertising (7.2%, n = 9) are markedly less represented. Ticket sales channels are dominated by online purchases via theatre websites (59.2%, n = 74). Box-office purchases still maintain a substantial share (41.6%, n = 52), while ticketing applications (e.g., Eventim) are used by 39.2% (n = 49) of respondents.

4.4. Attitudes towards marketing activities and attendance

Respondents' attitudes toward the current state of theatres' marketing communication reveal several key findings: (1) insufficient advertising—83 respondents (66.4%) disagree with the statement that productions are frequently advertised, indicating inadequate promotional activity; (2) underdeveloped digital marketing—93 respondents (74.4%) believe that theatres have not sufficiently developed their digital marketing, signifying considerable room for improvement; (3) ticket-price

affordability—opinions are divided: 47 respondents (37.6%) consider ticket prices unaffordable, while 51 respondents (40.8%) consider them affordable; and (4) online sales systems—the majority (72 respondents, 57.6%) evaluate the organisation of online ticketing systems positively.

Preferences for marketing measures likely to increase attendance reveal two clear priorities. Financial incentives are the most attractive: ticket promotions and discounts received positive evaluations from 104 respondents (83.2%), and free tickets for a first performance were positively rated by 91 respondents (72.8%).

Digital communication channels also display strong potential: regular information via social media is considered useful by 95 respondents (76.0%), and the same number identify mobile applications for cultural events as having significant potential.

Traditional promotional tools remain relevant: city posters and billboards are regarded as useful by 99 respondents (79.2%), and leaflets/brochures placed in cafés and restaurants are deemed relevant by 78 respondents (62.4%).

Respondents show moderate acceptance of innovative approaches: QR codes on promotional materials are positively evaluated by 75 respondents (60.0%), and newsletters with relevant information are regarded as useful by 80 respondents (64.0%).

The impact of the COVID-19 pandemic on interest in theatre was assessed as minimal by most respondents: 86 respondents (68.8%) indicated that the pandemic did not affect their interest in theatre. However, respondents judged theatres' adaptation to online formats during the pandemic as modest—only 21 respondents (16.8%) considered that theatres had adequately adapted their productions to online formats.

These results provide a quantitative baseline for understanding the current state, habits and perceptions of theatre audiences in Croatia and can inform further analysis and the formulation of recommendations in the field of marketing-communication strategy. The findings also indicate measurable potential to increase attendance at Croatian theatres through targeted marketing-communication strategies—particularly those that combine digital tools with traditional approaches and include financial incentives for audiences.

5. DISCUSSION

This chapter interprets the empirical findings on marketing communication in Croatian theatres in the context of the relevant domestic and international literature. It analyses the key factors affecting attendance, formulates practical implications for theatre managers, evaluates the research hypotheses, critically reflects on the study's limitations, and proposes directions for future research.

5.1. Interpretation of results in the context of existing literature

The empirical results substantially corroborate theoretical frameworks developed in the international literature on marketing communication in the performing arts. Walmsley (2019) emphasises the importance of understanding the fundamental motivations of theatre audiences, a point reflected in our findings where social gathering and entertainment are the dominant motives for attendance (60% of respondents). This supports

Walmsley's argument that successful marketing communication must acknowledge the intrinsic social character of the theatrical experience rather than treating it solely as a cultural product.

The identification of a tripartite structure of communication channels — word-of-mouth (61.6%), theatre websites (57.6%) and social media (56%) — aligns with Hausmann and Poellmann's (2013) analysis of the hybrid nature of contemporary arts marketing. Their work suggests that social media do not replace traditional communication forms but complement them; our results offer empirical confirmation of that position. The continuing primacy of word-of-mouth is consistent with Bernstein's (2011) concept of the "core value of the theatrical experience," i.e., its capacity to generate strong emotional responses that audiences spontaneously share.

Perceptions of underdeveloped digital marketing (74.4% of respondents) correspond with Leko Šimić and Biloš (2017), who argue that Croatian theatres do not fully exploit digital communication tools. Our study advances this argument by quantifying that gap, providing empirical grounding for the earlier theoretical claim. Buljubašić, Mijoč and Jobst (2020) highlight the potential of unconventional marketing for Generation Y; this is reflected in our findings showing broad acceptance of innovative approaches such as QR codes (60% positive) and mobile applications (76% positive).

Some deviations from international trends were also observed. Nielsen's (2019) Theatre Talks methodology emphasises participatory audience approaches, whereas our results indicate that Croatian audiences still predominantly prefer a more traditional, observational role: only 8.8% cited support of the local artistic community as a motivation. This may reflect particularities of the Croatian cultural context or a need for gradual audience education toward more active participation.

5.2. Key factors for increasing attendance

The tripartite information-structure analysis reveals a complex information ecology that requires an integrated communications approach. The dominance of word-of-mouth (61.6%) validates Bernstein's (2011) theory of the "emotional bond" as a principal driver of theatre consumption. Nevertheless, almost equal shares for theatre websites (57.6%) and social media (56%) indicate an ongoing digital transformation that is not yet fully realised.

A particularly salient finding is the prominence of financial incentives: 83.2% of respondents positively evaluated ticket promotions and discounts, while 72.8% were favourable to free entry for a first performance. These results corroborate Nielsen's (2019) identification of financial barriers as a primary constraint on attendance and suggest that financial stimuli can function not only to remove barriers but also as active motivators that mobilise latent interest.

The generational aspect is notable: 68.8% of respondents are younger than 35. Despite this, channel preferences do not show a stark generational divide — word-

of-mouth retains importance among younger cohorts — indicating that the theatrical experience's social dimension transcends simplistic "digital vs. non-digital" generational binaries. This finding challenges assumptions about homogeneous "digital" generations and points to the need for micro-segmentation that accounts for education, income and professional status when designing communication tactics.

Genre preferences (comedy 87.2%, musical 34.4%, drama 32.8%) reveal a clear orientation toward lighter, entertainment-focused content. This aligns with the predominance of social and entertainment motives and has programmatic implications: theatres must balance artistic ambitions with market demands.

5.3. Implications for marketing communication in Croatian theatres

Operationally, the results indicate an urgent need to implement integrated digital strategies. The fact that 59.2% of respondents purchase tickets online while only 16.8% believe theatres adapted adequately to online formats during the pandemic reveals a paradox: audiences are digitally ready, but theatres' digital offerings remain inadequate.

Concrete operational recommendations include: (1) establishing professional social-media teams dedicated to interactive content designed to stimulate word-of-mouth; (2) deploying personalised e-mail campaigns that combine information with financial incentives; (3) optimising websites for mobile devices with a strong user-experience focus; and (4) developing mobile applications that integrate ticket purchase, show information and social features.

Strategically, the findings support a hybrid model that balances traditional and digital approaches. The primacy of word-of-mouth suggests that digital tools should act as catalysts for traditional communication patterns rather than substitutes. This corresponds with Walmsley's (2016) concept of "audience enrichment," whereby digital engagement deepens and democratises artistic exchange.

Regarding resources and competencies, results point to the necessity of: (1) recruiting or training marketing professionals with digital competencies, (2) ongoing staff education in digital trends, (3) forming partnerships with technology firms to implement advanced solutions, and (4) allocating a meaningful share of budgets to digital marketing (recommended minimum 15–20%).

5.4. Practical priorities for theatre managers

Prioritisation of marketing activities — informed by the empirical findings — should proceed as follows: (1) design attractive financial packages and loyalty schemes (supported by 83.2% positive attitudes), (2) professionalise social-media presence (76% find regular posts useful), (3) optimise traditional promotional materials (79.2% rate posters and billboards as useful), and (4) implement innovative technologies such as QR codes and mobile applications.

Budget allocation should reflect the tripartite communications structure: approximately 35% for digital channels (social media, web optimisation, online advertising), 25% for traditional promotion (posters, print media, PR), 25% for financial incentives and loyalty programmes, and 15% for innovative and experimental approaches.

Organisational changes required for digital transformation include: (1) creating a digital-marketing manager role or outsourcing these functions, (2) regular staff training on digital trends, (3) implementing systems for tracking and analysing digital performance, and (4) developing procedures for rapid response to emerging digital trends.

5.5. COVID-19 context and digital transformation

Interpretation of pandemic-related findings is one of the study's most intriguing aspects. The observation that 68.8% of respondents report no decline in interest in theatre suggests a resilience of public interest in the face of external shocks, consistent with Ursić (2023). However, this should be interpreted with caution given the sample's demographic profile—namely a younger, more educated cohort that may adapt more readily to changing conditions.

The modest assessment of theatres' adaptation to online formats (only 16.8% positive) likely reflects several factors: (1) limited technical competencies and resources within theatrical institutions, (2) conservative managerial attitudes toward digital innovation, and (3) conceptual misunderstandings that treat online formats as mere substitutes rather than complementary products. This underscores the need for a mindset shift from "digital necessity" to "digital opportunity."

5.6. Hypotheses validation

H1 (significant potential to increase attendance through better-designed marketing, especially digital): partially confirmed. Although 74.4% of respondents view digital marketing as underdeveloped, 76% evaluate regular social-media postings positively and 76% value mobile applications—evidence of considerable unrealised potential and a need for higher-quality digital implementation.

H2 (word-of-mouth remains important but digital channels significantly contribute to awareness and attendance): fully confirmed. The tripartite structure demonstrates that word-of-mouth (61.6%) remains dominant but is closely paralleled by digital channels (websites 57.6%, social media 56%), suggesting a model of "amplified word-of-mouth" in which digital tools catalyse traditional information flows.

5.7. Study limitations

This research has several limitations that should be considered when interpreting results and generalising conclusions: (1) convenience sampling and representativeness: the self-selected sample may not be fully representative of the entire Croatian theatre-going population; online respondents are likely to be more digitally

literate, which could bias results toward digital channels; (2) demographic bias: the sample comprises 65.6% women and is dominated by younger age groups (25–34 years), limiting generalisability to older cohorts and male audiences whose behaviours may differ; (3) short data-collection period: the one-week collection window (9–16 August 2024) may restrict sample size and diversity; a longer collection period could capture seasonal variation and yield a larger, more heterogeneous sample.

It is also important to note that the results reflect perceptions and attitudes of those who already have some interest in theatre and do not capture segments of the population with no interest in theatre at all; this may lead to an optimistic assessment of the potential impact of marketing strategies.

5.8. Theoretical contribution and practical value

This study contributes to the literature on theatre marketing in several ways. First, it quantifies the "digital divide" in Croatian theatres, providing empirical evidence that complements the theoretical claims of Leko Šimić and Biloš (2017). Second, it identifies a specific tripartite communications structure that can serve as a model for comparative studies. Third, it demonstrates the significant role of financial incentives as drivers of theatre consumption, supplementing existing emphases on cultural and social motives.

The specificities of the Croatian context — notably the dominance of public funding (Bestvina Bukvić, Mihaljević & Tokić, 2015) — may partly explain the slower pace of digital transformation compared with more market-oriented systems. Nevertheless, our results suggest that Croatian audiences are not culturally averse to digital innovation; rather, adequate offerings and implementation are lacking.

Practically, the study provides concrete guidance for theatre managers: strategic investment in digital marketing, optimisation of online presence and active promotion of word-of-mouth are essential. The importance of financial incentives and a reassessment of pricing strategies are also highlighted. This research can serve as a starting point for developing more effective marketing strategies that increase attendance and build long-term audience relationships in the digital era.

Future research should focus on larger, more representative samples, qualitative studies to deepen understanding of audience motivation, and experimental designs to test the effectiveness of specific marketing interventions. Emphasis should be placed on developing hybrid communication models that combine the best elements of traditional and digital approaches tailored to diverse demographic segments. Finally, longitudinal studies are required to monitor the long-term effects of digital communication strategies on audience loyalty and the financial sustainability of theatres.

6. CONCLUSION

The empirical research partially confirmed Hypothesis H1 and fully confirmed Hypothesis H2. Hypothesis H1, which posited significant potential to increase theatre attendance in the Republic of Croatia through better-designed marketing activities, especially those that employ digital channels, was partially confirmed. Although respondents perceive digital marketing as insufficiently developed, theatre websites and social media emerged as primary information channels for audiences. This indicates an underutilised potential that requires higher-quality digital implementation and strategic investment to be fully activated. However, it must be noted that the study relied on a convenience sample, predominantly consisting of younger, digitally literate respondents. This issue with sample representativeness presents a limitation for generalizing these findings to the broader Croatian theatre-going population.

Hypothesis H2, which stated that word-of-mouth remains an important information source for theatre audiences, while the growing presence of social media and active use of theatre websites significantly contribute to improved audience awareness and increased attendance, was fully confirmed. Word-of-mouth retains its primary role, emphasising the importance of outstanding theatrical experiences that generate personal recommendations. At the same time, digital channels demonstrate complementary and increasing importance, which calls for an integrated marketing-communication approach. The study found that the principal motives for attending theatre are social gathering and entertainment, followed by the artistic experience, with comedy identified as the most preferred genre. Monthly income was shown to affect the ability to attend theatre, suggesting that pricing strategies and financial incentives may play a significant role in attracting a broader audience. Perceptions of inadequate advertising frequency and underdeveloped digital marketing point to the need for more proactive and targeted communication efforts.

Practical implications for theatre managers are manifold. Priority should be given to optimising digital channels, including professional development and regular

updating of websites, and active, interactive use of social media. Encouraging word-of-mouth through loyalty programmes and by creating exceptional audience experiences is crucial for long-term audience development. Budget allocation should be rebalanced in favour of digital platforms, considering cost-effectiveness and reach. Organisational changes should include staff training, hiring or contracting digital-marketing specialists, and fostering a culture of continuous monitoring and analysis of digital performance.

Findings related to the impact of the COVID-19 pandemic indicate that, although audience interest in theatre did not decline, theatres largely failed to respond adequately by offering high-quality online alternatives. This underlines the need to develop capacities for producing and distributing online content as an integral part of future marketing strategies, not merely as a crisis response.

The theoretical contribution of this research lies in providing empirical insights into the specificities of the Croatian theatre context: it corroborates global trends regarding the importance of digital marketing and audience engagement while emphasising local particularities such as the enduring primacy of word-of-mouth. The practical value is evident in the concrete guidance offered to theatre managers, which can assist in designing more effective marketing strategies to increase attendance and build long-term relationships with audiences.

While the study offers valuable findings, its limitations should be recognised — notably the use of a convenience sample, demographic bias and a short data-collection period. Future research should address these limitations by employing larger and more representative samples, undertaking qualitative studies to deepen understanding of audience motivation, and conducting experimental research to test the effectiveness of specific marketing interventions. Such work would further enrich knowledge of marketing communication in the theatre sector and provide more precise guidance for practice.

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PORTRAYING THE AI-DEVELOPING FIRMS IN CROATIA

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Abstract

Adopting AI within various sectors (governance, business, civil society) has led to a significant increase in the global AI market size. As the latest EU-member state, Croatia stands as an example of fast-growing AI usage, following the EU trends and maintaining the AI adoption rate close to the EU-28 average. Croatia may be an interesting example of a small post-transition economy with underexplored AI potential; however, the structured data on the AI-developing companies is missing. This research sheds light on this narrow but promising part of the Croatian business sector. The original survey data aims to portray the AI developing sector by attributes of firms developing AI applications and solutions in Croatia in 2025. We empirically assess the AI developer's subsector in the small EU economy and analyse characteristics of different types of AI developing firms in terms of size, sector in which they operate, regional distribution, and financial results. We also distinguish firms according to their AI adoption stage, which aligns with the innovation diffusion theory classification (Rogers, 1962). Compared to other relatively scarce data sources on the AI adoption and development in Croatia, the added value of this study is that it includes the micro firms in the survey and analysis. Among surveyed AI developing firms, 74% are micro-sized firms with fewer than 10 employees. In the subsample of micro firms, there is a notable share of firms with only one or two employees. More than half of the AI developing firms come from the capital city of Zagreb. Most AI developing firms operate in manufacturing (46% of firms surveyed) and ICT sectors (43%), yielding very different financial results. The findings of AI-related activity of Croatian firms increase the overall knowledge of their AI potential and their role in fostering an innovation-driven economy. This is particularly important given that 44% of AI developing firms are early adopters of this new technology. The policy recommendations offered are developed in line with the EU policy framework.

Keywords: artificial intelligence; AI development; innovation; Croatia; technology adoption

1. INTRODUCTION

The rapid adoption of digital technologies and the internet has played a key role in the recent expansion of the global artificial intelligence (AI) market. Major tech companies continue to drive innovation across industries through substantial investments in nonmaterial assets (e.g. R&D activities). Rising demand for AI across various sectors—such as automotive, healthcare, banking and finance, manufacturing, food and beverages, logistics, and retail—is expected to propel market growth significantly in the coming years. Technological innovation remains a cornerstone across most industries.

In particular, the banking and financial sectors are projected to see considerable AI growth due to their data mining, fraud detection, cybersecurity, and data analytics applications. As a result, AI adoption is accelerating across end-use industries, helping businesses streamline operations and enhance efficiency. This growing interest in AI also opens doors for new market entrants offering niche, application-specific solutions. As it considers the subfields or applications of AI, the most prosperous future is anticipated for Machine Learning (ML) and Natural Language Processing (NLP). Machine learning will remain the most significant way to use AI and quadruple its estimated market share by 2030. Thus, by 2030, ML will account for about half of the total market share, and NLP for about 20%. AI robotics, computer vision, and autonomous and sensor technology would each count for about 10% of the global market size in 2030 (Statista, 2024).

The latest reports on the development of AI in industry show that the fast penetration of AI has led to a significant increase in the global AI market size. As of 2025, there are approximately 70,000 AI companies worldwide, and the U.S. companies are leading the global AI race, followed by the rapidly progressing Asia-Pacific region (Ascendix, 2025). Approximately 10,095 AI startups are in the top ten countries leading in artificial intelligence innovation. Most AI startups (5,509) are U.S.-based, including the leading *OpenAI* with USD 11.3 billion in funding. China follows with 1,446 startups, while the United Kingdom ranks third with 727. About half of the tech unicorns in 2024 were AI-related startups, showing strong investor confidence. OECD report on intellectual property data comprising AI-related patents and trademarks showed that AI-related activities are highly concentrated by countries (the United States, Japan, Korea, China), in ICT sectors (computer and electronics, IT services), and in start-up firms or large incumbents (Dernis et al., 2021).

The global AI market size was USD 638.23 billion in 2024, calculated at USD 757.58 billion in 2025, and is expected to reach around USD 3,680.47 billion by 2034, expanding at a compound annual growth rate of 19.20% from 2025 to 2034 (Precedence Research, 2025). AI business usage is also accelerating. According to some reports, 78% of all companies worldwide were using AI

in 2024, up from 55% the year before (Stanford University Human-Centred Artificial Intelligence, 2025), reaching 82% in 2025 (Ascendix, 2025).

In all these reports and studies, mainly conducted by consulting companies and university hubs, there is much less data on the European region, currently occupying 25% of the global AI market (Precedence Research, 2025). The most significant AI countries in Europe are France, Germany, and the United Kingdom, while companies from Spain, Italy, Portugal, Switzerland, Belgium, the Netherlands, Sweden, Finland, and Norway are catching up (The Boston Consulting Group, 2025). Countries in the Western Balkans region are not included in these global reports. Statistics on the adoption rate of AI and data on the number of companies using AI have recently been collected for EU member states, starting in 2022. One of the new EU-member states, Croatia, stands as an example of fast-growing AI usage, following the EU trends and maintaining the AI adoption rate close to the EU-28 average. Croatia may be an interesting example of a small post-transition economy with underexplored AI potential. Further, besides anecdotal evidence on the success of AI-developing firms and start-ups, the structured data on the AI-developing companies is missing. Here, the AI development companies are considered part of the AI service providers that focus on designing and delivering custom AI solutions tailored to specific organisational needs. Their services typically involve the end-to-end development of machine learning models, data engineering pipelines, and system integration, often necessitating close collaboration with clients. Some of the leading AI development companies include NVIDIA, OpenAI, Microsoft, Apple, and Alphabet (Google). Other AI development companies include companies specializing in AI-driven solutions for specific industries like healthcare, finance, and manufacturing.

2. LITERATURE REVIEW

Literature on AI is growing, and academics and practitioners have opened numerous research niches. Scientific publications have increased at the annual rate of 23% since 2015 (Baruffaldi et al., 2020), and new topics emerge to be addressed by academics and practitioners. Most of the studies of AI usage consider AI as a general-purpose technology (Truong & Papagiannidis, 2022; Calvino & Fontanelli, 2023), denoting the disruptive technology that emerges and fundamentally reshapes how businesses operate and create value. It impacts multiple sectors, thus affecting the entire economy, enabling innovation and fostering productivity and growth (Crafts, 2021; DeSantis, 2024; Vujović, 2025). Calvino and Fontanelli (2023) argue that the wide sectoral distribution of firms in France buying AI systems and solutions supports the view of AI as a general-purpose technology. Although the evolution of AI occurred in different patterns in the United States, European Union, and China, it produced a complex interdependency of

The activity of all firms developing AI applications and solutions in Croatia has slipped under the radar of statistics and researchers so far. This research sheds light on this narrow but promising part of the Croatian economy. The novel approach is to include micro firms with less than 10 employees, who make up 51% of active legal entities in Croatia (Croatian Bureau of Statistics, 2025). Active firms with up to 9 employees and active firms with no employees make up 90% of the total number of firms in Croatia and might perform as AI-developing firms. The original survey data aims to portray the AI-developing sector by attributes of firms developing AI applications and solutions in Croatia in 2025. Our contribution to literature is twofold. Firstly, we empirically assess the subsector of AI-developing companies in the small EU economy and analyze characteristics of different types of AI-developing firms in terms of size, sector in which they operate, regional distribution within Croatia, and financial results. We also distinguish firms according to their AI adoption stage, which aligns with the innovation diffusion theory classification (Rogers, 1962). Secondly, the findings of this underexplored part of the business sector are expected to increase the overall knowledge of its AI potential and the important role it might have in fostering an innovation-driven economy.

The paper is structured as follows. The literature review dealing with AI-developing firms and their innovation potential, focusing on the micro-sized ones, is presented in the next section. A brief overview of the Croatian AI landscape is presented in Section 2. Section 3 explains the survey data used in this empirical research. The results of the survey data analysis are presented and discussed in Section 4. The final section concludes with findings by putting them in the broader policy context and suggests avenues for further research.

AI-developing firms, manufacturers, and users (Jacobides et al., 2021). AI is a disruptive, emerging technology that might be seen as innovative (Madan & Ashok, 2023). Therefore, AI adoption should be analyzed using the Innovation Diffusion Theory (IDT) developed by Rogers (1962). The postulates of IDT apply to all types of organizations, explaining how new technologies, ideas, or practices spread within a social system over time. As represented by the Innovation-Adoption Curve, Rogers' diffusion model indicates that organizations undergo different stages when adopting new technologies. His model distinguishes five segments of organizations, based on their aversion to risk and propensity to adopt a specific innovation: innovators, early adopters, early majority, late majority, and laggards (Rogers, 1962). The theory identifies key factors influencing adoption, including the perceived advantages and a theoretical background for researching AI adoption in firms. However, micro-firms' innovative potential is underestimated or at least underexplored. The

study of Farè (2022) based on the Community Innovation Survey data (CIS, 2018) showed the non-negligible share of innovative firms with less than 10 employees in the EU-27 countries. For example, in Croatia, 0.51% of micro firms were reported as innovative, compared to 0.63% of medium-sized and 0.61% of small firms. Most of the innovative firms in Croatia come from industry (0.72%), followed by trade (0.59%), services (0.59%), and construction (0.49%), and these shares are close to the relevant data for other EU-27 countries (Farè, 2022). The deeper analysis of German micro, small, and medium-sized firms showed that micro firms engage in innovative activities with a negligible probability. However, if they decide to do so, their R&D intensity will be higher and yield similar benefits to those of larger firms (Baumann & Kritikos, 2016). Moreover, the advantage of large firms disappears if micro firms operate in knowledge-intensive services, particularly for start-ups and young firms (Audretsch et al., 2020). Micro firms account for most of the employment in knowledge-intensive services, and their innovative capacity plays a key role in driving technological advancement (Audretsch et al., 2020). Other studies stress the importance of networks on innovation of micro-firms in traditional industries (Ricciardi et al., 2025). One should distinguish the AI solutions and applications as innovative products from the AI role in supporting (other) firms' innovative activities. Truong and Papagiannidis (2022) argue that AI can act as an enabler for innovation, helping innovation managers throughout the innovation process. However, this aspect of the AI and innovation nexus is still underexplored. AI-related goods and services emerge in various sectors, e.g., education and consumer markets, according to the trademarks registered to protect AI computer products, software, devices, and similar (Nakazato & Squicciarini, 2021). Micro and small enterprises (MSEs) entering the field of AI development is a growing trend (Farè, 2022; European Economic and Social Committee, 2021). While traditionally dominated by big tech companies, the democratization of AI tools, open-source models, and cloud computing has opened the door for smaller play-

ers to innovate and compete. MSEs can position themselves as AI service providers in specialized niches, solving problems for industries like agriculture, healthcare, logistics, or education, where large companies might not focus. They might benefit from agility and innovation potential because smaller teams can pivot quickly, experiment with new technologies, and adopt novel approaches faster than large enterprises with rigid structures.

Access to powerful open-source AI frameworks levels the playing field by reducing entry barriers, and access to smaller AI-specific cloud providers enables MSEs to scale their AI products without investing in expensive infrastructure. The remote work commonly practiced in MSEs ensures them access to a global talent pool and allows them to contract freelancers or remote developers to build cost-effective AI solutions. However, MSEs face challenges such as limited funding to acquire data needed for training large models, competing with tech giants in the global market, compliance with AI ethics, privacy laws (like GDPR and EU AI Act), and sector-specific regulations.

European Economic and Social Committee (2021) pointed out that micro, small, and medium-sized enterprises (MSMEs) will adopt AI only if it is reliable, inclusive, sustainable, and aligned with environmentally and socially responsible frameworks. MSMEs, including the self-employed, are vital to the EU's digital and green transition and must have equal access to AI. However, they face barriers such as high costs, poor infrastructure, limited financing, and a lack of training. Support should include easy-to-use tools, accessible funding, quality data, and full-scale testing. Effective adoption requires strong political will, stakeholder cooperation, social dialogue, and smart, inclusive legislation (European Economic and Social Committee, 2021). These issues are common for MSMEs worldwide, especially regarding access to finance. Besides that, micro and small enterprises in Croatia face obstacles to getting microloans (Šišara & Šarlija, 2023); this funding is often insufficient to develop AI solutions and applications.

3. CROATIAN AI LANDSCAPE

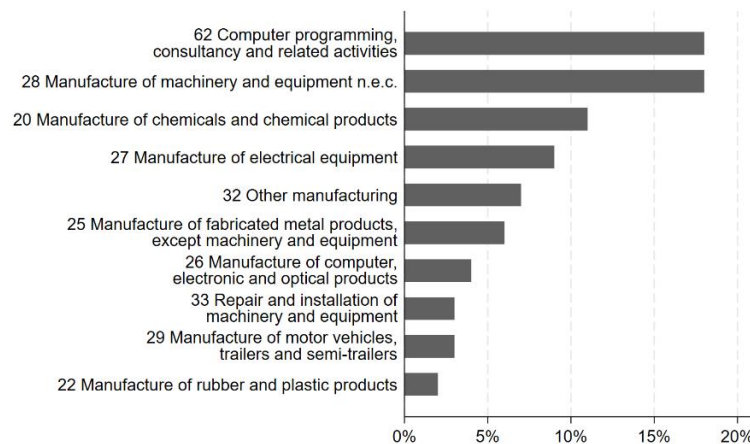
The data on the specific firms using and developing AI in Croatia is scarce. However, some recent information and data support the idea that AI-related activities have gained significance in the Croatian economy. In 2024, 13.5% of enterprises in the EU with 10 or more employees used AI technologies to conduct their business, indicating a 5.5 [percentage points](#) (pp) growth from 8.0% in 2023 (Eurostat, 2025). In 2023, 7.9% of all firms in Croatia were using AI (compared to the EU average of 8%), with this share slightly increasing to 11.8% in 2024.

The EU statistics on enterprises' AI technologies developed by their employees reported that there were 1.41% of such firms in Croatia in 2023, and this share doubled to 3.63% in 2024, surpassing the EU-27 average share of 2.77% (Eurostat, 2025). The Eurostat statistics, however, do not include micro firms with less than 10 employees, which might contribute significantly to this outcome (Dernis et al., 2021). The recent analysis of AI adopters by the Institute of Economics, Zagreb in 2025¹ indicates a concentration of companies using AI within the Computer programming sector (18.3% of total number of surveyed firms using AI in Croatia), as well as

¹ Survey was conducted within the project Determinants of Strengthening Technological Capabilities of Different Sectors, Institute of Economics, Zagreb, 2025

within segments of the manufacturing industry with higher technological complexity, such as the Manufacture of Machinery and Equipment (17.5%) and the Manufacture of Electrical Equipment (8.8%) (Figure 1).

Figure 1: Share of firms using AI per NACE 2-digit sector



Note: Total number of surveyed firms using AI in Croatia N=502.

Source: Institute of Economics, Zagreb; author's work.

More than four out of five firms using AI (80.4%) are concentrated within the top ten industries in Croatia. An interesting finding of this study is that more than half of AI adopters are in the capital City of Zagreb (38.5%) or its immediate surrounding area (Zagreb County, 12.5%).

Moving further from the Croatian firms using AI (AI adopters) to the analysis of the AI-developing firms that are the focus of this research, the data are even more incomplete. Some studies report on the significance of the AI production market and the growing number of AI-developing firms across Central and Eastern European (CEE) countries, including Croatia (The Recursive, 2024). The CEE report mapped 84 AI-developing companies in Croatia by August 2024 and points out the Croatian startups that raised significant funds in the last two years. The total funding raised by four leading AI

startups in Croatia amounted to 184 million EUR in 2023 and 107 million EUR from January to August 2024, hence over 96% of the funds went to one leading startup².

Another important source of information on the AI-related businesses in Croatia is CROAI. The CROAI is an association of AI companies, organizations, and experts in Croatia that was established in 2019. At the beginning of 2025, CROAI had 281 members (119 legal entities and 162 physical persons). The membership does not represent the total of firms using and developing AI because it is voluntary; however, CROAI collects valuable information about the companies and organizations developing AI, employing AI solutions, providing AI training, and performing AI-related services in Croatia (Table 1).

Table 1: Croatian AI landscape in 2025.

Field of AI-related activity / No. of companies, organizations		NACE-2 digit sector
Startups & Companies	315	
Service Providers	73	62
Data Analytics	28	62
AdTech & Sales & PR	28	62, 63, 73
Healthcare & Life Sciences	20	26, 32, 46, 62, 63, 85
Image & Video Processing	17	62,63
Mobility	15	46, 62, 64
FinTech & InsuTech	14	62
Agriculture & GreenTech	13	62
Customer Communication	13	62, 63, 70, 82
Robotics	12	26, 28, 62, 71, 72
Hospitality & Tourism	11	62
EduTech	10	62

² Rimac's startup Verne secured 180 million EUR in 2023 and 100 million EUR in 2024.

HR & Law	10	58,62
Automation	10	26, 33, 62, 71
Art	9	47, 90, 91, 94
Cybersecurity	8	46, 62, 70
Platforms & Infrastructure	8	58, 62, 95
Smart Cities & Homes	8	27, 30, 58, 62, 70
DevTools & Frameworks	8	62
Early Adopters	50	
Enablers & Extended Ecosystem	183	
Accelerators & Incubators & Investors	43	
Organizations & Communities	41	
Conference & Meetups	39	
Research	20	
Media	19	
Universities & Educational Institutions	16	
Public	5	

Source: CROAI Association, . Adapted by the authors. NACE codes are NACE Rev. 2 2-digit codes, available here:

The Croatian AI landscape presents AI companies by their activity on the market, which might differ from the NACE sectors to which these companies belong. Based on the CROAI list of companies, we have added the NACE 2-digit sector category to each of the companies to get insight into which sector they operate in. In comparison to the data presented in Figure 1, ICT sectors prevail, but the share in percentage varies significantly. When it comes to the Croatian landscape (Table 1), sectoral distribution shows that the largest share of AI companies (71.1%) belongs to ICT sectors (NACE sectors 62 and 63), much above the 18.8% found in the survey of AI using companies (Figure 1). Croatian landscape data reveal interesting information on the high proportion of AI companies coming from sectors 70 to 72 (Activities of head offices; management consultancy activities; Scientific research and development; Rental and leasing activities) and much less from the manufacturing sectors.

Startups and companies engaged as service providers and in data analytics using AI all come from the computer programming and consultancy sectors. However,

it seems that the more complex the field of AI-related activity, the greater the likelihood that companies from different NACE categories will emerge to provide AI services within that industry. Thus, healthcare and life sciences benefit from AI solutions provided by companies from ICT sectors, as well as from the manufacturing of computer, electronic and optical products, wholesale and education. The sectoral affiliation of companies contributing to the AI activity in the field of smart cities and homes is even more diversified: companies come from the manufacture of electrical equipment and other transport equipment, computer programming, publishing, and management consultancy sectors. In the field of mobility, AI companies are from computer programming, wholesale trade, and financial intermediation, except insurance and pension funding sectors. The Croatian AI landscape is covering many sectors and fields of activity, and it would be interesting to deepen the insight into the AI-developing firms as the most technologically promising part of the AI landscape in Croatia.

4. DATA

This study uses the data from a survey on AI usage in Croatian firms conducted on a sample of 506 firms that reported using some AI in their business operations³. A professional agency conducted interviews with managers, owners, or other persons responsible for each firm, using the computer-assisted telephone interviewing (CATI) method, in January and February 2025. The authors developed the survey based on the literature review.

We have extracted the firms identified as AI-developing firms from the total sample surveyed. In sum, 66 firms develop their AI solutions independently and/or in collaboration. Concerning the representativeness of our

sample, it is essential to note that the adoption of AI by firms is a relatively novel research topic in Croatia, for which no prior distributional information is available. Consequently, we did not have predefined strata for our sampling strategy.

When considering the overall representativeness of the larger sample from which we selected AI-developing firms, it is important to note that our sample closely reflects the population regarding firm size. However, small, medium, and large firms are slightly overrepresented. This is not unexpected, given that AI adoption was a key selection criterion. Regionally, the sample includes a higher proportion of firms from North Croatia

³ Survey was conducted within the project Determinants of Determinants of Strengthening Technological Capabilities of Different Sectors, Institute of Economics, Zagreb, 2025

and the City of Zagreb, while firms from Adriatic Croatia are underrepresented. The most significant deviation from the general firm population is in sectoral composition: companies in the Industrial and ICT sectors are

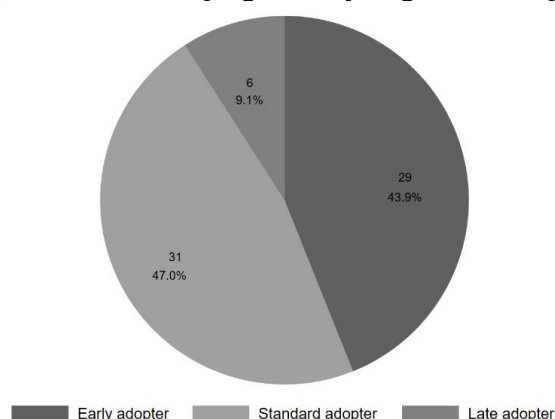
markedly overrepresented compared to those in the Service sector. We recognize this as a limitation to the generalizability of our findings. Nevertheless, this is the first study conducted on Croatian firms.

5. RESULTS

The total sample of 66 firms that develop AI includes 50 firms developing AI independently and 39 firms developing AI in cooperation with other firms. It means that over one-third of the AI-developing firms surveyed develop AI solutions and applications both independently and in collaboration with other companies.

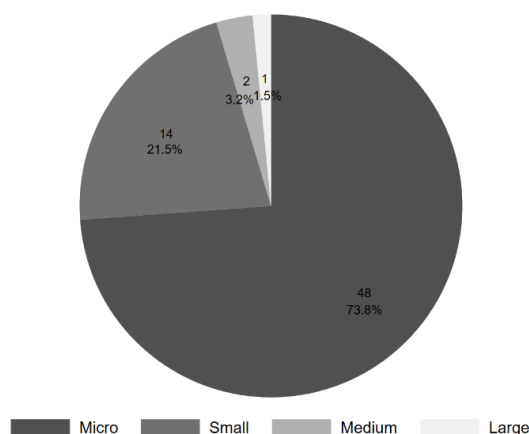
Regarding AI adoption, almost half of the sampled firms can be classified as "standard" adopters, meaning they adopt AI solutions at approximately the same time as their competitors. Around 44% of the firms consider themselves early adopters, while only 9% are late adopters (Figure 2).

Figure 2: AI-developing firms by stage of AI adoption



Source: Authors' work based on a survey.

Figure 3: AI-developing firms by size

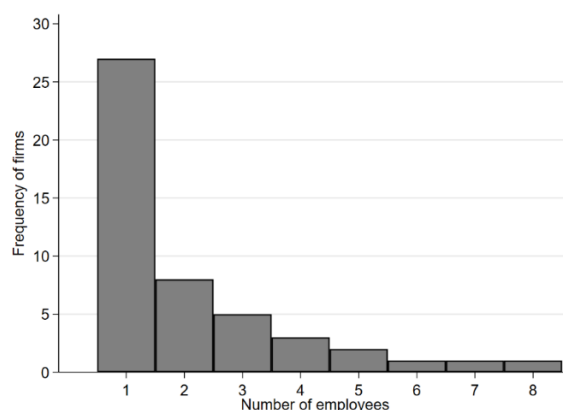


Source: Authors' work based on a survey.

Among the AI-developing firms surveyed, 73.8% are micro-sized firms with less than 10 employees (Figure 3). The share of micro firms accounting for 51% of all active legal entities in Croatia (Croatian Bureau of Statistics, 2025) suggests that micro firms in Croatia have significant potential in adopting new technologies and developing innovative AI-based solutions and applications.

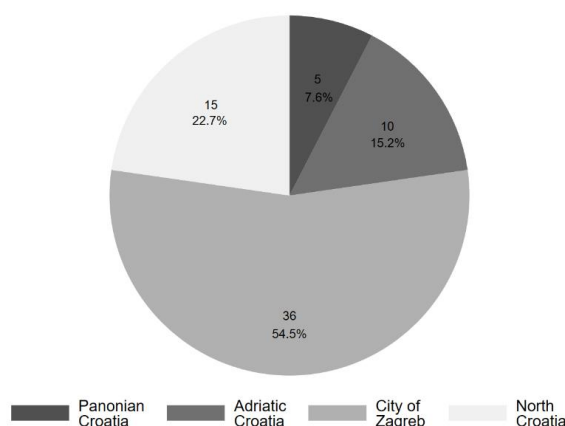
A closer look at the sub-sample of micro firms, often not included in studies and reports on the AI-related activities, reveals that more than half (about 56%) of the micro firms surveyed have only one employee (Figure 4), supporting the idea that individual efforts can develop AI solutions and applications.

Figure 4: Number of employees in micro firms



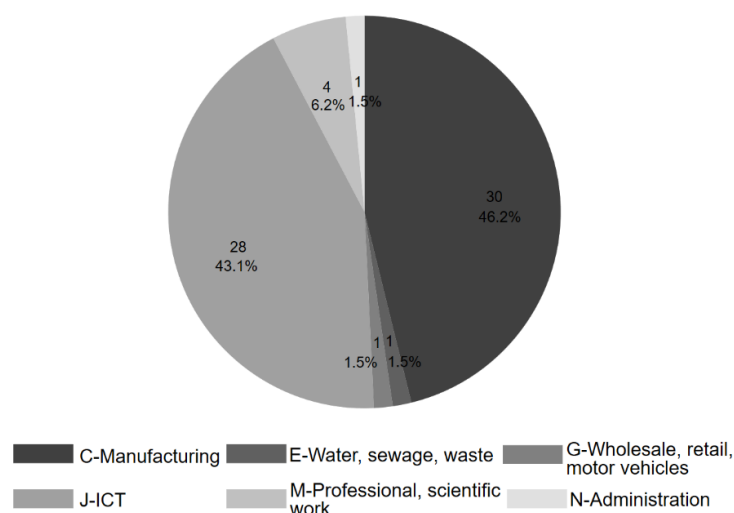
Source: Authors' work based on a survey.

Figure 5: Regional distribution of AI-developing firms



Source: Authors' work based on a survey.

Figure 6: Sectoral distribution of AI-developing firms (NACE 1-digit sectors)



Source: Authors' work based on a survey.

More than half of AI-developing firms (55%) are concentrated in the capital city of Zagreb (Figure 5). The survey data do not allow us to conclude on the exact settlement where the AI-related activity occurs, and it would be interesting to explore further if AI development is concentrated in urban regions with advanced infrastructure and networks, higher education institutions (and therefore more skilled experts), and other resources available.

As expected, almost all AI-developing firms operate in the ICT and manufacturing sectors (Figure 6). The manufacturing sector, however, covers many specific sub-sectors, so it was interesting to examine where AI solutions and applications are being developed more precisely (Table 2). In the C-Manufacturing sector, nine AI-developing firms manufacture machinery and equipment, followed by electrical equipment. In the J-ICT sector, AI-developing firms' subsectors are more homogenous because out of 28 firms in the ICT sector, 22

operate in the computer programming, consultancy, and related activities subsector.

Table 2: AI-developing firms by NACE 2-digit classification

NACE 2-digit sector	n	%
62 Computer programming, consultancy and related activities	22	33.85
28 Manufacture of machinery and equipment n.e.c.	9	13.85
27 Manufacture of electrical equipment	5	7.69
63 Information service activities	5	7.69
20 Manufacture of chemicals and chemical products	4	6.15
32 Other manufacturing	4	6.15
72 Scientific research and development	3	4.62
26 Manufacture of computer, electronic and optical products	2	3.08
30 Manufacture of other transport equipment	2	3.08
10 Manufacture of food products	1	1.54
16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1	1.54
25 Manufacture of fabricated metal products, except machinery and equipment	1	1.54
29 Manufacture of motor vehicles, trailers and semi-trailers	1	1.54
39 Remediation activities and other waste management services	1	1.54
46 Wholesale trade, except of motor vehicles and motorcycles	1	1.54
59 Motion picture, video and television programme production, sound recording and music publishing activities	1	1.54
70 Activities of head offices; management consultancy activities	1	1.54
77 Rental and leasing activities	1	1.54

Source: Authors' work based on a survey.

The average number of employees within the AI firms surveyed is 14.6, with a median of 2 (Table 3). Such a pronounced discrepancy indicates that a small number of firms employ significantly larger workforces, reflecting the presence of a few larger enterprises within an otherwise predominantly micro to small business. Analyzing the turnover, the mean figure is 1,959,423 EUR, while the median is considerably lower at 127,024 EUR. The standard deviation, which reaches 8,333,299 EUR, indicates an extensive variation among the firms regarding revenue generation capabilities, potentially reflecting differences in market access, service offerings, and

client bases. Total assets average 1,616,490 EUR among the firms, revealing a significant discrepancy between firms' access to financial resources. The median total assets at 153,284 EUR further support the assertion that while some firms command substantial asset bases, many are relatively asset-light, which might limit their operational capabilities. The considerable standard deviation of 6,177,721 EUR alongside the min-max range spanning from 359 EUR to 47,309,067 EUR illustrates the marked asset disparities driven by differing strategies in financial investment and growth trajectories among these firms.

Table 3: Firm financials

Financials	Mean	Median	St. Dev.	Min.	Max.
Number of employees	14.6	2	47.2	1	333
Turnover	1,959,423	127,024	8,333,299	0	65,000,000
Total assets	1,616,490	153,284	6,177,721	359	47,309,067
Fixed tangible assets	269,415	13,144	784,864	0	4,427,669
Fixed intangible assets	49,386	0	979,166	0	7,825,646
Turnover per employee	82,641	47,181	106,913	0	527,143
Total assets per employee	225,465	43,607	1,129,353	359	9,137,410
Fixed tangible assets per employee	78,421	3,773	450,812	0	3,625,629
Fixed intangible assets per employee	7,200	0	32,058	0	238,000

Notes: All monetary variables are in EUR for 2023. "St. Dev." denotes standard deviation.

Source: Authors' work based on a survey.

The turnover per employee metric is pivotal to understanding financial health and performance, averaging 82,641 EUR. The median of 47,181 EUR underscores that while some firms generate revenue relative to employee count, many struggle with operational efficiency. The extreme variability, indicated by a maximum of 527,143 EUR, may highlight the effectiveness of certain firms' business models or the strategic positioning of their services in the market. Turning to total assets per employee, the average is recorded at 225,465 EUR, with a median of 43,607 EUR. This disparity, alongside a staggering maximum of 9,137,410 EUR, suggests that certain firms operate with highly asset-intensive frameworks, potentially signifying a strategy prioritizing large-scale investment in physical and intangible resources. The implications of such a measure on firm scalability and operational efficiency warrant further analysis, particularly regarding how these asset structures impact competitive advantages stemming from capital investments.

6. CONCLUSION

The intertwined activity of AI startups and companies in Croatia supports the assumed multiplicative effect that AI adoption and development might have on the entire economy. However, there are no reliable statistics on AI users and AI service providers, and Croatia is not an exception. More structured and methodologically consistent evidence and monitoring of the AI landscape in Croatia would enable targeted policy measures for this heterogeneous business and enable spillovers of AI development and adoption effects to other sectors and out of the national market.

The sectoral distribution of AI-developing firms in Croatia corresponds to the situation in the CEE region, showing early signs of specialization in industry-specific AI solutions. The majority of AI-developing firms in Croatia operate in manufacturing (46%) and the ICT sectors (43%). AI solutions are also developed by companies registered in professional services and scientific work, and other sectors developing AI are emerging. The AI development is in over than 50% of cases performed in micro firms, and it is densely concentrated in the capital city of Zagreb area. Financial results of AI-developing firms in Croatia should be taken with caution because of a large variation among the firms regarding revenue generation capabilities, and due to the difficulties in distinguishing revenues from AI production from other revenue sources. Despite its limitations in terms of the size and completeness of the AI-devel-

It is important to note that the available data does not allow for a definitive assessment of the financial returns generated solely from AI-development activities. In many cases, AI development likely represents only one component of a firm's broader operational scope. This is particularly plausible for firms classified under sectors such as food manufacturing or the wood industry, where AI may be integrated as a supporting function rather than a primary product or service offering. Furthermore, micro and small enterprises that engage in AI development are more likely to do so to produce market-oriented AI solutions. Commercializing AI products and services may represent a core business strategy or a significant source of potential revenue for these firms. Therefore, any evaluation of AI development in Croatia must account for the diverse roles and business models associated with AI across different firm sizes and sectors.

oping companies' sample, this research indicates an existing AI development potential in Croatia. The specifics of Croatian AI-developing firms call for more systemized research and statistical evidence. The proper identification of this subsector is a prerequisite for its development, for which an EU framework already exists.

The EU digital agenda includes many measures to support AI development and to overcome the barriers that young firms and start-ups, micro and MSEs, face in securing the resources needed to develop and commercialize AI solutions. One of the recent initiatives within the European supercomputing initiative's regulations (EuroHPC) is to facilitate the creation of AI factories, designed to create a robust and interconnected network of AI hubs. Acting as one-stop shops, they will offer AI startups, SMEs, and researchers comprehensive support, including access to AI-optimised high-performance computing resources, training, and technical expertise. Shared supercomputer facilities provide SMEs with access to immense computational power, enabling them to train complex AI models more efficiently and to enter the global AI market⁴. The Croatian government announced that the drafting of the national AI strategy would start in 2025. Therefore, creators of national policy should acknowledge the potential of AI-developing firms in Croatia and align the policy measures accordingly.

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⁴ <https://digital-strategy.ec.europa.eu/en/policies/ai-factories>

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MANAGEMENT OF TOURISM DEVELOPMENT IN RURAL AREAS - CASE STUDY: DONJA KUPČINA, CROATIA

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Abstract

Donja Kupčina, the largest settlement in the Municipality of Pisarovina, has been losing its importance in recent years, suffering the negative consequences of demographic collapse caused by the aging population and emigration, as well as unfavorable economic conditions, especially as a result of the war events at the end of the last century. Tourism and family farms, of which there are 109 in the settlement of Donja Kupčina, can be determined as the backbone of future economic development, and which, by enriching their offer with catering and tourist programs, can significantly contribute to the preservation of heritage and identity, as well as the economic prosperity of the settlement and sociodemographic renewal.

Results have shown that residents of the settlement of Donja Kupčina expressed a low level of satisfaction with local infrastructure and economic development, in contrast to a high level of satisfaction with the rich and preserved resource base. Residents are not satisfied with the inclusion of the settlement in the tourism product of the Municipality of Pisarovina and believe that they do not have enough information about it. Based on the conducted research, the paper presents a proposal for the development of rural tourism in the settlement of Donja Kupčina, a CroRural model, which aims to improve the general economic, social and demographic picture of the settlement while ensuring the preservation of resources and the growth of the living standard of the population. The above model is applicable, with certain modifications, to all rural areas in the Republic of Croatia.

Keywords: rural tourism; management, Donja Kupčina

1. INTRODUCTION

Managing the development of a certain area is a very demanding and challenging process. If we start from the very core of the concept of management, the previously stated points us to the fact that it must be based on reliable and easily verifiable indicators, guided by clearly defined goals, and monitored in a timely manner in order to prevent possible anomalies in the application of this process.

The aforementioned management process is particularly challenging when designing programs that can be applied in sensitive areas such as the rural areas of a country. Rural areas face the problems of high unemployment rates, which increases the population's need for social programs at the level of European countries compared to residents of urban areas, which, along with depopulation and population aging, an average lower level of education, and often underdeveloped infrastructure, and especially in countries like the Republic of Croatia, underdeveloped non-agricultural activities in rural areas (Mesić et al, 2021, European Commission, 2008). The decline of the area in economic and demographic terms has also been contributed to by changes in habits, needs, occupations and population structure, war events, as well as inadequate development policies at the state level over the past decades.

All of the above problems also cause stagnation and degradation of the quality of life in rural areas of the Republic of Croatia (Miljenović et al., 2016, Grgić et al., 2010). The development of rural tourism and the involvement of the local community in rural tourism, es-

pecially family farms, provides an opportunity for successful economic and demographic-social renewal of the above areas. (Očić et al. 2019; Mesić et al., 2021).

The paper will examine the development of the settlement of Donja Kupčina, highlighting the disproportionate development of the Pokuplje area, once a very rich agricultural region. This disproportionate development is particularly evident when considering its favorable geographical location – close to the two centers of Zagreb and Karlovac.

The following problems affecting the development of the mentioned area have been identified: depopulation, population aging, insufficient economic activity, insufficient focus and readiness to acquire new knowledge and skills. Since the Republic of Croatia is a country that is strongly oriented towards tourism, the lack of interest of the local community (population, but also local government) in tourism, and in all possible positive impacts of its development on the general level of quality of life and revitalization of the mentioned area, has been particularly noted. Through the development of several forms of selective tourist offer, especially rural tourism, and new sustainable practices, and the restoration and preservation of traditional crafts, traditional lifestyle, customs and rich natural and cultural heritage, in which Donja Kupčina as the largest settlement in the Municipality of Pisarovina has the most significant role due to the oldest open-air local museum (Petrović, 2008) and the preservation of traditional construction (Getvaj, 1987) as a symbol of the identity of the local commu-

nity, a new and arguably sustainable economic and socio-demographic development of the settlement of Donja Kupčina will be enabled.

2. LITERATURE REVIEW

The improvement of the existing economic environment, which is mainly based on agriculture, must continue to be based on the local community. The author Yachin (2025) explores the possibilities of developing entrepreneurial ventures in rural areas and ways in which the engagement of the local community in entrepreneurial activities can be encouraged. In his research, he presents strategies and practices that help transform entrepreneurial initiatives into sustainable business models in rural communities, which is possible through the development of tourism. Yanan et al. (2024) point to the positive impact of rural tourism on preserving traditional ways of life and ensuring sustainable development of rural areas and settlements. The authors analyze the positive and negative effects of tourism development, focusing their attention on the preservation of cultural heritage and the socio-economic development of local communities. As tourism development is expected to contribute to the sustainable development of rural destinations (Nemes and Tomay, 2025) through the design of thoughtful policies aimed at determining the impact of environmental and social factors on sustainable development (Permana et al. 2024), it is necessary to conduct an analysis of the value chain within the local community and include their experiences in the creation of a unique tourism offer.

Soleymani et al. (2025) emphasize that by creating unforgettable tourist experiences, destination management contributes to the recognition of the destination, and by promoting sustainable development policies, to the very sustainability of rural areas, tourism, and agriculture.

They also emphasize the role of emotional and experiential elements in stimulating long-term interest and engagement of tourists, and thus the local community, in tourism activities. Cordova-Buiza et al. (2025) share a similar view, pointing out the importance of involving local communities in tourism planning and management, as this contributes to sustainability and community strengthening in rural areas.

In order to fully understand the management of tourism development in rural areas, it is necessary, after researching the views of the local community, to also research the views of potential tourists who will visit the destination with the aim of achieving sustainable development and creating a quality and competitive product in the tourism market. Li et al. (2025) indicated in their research that different physical and spatial characteristics of destinations influence the choice of destination and the behavior of tourists in the destination, which has implications for planning and management of rural tourism and should be taken into consideration. The successful development of rural areas is only possible through the cooperation of all stakeholders through partnerships between local communities, tourism workers and other stakeholders in order to improve the offer and achieve joint economic and social benefits. (Leite et al., 2023).

In conclusion, the successful development of a tourist destination in a rural area is possible only by applying a holistic approach (Chen et al., 2023) and by harmonizing the needs of the local community with the needs of modern tourists.

3. FAMILY FARMING IS THE BACKBONE OF THE DEVELOPMENT OF RURAL TOURISM IN THE REPUBLIC OF CROATIA

In order to properly assess the development possibilities of rural tourism in the settlement of Donja Kupčina, it is necessary to determine the state of development of rural tourism in the Republic of Croatia. The author has identified family farms as the carriers of the future sustainable development of rural tourism in the Republic of

Croatia, because they represent a combination of tradition and experience of the hosts and offer the possibility for sustainable development, growth and survival of local rural communities.

Table 1: Family farms in the Republic of Croatia by organizational structure 2016 – 2024

YEAR	FM	SSFM	CR	TC	CO	REST	TOTAL
2016	165.176	-	2.201	2.566	385	196	170.524
2017	159.191	-	2.174	2.554	347	192	164.458
2018	162.248	-	2.187	2.690	355	196	167.676
2019	162.966	2.032	2.251	2.846	362	205	170.662
2020	154.679	10.250	2.299	3.039	355	215	170.837
2021	141.351	22.842	2.416	3.287	359	219	170.474
2022	128.290	31.696	2.466	3.400	357	221	166.430
2023	122.879	35.267	2.464	3.442	355	222	164.629
2024	118.861	35.872	2.472	3.460	352	222	161.239

Notes: FM-family farm; SSFM-self-sufficient family farm; CR-craft; TC-Treding Company ; CO-Cooperative

Source: Paying Agency for Agriculture, Fisheries and Rural Development (Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju /APPRRR/- Access from: <https://agronet.apprrr.hr/v1/Forms/PublicForms/PublicData.aspx> (14.08.2025)

In the Republic of Croatia, the number of family farms in the period from 2016 to 2024 is in a slight decline. This indicates the need to implement urgent measures that are necessary to ensure the survival and development of family farms, and thus agricultural production in the Republic of Croatia. (See Table 1.)

Tourism can be developed on a family farm in the Republic of Croatia by registering an additional activity.

According to the Hospitality Act (Government of the Republic of Croatia, Hospitality+ Act, 2014-2024), a family farm is an agricultural holding registered in the Register of Farmers as a family farm in accordance with special regulations and which provides hospitality services in accordance with the provisions of the Hospitality Act.

Table 2: Provision of catering services on family farms 2022 – 2024

TYPE OF FACILITY	2024	2023	2022	2024/23 INDEX	2023/22 INDEX
Winery	70	60	54	116,67	111,11
Tasting rooms	134	116	98	115,52	118,37
Picnic area	240	199	156	120,60	127,56
Rooms	132	119	98	110,92	121,43
Apartments	158	141	118	112,06	119,49

Source: Paying Agency for Agriculture, Fisheries and Rural Development (Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju /APPRRR/). Access from: <https://agronet.apprrr.hr/v1/Forms/PublicForms/PublicData.aspx> (14.08.2025)

From the previously mentioned data in Table 2, it is evident that growth in the previous three years was achieved in all forms of hospitality facilities. In relation to 2023, in 2024 an increase was registered in the number of camping and Robinson accommodation spaces (21.43%), picnic areas (20.60%) and wineries (16.67%). In 2023, compared to 2022, the most new excursion sites (27.56%), rural holiday homes (26.34%) and rooms (21.43%) were opened.

In addition to catering services and catering facilities in rural tourism, it is also possible to offer various tourist services on family farms. The services offered according to the Register (Paying Agency for Agriculture, Fisheries and Rural Development, 2025) are listed in Table 3.

Table 3: Provision of tourism services on family farms 2022 – 2024

SERVICE	2024	2023	2022	2023/22 INDEX	2024/23 INDEX
enabling participation in agricultural activities (fruit/vegetable picking, harvest, etc.)	143	138	110	103,62	125,45
enabling participation in aquaculture activities (feeding aquatic organisms, cleaning breeding installations, catching aquatic organisms, presentation of aquatic organism breeding, etc.)	49	13	12	376,92	108,33
hunting and fishing and presentation of hunting and fishing methods	46	42	37	109,52	113,51
carriage rides, boat rides, cycling, horseback riding, hiking and similar activities	172	145	116	118,62	125,00
active and adventure tourism activities	97	85	64	114,12	132,81
rental of space, resources, equipment and supplies for a particular activity	121	109	89	111,01	122,47
rental of picnic and picnic areas	132	122	91	108,20	134,07
implementing a program of creative and educational workshops related to agriculture, aquaculture, traditional crafts and the like	87	78	63	111,54	123,81
presentation of the agricultural economy, hunting grounds and forests and the natural and cultural values within them	112	99	86	113,13	115,12
visits to ethno collections and the like	39	34	27	114,71	125,93
provision of excursion and tourist transfer services to OPG for guests using accommodation services	70	65	52	107,69	125,00

Source: Paying Agency for Agriculture, Fisheries and Rural Development (Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju /APPRRR/). Access from: <https://agronet.apprrr.hr/v1/Forms/PublicForms/PublicData.aspx> (14.08.2025.)

From Table 3 it is visible that numerous tourist services are provided on family farms in the Republic of Croatia. The largest number of services in 2024 relates to the service of carriage rides (172), enabling visitors to participate in fruit picking on the family farm (143), and renting out areas for excursions and picnics (132), while only 39 households offer the service of visiting ethnographic collections and similar (39). Compared to 2023, the offer that has improved the most is the provision of participation in aquaculture activities, which has increased by 276.92% due to the low offer in previous years, and carriage rides, boats, bicycles, horse riding, hiking and similar activities with an increase of 18.62%. In 2023, compared to 2022, the largest increase in offer

was recorded in renting out areas for excursions and picnics (34.07%) and active and adventure tourism 32.81%.

As shown in the table, the number of additional tourist services is constantly increasing, but this growth does not reflect the possibilities that rural areas have as a possible tourist destination. Therefore, it is necessary to encourage the population of rural areas, especially those who have their own agricultural production, to improve it by including it in the tourist product through the creation of additional value and income, through development programs, financial models and educational activities.

4. DONJA KUPČINA – TRADITION AND HISTORY GUARANTEE OF RURAL TOURISM DEVELOPMENT

The settlement of Donja Kupčina is the largest settlement in the municipality of Pisarovina, which is the largest (145 km²) and the most sparsely populated (25 inhabitants/km² = 3,689 inhabitants) municipality in Zagreb County, located in its southern part and dominated by the Vukomeričke gorice hills and the Kupa River. Donja Kupčina is the first settlement in Zagreb County, bordered on one side by the settlements of the city of Karlovac, and the municipal center of Pisarovina (Municipality of Pisarovina, 2025) - If we look at the geographical position of the municipality, and the settlement of Donja Kupčina itself, we can think that this

rural area along the Kupa River, and along the very border of urban Zagreb and near Karlovac has significant development opportunities, which have not been used. The settlement of Donja Kupčina, although spatially the largest settlement in the Municipality (Municipality of Pisarovina, 2025) with the largest number of inhabitants, is actually an area without significant economic activities and business entities, marked by significant depopulation, which was particularly pronounced after the Homeland War. (See Table 4.)

Table 4: Population of the settlement of Donja Kupčina according to official censuses in the 20th and 21st centuries

CENSUS YEAR	NUMBER OF POPULATIONS	(%) CHANGE INDEX (FALL)
1931	2.066	--
1948	1.843	-10,79
1953	1.853	0,50
1961	1.697	-8,42
1971	1.552	-8,55
1981	1.381	-11,02
1991	1.314	-4,85
2001	1.087	-17,28
2011	974	-10,40
2021	881	-9,55

Source: Croatian Central Bureau of Statistics, 2011,2013,2025. Access from: <https://web.dzs.hr/Hrv/DBHomepages/Naselja%20i%20stanovnistvo%20Republike%20Hrvatske/Naselja%20i%20stanovnistvo%20Republike%20Hrvatske.htm> , <https://web.dzs.hr/Hrv/censuses/census2011/censuslogo.htm>, https://podaci.dzs.hr/media/rqybclnx/popis_2021-stanovnistvo_po_naseljima.xlsx (15.07.2025.)

According to data from the Central Bureau of Statistics (2025), it can be seen that the decrease in the population has been constant in the observed ninety-year period, and compared to 1931, when the settlement had 2,066 inhabitants, in 2021, according to the last census, there were 881 inhabitants, which is a decrease of 57.36%, and the observed decrease between censuses is on average 8-10%.

Until the Homeland War, the settlement housed several shops, bakeries, milk purchasing points, local taverns

and veterinary stations. Today, the settlement has two taverns, a betting shop and a general store, and an agricultural pharmacy as a reminder of the once economically much stronger settlement. In the settlement, the population has no ideas about the development of tourism, despite the fact that the settlement is home to the first open-air museum in the Republic of Croatia. Donja Kupčina is also known as the stork village, but this has only been partially used in the promotional materials of the Tourist Board of the Municipality of Pisarovina

(Tourist Board of the Municipality of Pisarovina, 2025). Unfortunately, the local community, as well as the local government, and the tourist board do not have well-designed tourism development programs (or they are at a low level), and do not recognize tourism as an important element that can revive and revitalize the aforementioned rural area, even though it is the first site where an open-air ethno museum was built in Croatia.

Faced with global changes in economic development and demographic stagnation, and one could even say decline, it is necessary to adopt a new and sustainable model of economic and socio-demographic growth for the settlement of Donja Kupčina, which is possible through the development of rural tourism.

The problems of development of this area can be determined in:

- insufficient level of knowledge and motivation for tourism development
- poor demographic indicators – population decline, population aging

- insufficiently developed infrastructure – transport connections, wastewater drainage
- numerous cultural resources that are not valorized for tourism – neglected and unmaintained churches, elements of traditional construction.

In order to determine the desired development direction of a certain rural area, including the settlement of Donja Kupčina, it is necessary to first of all understand the views of the local community on the direction of the desired development. Since Donja Kupčina is a very rural area, this research is based on determining the possibilities for the development of tourism, as a complementary product to agriculture. In the following, an analysis of the advantages and disadvantages of the rural destination of Donja Kupčina was made and development threats and opportunities were determined, with the aim of designing a rural tourism development program for the settlement. (See Table 5)

Table 5: S.W.O.T. analysis of the situation (tourism) in rural areas of the Republic of Croatia

STRENGTHS	WEAKNESSES
• Preserved resource base • clean nature • unpolluted water • unpolluted air • Rich cultural and historical heritage • churches, traditional houses • language/dialect, folk dances, customs • crafts and trades • gastronomic specialties of the area • Proximity to large cities (Zagreb and Karlovac) • Safety • Proximity to emitting tourist markets • Kindness of the hosts	• Insufficient involvement of the area in economic developments • Tourism is not recognized as a significant economic sector for development • Neglected agricultural areas • Lack of local development plans • Lack of understanding of the needs of the local community by authorities at all levels • Lack of quality transport infrastructure • Lack of interest in tourism by the local community • Lack of trust in new ideas by the local community • Unmaintained material heritage
OPPORTUNITIES	THREATS
• Development of cultural tourism • Development of rural tourist offer • Development of agriculture • Consolidation of land • Creation of new and recognizable ecological products • Improvement of railway and road connectivity of rural areas • Programs to encourage the development of rural areas • Use of EU funds and encouragement of cross-border cooperation where possible • Adoption of good practices by neighboring countries/destinations	• Further depopulation of the area • Lack of labor force • Fragmentation of agricultural areas • Death of currently preserved crafts and trades • Disappearance of tangible and intangible cultural heritage caused by depopulation • Lack of jobs • Abandonment of traditional products and production • Pollution • Loss of resources due to inadequate development policies • Competition

Source: Author's analysis

Although the rural areas of Donja Kupčina possess significant and very important elements for the development of a modern and innovative tourist offer, this has not been recognized at the local level. Despite development programs and development strategies at the level of the Republic of Croatia, they have not taken root in local and smaller communities. The rural tourism product in the entire Republic of Croatia is, one could say, in the making. The connection between production in

the fields and restaurants and hotels is almost non-existent, and the level of information among tourists, as well as the local population in rural areas, about the advantages of developing the tourist offer is low. All of the above highlights negative threats such as further depopulation, abandonment of traditional production, loss of the uniqueness of the area, disappearance of intangible and tangible heritage due to population extinction or insufficient maintenance. The development of tourism

in rural areas should be characterized by sustainability and aimed at strengthening development potential and preserving the rich resource base and reducing depopulation.

The vision for the development of rural tourism in Croatia by 2020, commissioned by the then Ministry of Tourism and prepared by the Institute of Tourism in Zagreb, stated that rural tourism would be a competitive and increasingly sought-after export product of Croatia. Rural areas would attract tourists with their ecological preservation, authentic atmosphere and distinctive offer that would be intended for different consumer segments. (Ministry of Tourism, Institute of Tourism, 2015). Unfortunately, even today, the assumptions written in this Action Plan have not been realized at the level of the entire Republic of Croatia, including in the settlement of Donja Kupčina.

From the above, it is evident that rural tourism provides an opportunity for the demographic and economic and social revitalization of rural areas, including the settlement of Donja Kupčina. Tourism, as the most important element of economic development and social well-being, provides a unique opportunity for the development of rural areas through:

- preservation of the identity of the local community
- demographic recovery of rural areas
- economic recovery of rural areas
- strengthening the general level of competitiveness of the economy
- creation of new jobs
- strengthening interculturality
- acquisition of new knowledge and skills

Rural tourism is a factor of sustainable development that, through its development programs, enables the preservation of the natural, cultural, agrarian resource base, tradition, customs, gastro-enological peculiarities of the area, etc. (Adapted from Bartoluci, 2013:190). In order for the development of rural tourism to be successful, according to the authors Pröbstl-Haider et al. (2014), it is necessary to include as many stakeholders

as possible in its development, which will achieve better effects of this development, and the growth of this form of tourism is encouraged by tourism policy measures from the Ministry of Tourism and Sports, the Ministry of Agriculture, the Croatian Chamber of Commerce, as well as through programs of the Croatian Tourist Board, the Klub selo Association and other specialized associations.

Further development of rural areas will be achieved through the revitalization and restoration of numerous currently uncultivated and neglected agricultural areas, which can be achieved through the design of incentive measures in the form of financial and tax incentives, assistance in applying for projects for financing from European Union funds, or through support intended for small private investors. (Grgić et al. 2010.)

By creating brands of regional indigenous products, the prerequisites for creating a regionally recognizable tourist destination are created (Deže et al. 2018), and this can be achieved by including the existing family farms in the settlement of Donja Kupčina in tourist flows. The most important role in education and launching the tourist offer must be initiated by the Tourist Board of the Municipality of Pisarovina and the Municipality of Pisarovina itself. The development of rural tourism can offer an innovative tourist product with an indigenous traditional element that will ensure its regional recognition on the global tourist market. One of the most important carriers of the possible tourist development of rural areas is the family farm, and the local community itself.

4.1. Characteristics of the economy of the settlement of Donja Kupčina

Agriculture and related activities are the backbone of the economy of this settlement, as well as the surrounding area. According to data from the ARKOD system 1, in the settlement of Donja Kupčina there are land types: arable land, meadow, pasture, orchard, other types of land and temporarily unmaintained land.

Table 6: Land in the settlement of Donja Kupčina by type

Year	Arable land	Meadow	Pasture	Orchard	OTLU	Temporarily unmaintained plot						
	A	P	A	P	A	P	A	P	A	P	A	P
2022	412,56	900	376,64	969	1,55	3	3,31	20	0,85	2	6,28	19
2023	391,45	851	383,04	968	1,27	2	3,16	20	0,85	2	5,66	18
2024	309,18	686	409,93	1022	3,01	4	3,16	20	0,85	2	20,04	39

Note: column A (area, Ha), column P (number of plots), column OTLU (other types of land use)

Source: Paying Agency for Agriculture, Fisheries and Rural Development (Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju /APPRRR/). Access from: [Prikaz-broja-i-povrsina-ARKODa-po-naseljima-i-vrsti-uporabe-poljoprivrednog-zemljista_31_12_2024.xlsx](#) (14.08.2025).

¹ARKOD is the Croatian acronym for the Integrated Land Parcel Identification System (LPIS), a digital record of agricultural land use maintained by the Agency for Payments in Agriculture, Fisheries, and Rural Development (Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom

razvoju). It serves to clearly identify and track agricultural land parcels within Croatia, which is a prerequisite for farmers to receive EU subsidies and support.

From table no. 6. it can be seen that the number of arable plots is constantly decreasing, while the number of meadows is slightly increasing, which indicates an unsatisfactory trend of declining food production, where this area could find its market niche, especially if it is designed as part of the development of rural tourism in this area.

According to the register of farmers and family farms, there are 124 family farms operating in the area of the settlement of Donja Kupčina. If we exclude self-sufficient family farms, which cannot, in accordance with legal provisions, record additional services, 109 family farms, of which two are trading companies, have the

possibility of recording tourism and catering activities as additional. Of the listed family farms, only forty-one are recorded as active. Of the active agricultural farms in the settlement of Donja Kupčina, none have catering or tourist services registered as additional activities. The above points to the fact that tourism and catering have not yet been recognized as a possible source of further development of agriculture in a rural environment like the settlement of Donja Kupčina, especially if we take into account the possibility of preparing and directly offering high-quality food of plant and animal origin in an untouched landscape (Paying Agency for Agriculture, Fisheries and Rural Development, 2025)

Table 7: Family farms in the settlement of Donja Kupčina

TYPE OF FAMILY FARM	NUMBER
Family Farm	107
Self-Sufficient Family Farm	15
Trading Company	2
Total	124

Source: Paying Agency for Agriculture, Fisheries and Rural Development (Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju /APPRRR/), Access from: [Prikaz-broja-i-povrsina-ARKODa-po-naseljima-i-vrsti-uporabe-poljoprivrednog-zemljista_31_12_2024.xlsx](#) (14.08.2025)

According to gender, the responsible person on family farms in the settlement of Donja Kupčina is 80 men and 44 women. The average age of the head of a family farm is 11 people in the group up to 41 years of age, 8 people in the group from 41 to 45 years of age, 12 people from 46 to 50 years of age, 11 people in the group from 51 to 55 years of age, 17 people from 56 to 60 years of age, 8 people from 61 to 65 years of age, and 57 heads of family farms are over 65 years of age. The above demographic structure can be considered partially responsible for the lack of additional services in tourism and catering in this settlement. In addition to the owners, 100 members of the family farm are registered within the family farms (Paying Agency for Agriculture, Fisheries and Rural Development, 2025). According to the professional qualifications of the responsible person on the OPGs in the settlement of Donja Kupčina, there are 124 of them in total, the structure is arranged in such a way that for 47 people the educational qualifications are unknown, 5 people have not completed primary school, 42 people have completed primary school, 31 people have completed secondary school, and only 1 person has registered a completed higher education. (Paying Agency for Agriculture, Fisheries and Rural Development, 2025)

The above data, in the author's opinion, indicate a certain possibility that through the development of rural tourism, it will be possible to:

- retain young people in rural areas
- retain highly educated people in rural areas
- increase the interest of family farm owners in registering additional activities such as tourism
- connect production (especially organic production) and the tourist market through the offer of family

farm products directly at the "doorstep" without intermediaries and additional costs

- strengthen the authenticity, recognizability of the tourist offer and the settlement itself in rural areas.

A special challenge for tourism workers in rural areas is to create awareness that the development of rural tourism offers significant development opportunities, especially in the form of permanent revitalization of rural areas. The above should be significant not only for tourism workers but also for government officials. With the development of tourism, the weakest links in the economy of the Republic of Croatia today could become its carriers in the future.

4.2. Level of satisfaction of the population with life in rural areas

Although it could represent an area connecting two counties, with a special and unique cultural and tourist offer, Donja Kupčina has become an undeveloped and increasingly sparsely populated area. Once large cultivated fields have become areas overgrown with bushes and maquis, which represents an additional development and safety problem due to the possibility of fires and similar disasters, especially during summer heat or thunderstorms. A particular problem for further development, especially tourism, is also the poor transport connections, especially by public transport, which is especially pronounced during the summer months. Although it is located only 36 kilometers from Zagreb and 23 kilometers from Karlovac, public transport connects the settlement only with the city of Zagreb, while since the beginning of this century there has been no public transport network that would connect the settlement with nearby Karlovac or Jastrebarsko.

In order to initiate some economic activity, according to the author's opinion and previous similar research on the

topic (i.e. Grgić et al. 2010, Gelo & Akrap, 2003), it is first of all necessary to ensure quality municipal and transport infrastructure and well-designed development programs, which must be directed towards sustainable development and the development of selective forms of tourism. This area, due to its natural beauty and characteristics, rich flora and fauna, represents an ideal opportunity for the development of ecological, cultural, educational, hunting and rural tourism. Through tourism, the opportunity is opened for the presentation, and thus the preservation of traditional crafts, traditional lifestyles, local folklore, dialects, food, drinks, clothing, footwear and the like. By creating a new tourist product based on sustainability and rural tourism, space is also created for the revitalization of the Donja Kupčina local museum as a basis for promoting the values of this area. Without the active role of the local tourist board, education of locals, especially the younger generation, about the importance of preserving heritage and developing complementary activities to agriculture, such as tourism, depopulation will become even more pronounced. This will be particularly exacerbated by the lack of economic entities in the area and their lack of interest in "new" forms of economic activities, such as tourism, which is unknown to this once predominantly agricultural region.

According to the study Quality in Rural Areas of the Republic of Croatia - Stay or Go (Grgić et al. 2010),

conducted in 2009 and involving 941 respondents, the main difficulties of rural life are related to economic problems (employment opportunities, limited career choices, and lower incomes compared to urban areas) and the poor economic position of agriculture, which is clearly reflected in the strong pessimism of active farmers. According to the aforementioned study, the perception of quality of life in rural areas is significantly influenced by the respondents' dissatisfaction with social and health services and poorly developed infrastructure. Respondents are aware of the advantages of rural life compared to urban life. Rural life is life in a natural environment, with less pollution, better social ties, and less crime. One fifth of respondents expressed dissatisfaction with living conditions in rural areas and intend to migrate. This is an alarming indicator, since the respondents belong to the age group between 25 and 45, a population that has, as a rule, completed education and started a family. The largest number of potential migrants come from economically underdeveloped counties of Croatia, and most of them are unemployed or farmers. Potential migrants consider the lack of job opportunities as the main disadvantage of living in a rural area. The main advantages of living in the city, according to the respondents, are better opportunities for employment and additional income, as well as better opportunities for education and professional development.

5. METHODOLOGY

In order to start designing the development of the rural area of Donja Kupčina and the wider area of Pokuplje, it is necessary to research the needs and wishes of the local community. Only a satisfied local community is the guarantor of the achievement of permanent sustainable development of an area. For the stated reason, for the purposes of this paper, the author created and conducted a short initial survey of the inhabitants of this settlement. 103 respondents voluntarily agreed to take part in the research. Primary data was gathered for the purpose of our research with the use of a questionnaire. The questionnaire was designed based on the literature

the context of present research. . The Likert Scale was used for determining the level of satisfaction. Items were measured with scale ranging from "very poor" (as 1) to "excellent" (as 5).

The questionnaire consisted of four groups of questions, each with five possible statements. The groups of questions related to the quality of the settlement's infrastructure, economic characteristics of the settlement, resource base, and heritage and tourism. The survey results were analyzed using the SPSS package (IBM Statistical Package for Social Sciences, Version 25, 2017 IBMSPSS, USA).

1. Is the local community satisfied with the level of inclusion of the Donja Kupčina destination in the tourism product?
2. Does the level of development of rural areas affect satisfaction with the quality of life of the local community?
3. What is the importance of preserving tangible and intangible heritage for the local community?
4. Are the residents satisfied with the quality of the transport infrastructure?
5. Are the residents satisfied with the economic indicators in the destination?
6. Are the residents satisfied with life in the rural area?
7. Do residents recognize tourism as a potential opportunity for economic development?
8. Do residents think it is important to preserve the identity of the local community?

review (Bitner 1992; Baker & Crompton 2000; Xie 2004; Lee et al. 2008; Grgić et al. 2010; Marković et al. 2018; Cudny et al. 2021, Drpić et al., 2022, Milohnić, Drpić, 2022). Measures were modified in order to meet

The author presents the results of the pilot study in this paper, and based on them sets the following research questions:

The limitations of the research conducted are primarily determined by the smaller sample of respondents, the short time for conducting the research, as well as the lack of funds for more thorough research. The aforementioned research should be repeated in full after informing the public about the potential of sustainable

tourism development for the general economic development of the settlement of Donja Kupčina. The idea is to stimulate the local community to participate more willingly in the research with the aim of obtaining more complete results, and thus designing the final development guidelines that will be implemented through the The CroRural project.

6. RESEARCH RESULTS

Based on a preliminary survey conducted on a sample of 103 respondents, the data presented below were obtained. Table 9 shows the groups of questions asked in

the questionnaire, and the degree of satisfaction of the respondents with them. The structure of the respondents is shown below. (See Table 8)

Table 8: Structure of respondents who participated in the study N = 103

Characteristic	Frequency	Percentage
Gender		
Male	40	38,83
Female	63	61,17
Age group		
0 – 18	7	6,80
19-25	13	12,62
26-39	23	22,33
40-64	39	37,86
65+	21	20,39
Education		
Elementary	18	17,48
High school	73	70,87
University	12	11,65

Source: Author's research

A total of 103 respondents participated in the preliminary research, of which 40 respondents (37.63%) were male and 63 respondents (62.37%) were female. The largest number of respondents, 39 of them, belong to the

age group of 40-64 years (37,86%), and have a secondary level of education, 73 of them or (70.87%) of the respondents.

Table 9: Level of satisfaction with the quality of life of the local community, N = 103

GROUP OF QUESTIONS	SATISFACTION INDICATORS	ARITHMETIC MEAN (N=103)
INFRASTRUCTURE AND TRAFFIC	Quality of transport infrastructure	3,1
	Quality of municipal infrastructure (drainage, water supply, waste management)	2,6
	Transport connections between the settlement of Donja Kupčina and surrounding settlements	1,9
	Quality of public transport	0,1
AM	INFRASTRUCTURE AND TRAFFIC	1,9
ECONOMIC FACTORS	Number, variety and quality of economic entities in the environment	2,8
	Employment opportunities in the immediate area	1,9
	Tourism is recognized as an opportunity to revitalize settlements	1,2
AM	ECONOMIC FACTORS	1,96
RESOURCES - PRESERVATION OF THE RESOURCE BASE	Awareness of the importance of preserving rural space among residents of the settlement	4,5
	The need to preserve and revitalize crafts and old crafts	3,9

	The need to preserve intangible heritage (language, folklore, costumes)	4,6
AM	RESOURCES - PRESERVATION OF THE RESOURCE BASE	4,33
	The pleasure of running the Donja Kupčina ethno museum	2,1
	Inclusion of the ethno museum in the tourist product of the Pisarovina destination	1,2
HERITAGE AND TOURISM	The initiative of Tourist Board Pisarovina in the inclusion of ethno museum Donja Kupčina in the tourism product of the destination	0,6
	Local government support for heritage preservation programs	1,9
AM	HERITAGE AND TOURISM	1,45
TOTAL	SATISFACTION WITH THE QUALITY OF OBSERVED ELEMENTS IN THE SETTLEMENT OF DONJA KUPČINA	2,41

Source: Author's research

The local population is partially satisfied with the quality of individual elements reported in the conducted research, and according to the author, the quality of life in the settlement of Donja Kupčina can be determined as such (2.41). They express the highest level of satisfaction with the quality of transport infrastructure (3.1), communal infrastructure (2.6), while they are most dissatisfied with the quality of public transport (0.1).

The local population is extremely dissatisfied with the initiatives coming from the Pisarovina Tourist Board (0.6) and the level of inclusion of the Donja Kupčina ethno museum in the tourism product of the Pisarovina Municipality (1.2). According to the respondents, tourism is not recognized as a significant form of revitalization of the Donja Kupčina settlement (1.2).

The local community believes that the preservation of intangible and tangible heritage is of high importance for the destination of Donja Kupčina, so the need for spatial preservation was rated the highest (4.5), the need for the preservation and revitalization of crafts and old trades (3.9), and the preservation of intangible heritage (4.6), which confirms the high level of awareness of the

population about the need to preserve heritage as the basis for preserving local identity.

In order to improve the quality of life, the activities that should be implemented by the local community and local administration are:

- demographic and economic measures for the revitalization of settlements and heritage
- creating a new offer based on sustainable rural tourism
- encouraging (self)employment, especially of young people
- stronger inclusion of the Donja Kupčina ethno museum in the tourism product
- better and more adequate management of the Donja Kupčina ethno museum
- creating a strong and recognizable brand of real value in the tourism market

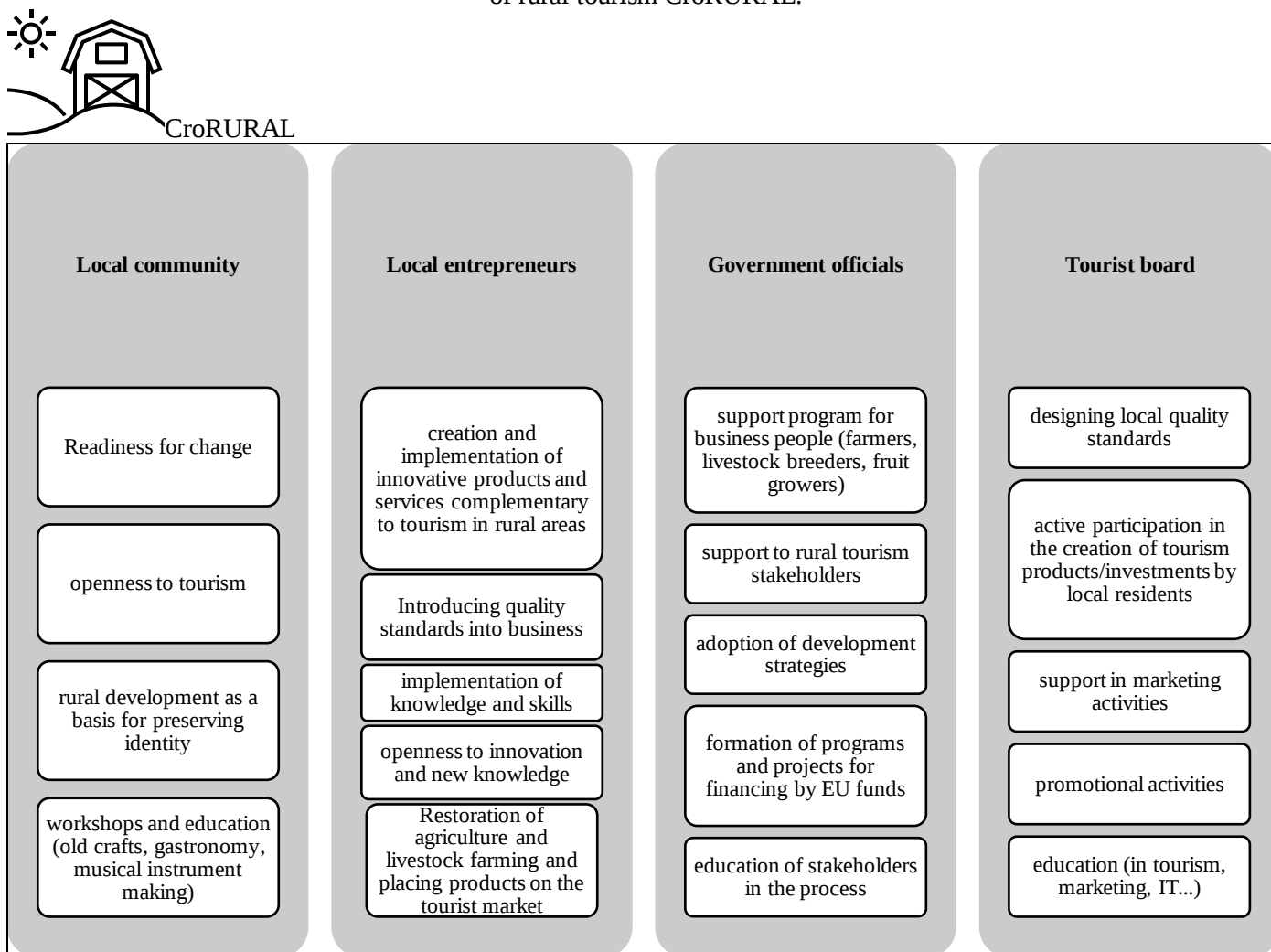
Following author will present the CroRural model, which was designed with the aim of directing the activities of all stakeholders in rural areas with the aim of creating a new tourism product and, therefore, a new direction of economic and social activities in rural areas.

7. PROPOSAL FOR A RURAL DEVELOPMENT MODEL CRO-RURAL

In order to ensure a long-term sustainable and at the same time economically successful model of development of rural areas and rural tourism in the Republic of Croatia, it is necessary to apply a development model that will enable the creation of development and interest synergy of the local community. The author proposes the CroRural model presented in the paper. The mentioned model can be applied in all destinations, including the destination Donja Kupčina, with possible adjustments to their specificities.

The CroRural model brings together the most important factors that directly influence the success of all development policies and programs in rural areas. The program focuses on four components: the local community (as primary), local business people (who are most often also stakeholders in the local community), government officials at the local, regional and even national levels, and the tourist board, which, as a non-profit organization, is closely linked, due to its specificity, to local administration and self-government, on whose financing its work depends.

Figure 1: Model for encouraging cooperation between all stakeholders in rural areas for the successful development of rural tourism CroRURAL.



Source: Author's research

The local community should, through various programs (workshops, playrooms, certification programs, education, financial support, etc.), create a strong sense of the importance of revitalizing life, heritage, and crafts through a tourism product. In addition to containing sustainability as a fundamental postulate, this product must also connect the revitalization of agriculture and its complementary activities and connect it with tourism. Such a tourism product will guarantee the survival of local producers, but also new businessmen who will certainly appear with the development of tourism. In the example of the Donja Kupčina, education can take place at the ethno museum site and be organized by the locals themselves, who will transmit the specificities of the tradition and customs of Donja Kupčina to new generations through word of mouth and by demonstrating skills in preparing food, drinks, winter food, traditional items, clothing, and footwear. The above will strengthen the awareness of belonging to the community and strengthen the local identity and uniqueness of the area,

thereby achieving important prerequisites for the development of tourism. Local businessmen should design such products and services that will be based to a greater extent on the preservation and cultivation of tradition. First of all, they should be focused on revitalizing neglected agriculture and, through association in interest groups (clusters), create traceability, through which their products will reach end users directly, without intermediaries, which will ultimately result in a product that will be cheaper and more accessible to the entire local community, and therefore it is possible to place it more easily on the tourist market. Businessmen, with the help of local government and self-government, must acquire additional knowledge from modern business, especially that related to financing options from the European Structural Funds, favorable lines for businessmen from HBOR⁶ and commercial banks, support of smaller values from local government and others. On the other hand, local government must develop, based on the agreement of all stakeholders, a new development strategy that will be focused on sustainable

⁶ HBOR – Croatian Bank for Reconstruction and Development (Hrvatska banka za obnovu i razvoj)

development and rural tourism. To achieve this, it is necessary to approve significant funds for education, for the operation of the tourist community, promotion, and other things, so that the adoption of tourism as a new driver of sustainable community development becomes an imperative for all stakeholders in the destination. In order for the tourism development of rural areas to be successful, it must first and foremost be based on ensuring sustainable development and preserving the natural resources of the destination as the basis for its protection. The development of tourism in rural areas is not possible without the direct and strong involvement of the local community in adopting development programs and determining tourism development policies. Businessmen certainly play a significant role, especially those who are themselves connected to the rural area (especially owners of family farms).

The further development of rural areas and the revitalization of areas that have been demographically devastated will be contributed to by the implementation of the following development guidelines:

- creation of a new National Catalogue of Rural Tourism of the Republic of Croatia (parts of which can be found on the portal idemonaselo.hr)
- permanent, timely and continuous monitoring of indicators of rural tourism development (night stays, number of tourists)
- creation of an overall development strategy for rural areas and rural tourism of the Republic of Croatia
- encouragement of investments in rural areas and rural tourism while respecting the postulates of sustainable development
- creation of a clear and implementable promotion strategy for rural tourism of the Republic of Croatia
- strengthening capacities for training personnel in rural tourism
- reintroduction of training that should be conducted before submitting an application for approval to engage in rural tourism

The importance of the proposed programme is also reflected in the application of EU rural tourism development policies in rural areas. These policies support local initiatives that make tourism sustainable and beneficial for the local community. In the new development period, they are aimed at diversifying income and

- Value for money
- quality over quantity
- education for tourism, education for sustainable development

The above guidelines will contribute to the creation of a new and successful tourist offer in rural tourism, as a generator of development of rural areas. New tourist products of rural tourism will contribute to new economic benefits for all stakeholders, but also for the social community. Economic development will contribute to the demographic renewal of rural areas, and it can be assumed that new and innovative changes will develop in the general economic and social condition of rural areas.

The CroRural project was designed in accordance with the similar projects implemented in coastal destinations in the Republic of Croatia (such as "New Generation for a New Development Concept of Rural Tourism" (Agroturizam Konavle, 2024), while taking into account the specificities of the rural areas of continental Croatia with regard to the general state of the economy, demography, expertise and knowledge of the local community. Likewise, the aforementioned plan contains the most important elements of the Strategy for the Development of Sustainable Tourism of the Republic of Croatia until 2030, which clearly determines the direction and policies of the Government of the Republic of Croatia towards sustainable tourism development, according to which in 2030 Croatia will be a competitive, innovative and safe country with a recognizable identity and culture, a country of preserved resources, quality living conditions and equal opportunities for all. The strategic goals are tourism that is year-round, more regionally balanced, with preserved environment, space and climate, competitive and innovative, and resilient (Government of the Republic of Croatia, 2022). These goals are also promoted through the The Cro rural program.

strengthening rural areas through sustainable tourism, using funds from the Common Agricultural Policy (CAP) and Cohesion Policy. The aim of these policies, and thus of the presented programme, is to stimulate agriculture, create new jobs and encourage sustainable tourism (European Parliament, 2025).

8. CONCLUSION

The development of rural tourism in the Republic of Croatia plays a very important role in repositioning the existing tourist offer in the direction of sustainable development and revitalization of rural areas. According to the data obtained in the paper, presented as a result of a survey on the example of the destination Donja Kupčina, residents of rural areas are less satisfied with the general level of quality of life, which, the author believes, is one of the fundamental reasons for depopulation and economic impoverishment and thus the disappearance of settlements. A special problem is the lack of common elements in developed areas that enable a

high quality of life and satisfaction of the population, such as well-maintained road infrastructure, drainage, tourist events, quality public transport and others. Solving the basic living needs of the population of rural areas must be a necessity for all stakeholders of the government and the economy in rural areas, with special emphasis on the active inclusion of the local community, especially local family farms, in the tourism product, and thus in the economic development of the area.

The CroRural development model proposed in the paper is a guideline that can be used for the development of

all types of selective tourism offer in any area and destination in the Republic of Croatia, but also in the world, because it represents the basis for actions that need to be taken within the destination in order to achieve economic and social growth in the area.

The model is suitable for creating cooperation between different stakeholders in the tourism market, as well as for creating cooperation between different tourist destinations, especially in those border areas where rural tourism can serve as a unique model for sustainable development and increased understanding among the pop-

ulation. By preserving one's own identity and uniqueness, through cooperation and better understanding of others, which is possible through rural tourism, long-term well-being and prosperity of all rural areas is achieved, both in Croatia and in neighboring countries. In order to obtain clearer and better guidelines for the further development of rural areas, especially in the observed settlement of Donja Kupčina, it is necessary to conduct a comprehensive study on a larger sample and a wider regional area, the pilot results of which are presented in this paper.

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SUSTAINABILITY AND SUSTAINABILITY REPORTING IN SERBIA: ANALYSIS OF THE FOCUS GROUP RESULTS

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Abstract

Sustainable development of society cannot be achieved without responsible and sustainable business practices. Regarding the necessity of achieving the goals of sustainability derived from the Agenda 2030, Serbia, as a full-fledged member, is no exception. Therefore, companies in Serbia are obligated to follow the Agenda 2030 as well as the sustainable development goals established in this document. However, much evidence shows that Serbia lags behind the European Union (EU) average in almost every indicator regarding these goals. Given the importance of sustainability and sustainable business practices as well as the numerous challenges related to these issues in Serbia, in order to get deeper insight into this area, the focus group, as a qualitative research method, was implemented. Therefore, the aim of this paper is to analyse the focus group results, upon which some recommendations for the policymakers in this country were made. The experts from the area of sustainability who took part in the focus group highlighted the crucial problems in the area of sustainability in Serbia, such as not paying sufficient attention to the impact on the environment of many companies, the avoidance of paying eco-taxes, missing adequate infrastructure for collecting the waste, the limited scope for reporting on sustainability, etc. The contribution of this paper is twofold: enriching domestic literature in the field of sustainability and providing recommendations to policymakers on how to improve the situation in Serbia regarding sustainability issues.

Keywords: sustainability, sustainability reporting, companies, policymakers, Serbia.

1. INTRODUCTION

In today's world, faced with various challenges, the issue of sustainability, as well as the sustainable development of companies, became an essential part of the attempts for building a better and more responsible human society. Although the concept of sustainability was introduced in the late 1980s, it became one of the most important topics all around the globe when in 2015 the United Nations (UN) adopted the document Transforming Our World: The 2030 Agenda for Sustainable Development (United Nations, 2015). As an important part of this document, 17 sustainable development goals were formulated, aiming to stimulate action in all areas of critical importance for humanity and the welfare of the people (United Nations, 2015).

Since the sustainable development of society cannot be achieved without responsible and sustainable business practices, companies have a significant role in meeting these goals. By incorporating sustainability objectives into their strategies and practices or not, companies can make a significantly positive contribution to sustainability or, on the contrary, can dramatically detriment the environment in which they operate.

Regarding the necessity of achieving the goals of sustainability derived from the Agenda 2030, Serbia, as a full-fledged member, is no exception. However, much

evidence shows that Serbia lags behind the EU average in almost every indicator. Additionally, according to current regulations in Serbia, only companies with more than 500 employees are obligated to publish non-financial reports referring to sustainable practices, while other companies do not have such an obligation, leading to not taking enough care of sustainable business.

Given the importance of sustainability and sustainable business practices as well as the numerous challenges related to these issues in Serbia, the focus group, as a qualitative research method, was implemented with the aim of gaining deeper insights into this topic. Based on the highlighting of the crucial problems and shortcomings within the area of sustainability and sustainability reporting in Serbia by the experts in the field of sustainability, some recommendations for policymakers in this country were made.

The structure of the paper is as follows. In the first part, literature on sustainability and sustainability practices in Serbia is given. In the second part, the implemented methodology is explained, and the results of the focus group meeting are analysed. In the third part of the paper, recommendations regarding the issue of sustainability and sustainability reporting in Serbia are given. At the end of the paper, a final conclusion is made.

2. LITERATURE REVIEW

2.1. Sustainability and sustainability development

Sustainability is one of the most important concepts that has occupied the attention of the academic audience as well as the practitioners for several decades. Although the history of this concept dates back to 1987 when the World Commission on Environment and Development, as a sub-organisation of the UN, published the document entitled *Our Common Future* (later known as the Brundtland Report after the president of that Commission), the topic of sustainability became the most prominent concept since 2015 when the UN adopted the above-mentioned document *Transforming Our World: The 2030 Agenda for Sustainable Development*.

The document *Transforming Our World: The 2030 Agenda for Sustainable Development* or shortly *Agenda 2030*, was created on the premise that global environmental problems lie in the fact that there is enormous imbalance in the world, that there is enormous poverty in the South and unsustainable patterns of consumption and production in the North (World Commission on Environment and Development, 1987). Therefore, an urgent need for a strategy that will provide sustainable development that will not compromise the ability of future generations to meet their own needs has appeared (World Commission on Environment and Development, 1987).

When it is about the essence of the concept of sustainability, there are as many definitions of it as there are different subjects and interest groups defining it from their point of view (Harrington, 2016). In the academic literature, most of the definitions of sustainability put focus on the need for achieving the balance between today's human needs and the needs of future generations, emphasising the long-term orientation in providing well-being for the people. As so, Stoddart et al. (2011) defined sustainability as the efficient and equitable distribution of resources intra-generationally and inter-generationally with the operation of socio-economic activities within the ecosystem. Thomas (2015) additionally argues that sustainability brings into focus human activities and their ability to satisfy human needs and wants without exhausting the productive resources. Harrington (2016) very shortly defined sustainability as maintaining well-being over a long, perhaps even an indefinite, period.

Since the natural resources in most cases are limited, and the ecological and societal challenges are rising every day, to reach sustainability goals and provide a foundation for future generation welfare, it is necessary that today's generation develop society, economy and environment in a responsible way. Therefore, closely connected to sustainability is another concept – sustainable development.

Sustainable development, like sustainability, has many definitions, but the most cited definition is the one that is contained in the Brundtland Report, upon which sustainable development is such development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). A substantial body of academic literature is dedicated to explaining the relationship between these two concepts. The authors generally agree that “sustainability” is a broader concept than sustainable development (Harrington, 2016) and hence includes it. Emphasising their difference Harrington (2016) noted that sustainability is orientated toward long-term treatment of natural resources, social systems, and people in ways that are consistent with human well-being and dynamic system stability. On the other hand, sustainable development focuses on human well-being by making the balance between current and future human needs (Harrington, 2016; Mensah, 2019). Summarising their relationship, Kates et al. (2005) stated that sustainability is a goal that can be achieved only with sustainable development representing the pathway leading to that goal.

Sustainability and sustainable development are grounded on three conceptual pillars, which include “economic sustainability”, “social sustainability”, and “environmental sustainability” (Harrington, 2016). In this triple model, environmental sustainability refers to the natural environment and how it can remain productive and resilient to support human life, implying that this aspect of sustainability has to support not only today's generation but the future as well (Harrington, 2016).

When it is about social sustainability, according to Saith (2006), it refers to the development of people, culture preservation, and providing the proper healthcare, education, gender equality, peace and stability all across the globe.

Finally, when it is about economic sustainability, it refers to such a system of production that satisfies present consumption levels while at the same time not compromising future needs (Lobo et al., 2015).

Damico et al. (2022) noticed that when sustainability (and sustainable development) is talked about, people generally have in mind the environmental aspect, while the social and economic dimensions are neglected in many cases. However, these pillars are interconnected, so sustainability and sustainable development cannot be achieved by focusing only on ecological or economic factors, but an integrated approach across all three pillars is required (Elkington, 1997).

Figure 1: Relationships among social, environmental and economic sustainability

Source: Wanamaker, C. (2018) The Environmental, Economic, and Social Components of Sustainability: The Three Spheres of Sustainability in Harrington, L. M. B. (2016). Sustainability theory and conceptual considerations: A review of key ideas for sustainability, and the rural context. *Papers in Applied Geography*, 2(4), 365–382.

The necessity to achieve sustainable goals in all three pillars is established in the above-mentioned UN document Transforming Our World: The 2030 Agenda for Sustainable Development, in which 17 sustainable development goals (SDGs) in the economic, social and environmental areas were formulated in order to stimulate action of critical importance

2.2. Sustainability practices in Serbia

Serbia, as a full member of the UN, according to Agenda 2030, also has the obligation to undertake measures and activities aimed at achieving goals that contribute to sustainability in all three pillars mentioned above. However, according to data from 2023, in most indicators in achieving SDGs, Serbia lags behind the average of the EU's 27-member states, implying that Serbia still has a long way to go in terms of reform and development before it reaches the average levels for the EU-27 (Martin, 2023). The exception is the indicator regarding reducing the risk of poverty and economic growth.

Based on the available data from 2023, Serbia has specifically unfavourable data in the following areas regarding SDGs (Babović, 2024):

Goal 6 - Clean water and sanitation.

Indicator 6.1.1 - Proportion of population using safely managed comparing the period 2016–2020 stagnated.

Indicator 6.2.1a - Proportion of population using safely managed sanitation services comparing the period 2015–2019 decreased.

Indicator 6.a.1 - Amount of water and sanitation-related official development assistance that is part of a government-coordinated spending plan comparing the 2017–2021 decreased.

As support for the above unfavourable data is the fact the level of wastewater treatment in Serbia remains very low – only 14%, compared to 80.87% in the European Union (Naled, 2023).

Goal 7 – Affordable and clean energy.

Indicator 7.1.2 - By 2030, ensure universal access to affordable, reliable and modern energy services – precise data missing but according to data from 2019 near the half of the population does not use clean energy.

In addition, in Serbia electricity production is mostly based on thermal power plants, which mostly use lignite as the lowest-calorie coal (Martin, 2023), causing health risks for the local population and beyond.

Goal 11 - Sustainable cities and communities

Indicator 11.6.2 - Annual mean levels of fine particulate matter (e.g. PM_{2.5} and PM₁₀) in cities (population weighted) increasing.

As a consequence of high level of air pollution in Serbia, according to the data of National Ecological Association (NEA), of all the diseases in Serbia due to chronic obstructive lung diseases, 23% can be attributed to air pollution as a cause. In addition, near 20% of all deaths from diabetes, heart disease, lung cancer, a stroke, and a lower respiratory tract infection, are caused by air pollution. What is particularly worrying is that 9% of all child deaths in the first month of life are attributed to polluted air” (National Ecological Association, 2023).

In Serbia, as well as in EU countries, there is a legal obligation to report on sustainability. This obligation was established by the adoption of amendments to the Law on Accounting in 2019 (Official Gazette of RS, no. 73/2019 and 44/2021), according to which big companies (with more than 500 employees) have an obligation to report on sustainability, which is an integral part of the so-called non-financial report.

In addition to the aforementioned law, in Serbia there are additional legal documents dealing with certain aspects of SDGs. Some of the most important of them are presented in Table 1.

Table 1: Some legal documents in Serbia dealing with specific aspects of SGD.

ENVIRONMENT	SOCIAL	GOVERNMENT
The Law on Environmental Protection. The Law on Climate Change Law on Waste Management. The Law on Nature Protection.	The Labour Law. The Law on Prohibition of Discrimination. The Law on Gender Equality. The Law on Safety and Health at Work. The Law on the Protection of Personal Data.	The Law on Business Companies. The Law on the Capital Market. The Law on Public Enterprises. The Law on Prevention of Money Laundering and Terrorist Financing. The Law on Prevention of Corruption.

Source: Author's investigation

Despite the fact that Serbia has a solid planning and institutional framework for achieving SDGs, and that it covers 82.7% of them (Vlada Republike Srbije, 2024), their implementation is not at a satisfactory level so far. The practice of reporting on sustainability in Serbia that has been realised so far has shown that there is a lot of room for improving this legal obligation. Namely, Petaković (2024) in her article cited some experts in this field who emphasised the fact the law does not propose any specific reporting standards to be used, making it much more difficult for companies to define exactly what they should include in their reports. In addition, the experts in Petaković's (2024) article also noted that there are also companies that have the legal obligation of reporting on sustainability, but nevertheless, they do not publish such documents without any sanctions, although the Law on Accounting proposes penalties. Finally, many reports on the sustainability of companies that have internationalised their operations in Serbia are generally published at the international level by groups, so that in some cases there is no separate data related to operations in Serbia.

However, having in mind two facts: first, that recent EU regulatory frameworks, such as the Corporate Sustainability Reporting Directive (CSRD) and European Sus-

tainability Reporting Standards (ESRS), establish detailed and standardised requirements for sustainability reporting; and second, that Serbia is in the process of joining the EU, it could be expected that the practice of sustainability reporting in Serbia will be improved in the next period. Although Serbia is not a member of the EU, the requirements of the above EU framework documents will indirectly affect domestic companies that are part of supply-chain integration or conduct significant operations on the EU market (European Parliament & Council of the European Union, 2022). By following the ESRS, domestic companies will have a unified framework on how to deliver sustainability information on climate changes, pollution, water resources, biodiversity, workforce issues, and conducting business (European Commission, 2023). Following these documents, companies in Serbia will have a clear framework for how to report in more detail on ESG impacts, as well as a set of mandatory ESG reporting requirements. The necessary step in this regard would be for the Serbian policymakers to improve the national sustainability regulating framework regarding sustainability reporting, which will provide transparency and comparability of domestic reports, as well as a ground on which domestic companies could operate on EU territory without restrictions.

3. METHODOLOGY

In order to gain deeper insight into the ecological, economic and social aspects of sustainability in the Republic of Serbia (RS), the focus group, as a qualitative research method, was implemented. This method belongs to qualitative research methods whose objective is to understand people's opinions, ideas, and feelings derived from their experiences (Ugwu & Eze, 2023). Before meeting, the protocol as a research instrument was distributed to all participants. It contained the list of questions and topics that were planned to be discussed with participants as well as other information regarding the meeting. The focus group meeting was held at the Faculty of Economics, University of Niš, in March 2024.

In the focus group five experts from the area of sustainability took part. Three participants were managers in

the fields of sustainability, workplace safety and health, and product safety; one participant was the director of operations in a recycling company; and one participant was an expert for sustainable development of the Regional Chamber of Commerce of the Nišava, Pirot and Toplica Administrative Districts.

The objectives of the focus group discussion were as follows:

- Identifying key challenges in environmental, economic and social aspects of sustainability in RS,
- Identifying the gaps between the above sustainability aspects,
- Identifying areas of sustainability in which RS is lagging behind the EU,
- Identifying the potential and constraints for sustainability reporting,

- Identifying opportunities for the implementation of information technology (IT) to support sustainability-based practices.

The data and information regarding the sustainability practices in Serbia that were gained from the experts

4. RESULTS

The opinions and answers of the focus group obtained during the focus group meeting were grouped in accordance with the above-mentioned research objective.

I When the most challenging aspects of environmental sustainability in RS, as a part of the first research task, were discussed, all participants of the focus group agreed that in this area there are numerous challenges. One of the keys highlighted by participants was the insufficient use of renewable energy sources. However, the participants also noted that, at this time, the existence of wind turbines and solar power plants alone is not enough to ensure a stable electricity supply for the economy. Therefore, while reliance on traditional energy sources, such as thermal power plants, remains necessary at this stage of economic development, this does not mean that the transition toward renewable energy should be neglected.

Another significant ecological issue in RS identified by participants was water pollution. In this context, they pointed out the insufficient number of wastewater treatment plants in the RS. Moreover, they noted that even when their construction begins, completion is often delayed, and in cases where they are built, they frequently remain unused.

A further problem concerning the ecological aspects of sustainability is the fact that Serbia has, in a way, become Europe's recycler. For example, while certain countries prohibit the use of diesel-engine vehicles, Serbia continues to import them.

Regarding the economic aspects of sustainability in RS, participants of the focus group highlighted the issue of waste management, noting that certain types of waste must be exported to major European centres due to the lack of adequate recycling infrastructure within the country. This significantly raises the costs of the recycling process.

Additionally, it was pointed out that some companies avoid paying this tax by categorising their imported devices under the "other" classification, which is not subject to taxation. As a result, these companies gain a price advantage over those that follow environmental regulations.

Furthermore, participants noted that some states' policies are inconsistent. They said that although it was announced that on each product it will be written how much the eco tax costs and how much the product costs, this is not applied in practice.

One of the problems identified in RS is the lack of control over natural resources, such as mineral resources, forests, water, etc. More precisely, some of these strategic resources have been sold, and some are being spent irrationally.

during the focus group meeting were later processed through qualitative analysis, which in this case meant that the participants' opinions regarding the sustainability practices in Serbia were grouped upon certain criteria and then analysed.

When it comes to the social aspects of sustainability, all respondents agreed that understanding the importance of this aspect of sustainability should be raised, and they agreed that through the education system, awareness should be raised about the importance of applying practices that serve sustainability.

II The second research task of the focus group was identifying the areas of sustainability in which Serbia is lagging behind the other countries, especially the countries of the EU. Regarding this issue, all respondents agreed that it is the environmental aspect, but since all aspects of sustainability are connected, improvement is needed in all of them.

The participants of the focus group also noted that investments in environmental sustainability are often perceived by many companies in Serbia as costs rather than as long-term investments in the future. In discussing this issue, some respondents highlighted that companies are required to regulate their pollutant emissions by 2025. Despite this obligation, there is currently little action being taken, raising concerns about whether any meaningful steps will be made in the coming year.

III The third research task of the focus group was identifying the circular economy activities applicable in Serbia. The respondents agreed that circular economy activities in RS are not implemented sufficiently and that it is crucial to reduce the amount of waste. Before that, whenever possible, new value should be created from non-products, either through recycling or through the production of electricity. They noted that regarding the circular economy activities, there are some examples of good practices in some companies in Serbia. For example, respondents noted that in some companies IQOS devices collected through direct retail, which are no longer used, are disassembled into components that can be recycled, which enables the operator to ensure recycling of 85% of the generated waste. Also, in some companies waste water is purified and reintroduced into the production process.

IV Regarding the fourth research task of the focus group, the topic of the possibilities of applying information technology (IT) to support sustainability practices was discussed. All respondents agreed that the possibilities for applying IT to the function of sustainability are numerous. They stated that artificial intelligence can be used for data reduction, waste sorting (especially in the field of e-recycling), processing large amounts of data, etc. In addition, the respondents also stated that IT can be used in the spheres of production automation, optimisation of business processes in order to save energy, etc.

V When it was about the fifth research task referring to potentials and limitations of the sustainability reporting in RS, participants of the focus group remembered that according to legal regulations the obligation to report on sustainability currently exists only for companies employing more than 500 employees, while other companies do not have this obligation. They concluded that the practice of reporting on sustainability is applied by a relatively small number of companies.

When it comes to challenges related to the practice of reporting, it was also stated that the legal regulations in this area are imprecise, i.e., that the indicators that should be monitored have not been specified. On the other hand, the European directive ESRS (European

Sustainability Reporting Standards) for now proclaims the standards that should be reported, but the issue of the indicators that should be monitored, as well as the structure of the reports themselves, is still open.

As an advantage of introducing the practice of reporting on sustainability, the respondents stated that the very fact that it becomes an obligation for other companies will require them to think more about this topic and to identify opportunities for improvements in this area (for example, reduction of electricity and water consumption, improvement of business processes, cost optimisation, impact on the environment, employees, etc.).

A summary of key challenges regarding the sustainability practices in Serbia is given in the next table.

Table 2: Sustainability challenges in Serbia

KEY SUSTAINABILITY CHALLENGES IN SERBIA	
A certain number of companies avoid paying eco taxes.	Some companies avoid this tax by classifying the imported devices in the "other" category, for which no taxes are paid and gain an unfair cost advantage.
Many companies do not pay sufficient attention to their impact on the environment.	Investing in equipment for purifying wastewater and prevention of air pollution is often treated as a cost.
Only big companies have the obligation to report on sustainability.	There is no legal obligation for medium size and small companies to report on sustainability. The legal regulation is imprecise, i.e., the indicators that should be monitored are not specified.
The infrastructure for collecting the waste is not developed at proper level.	Certain types of waste, in the absence of appropriate recycling infrastructure in the country, have to be exported to large centres in Europe, which significantly increases the cost of the recycling process. Recycling infrastructure for the waste from households is not developed at a proper level, especially in small cities and villages, while in some of them there is no infrastructure for collecting the waste at all.
Low awareness among people about the importance of sustainability practices.	People in general are not aware enough about the importance of sustainability and sustainable practices and do not separate waste in households even if there is a recycling infrastructure.
The possibilities of applying IT to support sustainability-based practices are not well used.	IT is not used enough for optimisation of business processes in the function of energy saving, making less waste, better waste management, etc.

Source: Author's investigation.

5. RECOMMENDATIONS FOR POLICYMAKERS

Having in mind the above-listed crucial challenges regarding sustainability in Serbia, some recommendations for policymakers could be made.

- When it is about the fact that *many companies do not pay sufficient attention to their impact on the environment*, the policymakers can implement the following measures:
- Introducing stricter law regulations regarding the emissions, waste management, and resource efficiency and, at the same time, implementing efficient monitoring and penalties for companies that do not follow the regulations.
- Providing incentives for companies that invest in sustainable technology and eco-innovation through tax reduction or more favourable loans.
- Require more sustainability criteria in public tenders to force companies to adopt and implement responsible practices.
- Regarding *the avoidance of eco-taxes and viewing sustainability as a cost*, policymakers could take the following measures:
- Strengthening eco-tax collection mechanisms and investing eco-tax revenues for environmental projects.
- Promote sustainability policies as a driver of competitiveness.
- Providing subventions for the companies that recycle the waste.

Having in mind that infrastructure for collecting the waste from households (in urban and especially rural areas) is not developed at a proper level, policymakers could take the following measures:

- Introducing a national waste strategy.
- Encouraging public-private partnership in building and managing waste systems.
- Allocating funds for expanding waste collection and recycling infrastructure to smaller towns and rural areas.
- When it is about the fact that among people *there is generally low awareness about the importance of sustainability practices*, policymakers can realise the following measures:
- Introducing into the school curricula from an early age topic regarding sustainability.
- Realisation of national campaigns by using different media (TV, social media, radio) for promoting the benefits of sustainable practices.
- Introducing tax benefits and other incentives for individuals or households which implement eco-friendly practices.

6. CONCLUSION

In this paper key aspects of the concept of sustainability and sustainable development were addressed. It was stressed that when it is about Serbia, there are many challenges in this area, as this country, in many indicators regarding the SDGs established by the UN, lags behind the EU.

In order to get deeper insight into this area, at the Faculty of Economics, University of Niš, the focus group with the experts from this field of sustainability as participants was organised. The participants stressed that most companies in Serbia do not pay sufficient attention to their impact on the environment, and some of them avoid paying eco taxes. Further, participants noted that only big companies have the obligation to report on sustainability, relaxing small and medium companies in implementing the sustainable practices. They also stressed that the infrastructure for collecting the waste is not developed at a proper level, as well as the fact that awareness among people about the importance of sustainability practices remains low. Finally, they stressed that the possibilities of applying IT to support sustainability-based practices are not well used.

Based on the opinions of the focus group participants regarding the sustainability issues in Serbia and by analysing domestic literature in this field, some recommendations for policymakers are formulated. The authors of

- Since in Serbia there is a *limited scope for reporting on sustainability*, as only big companies have this obligation, the policymakers can realise the following measures:
- Introducing reporting on sustainability obligations for all legal entities.
- Providing seminars and training for companies' representatives regarding sustainability reporting.
- Ensuring reporting alignments with EU standards. In order to stimulate using IT to support sustainability-based practices, policymakers can undertake the following measures:
- Providing grants or tax benefits for companies that develop IT solutions for sustainable purposes.
- Encouraging collaboration between academia, industry and the IT sector regarding the creation of sustainability solutions.
- Developing public platforms to share best practices on using IT solutions for sustainability purposes.
- By combining all these measures and policies, policymakers in Serbia can create a more simulative and comprehensive sustainability framework.

the paper believe that by implementing the recommended policies and measures, the portrait of Serbia regarding the issue of sustainability would be much improved and SDGs according to the Agenda 2030 will be achieved at a higher level.

However, this paper is not without limitations. They primarily relate to the method that was used for collecting the information in the empirical part of the paper, i.e., the focus group method. Although this method has many advantages when the aim of research is deeper understanding of some phenomenon by interactions and group discussion of the experts, the results cannot be generalised but only be interpreted in a specific context. In addition, in the case of a particular focus group meeting, only four participants took part, as some of the invited experts were unable to participate, providing this information on short notice.

Despite these shortcomings, the contribution of this paper is in providing an additional aspect of investigating the sustainability practices in Serbia and thereby enriching domestic literature in this field. Further, this paper provides some proposals for policies and measures for the policymakers on how to improve the framework for sustainability issues in Serbia.

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THE ROLE OF SUSTAINABLE INSTITUTIONS IN PROMOTING ECONOMIC GROWTH IN SOUTHEAST EUROPE

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Abstract

This study analyzes the role and importance of sustainable institutions in promoting economic growth in Southeast European countries. It explores how institutional quality good governance, rule of law, transparency, and anti-corruption efforts affects the region’s economic performance. Institutions are essential for ensuring a stable macroeconomic environment and attracting both domestic and foreign investment. Effective institutions enable fair resource allocation, improve economic efficiency, and build trust in state structures. The study uses secondary data from reliable sources such as the World Bank, IMF, ECB, and Eurostat. It covers the period 2010–2022, a timeframe marked by significant political and economic developments, allowing for a comprehensive analysis of trends. An econometric model and statistical analyses are employed to test the research hypotheses. Findings suggest that improved institutional quality is associated with increased GDP. Political stability and inflation control also contribute positively to growth. Interestingly, in some cases, improved corruption control has had a short-term negative impact on GDP, possibly due to structural adjustments affecting economic activity. The study highlights the impact of institutional quality on economic growth in SEE countries and emphasizes the need for policies that strengthen governance, institutional effectiveness, and anti-corruption measures. The results align with empirical evidence, and the time period analyzed provides a strong basis for drawing relevant conclusions and recommendations.

Keywords: GDP, institutional quality, corruption, sustainable institutions

1. INTRODUCTION

Institutional quality is an important determinant of economic performance and facilitates productive activities, investments, and the adoption of new technologies. However, researchers have primarily focused on explaining how institutional quality positively affects national economic growth and efficiency, while less attention has been paid to its impact on firm-level performance (Jonathan Lehne, et al, 2014).

This study also contrasts the impact of various factors on economic growth, such as corruption control, political stability, and stricter rule-based environmental measures. Many economies in the region experienced a decline in Gross Domestic Product (GDP) during the 1990–1991 period, in some cases by more than 20% or even 30%. Unemployment rose from 0% to 9%, while inflation doubled. The consequences of political unrest and armed conflict had a strong impact on local economies, which at that time were completely disconnected from global markets.

Based on the analysis by Roumeen (2013), it is suggested that economic institutions tend to be stronger in

countries that are more trade-oriented, as well as in those that rely on investments and financial flows and lack significant natural resources. While natural resources can enable countries to improve effective governance, regulatory quality, and other institutional capacities that tend to improve continuously with income growth, deeper institutions such as rule of law and corruption control tend to be weaker in resource-rich countries.

Many Southeast European countries still face challenges such as weak rule of law, high levels of corruption, inefficient public administration, and lack of transparency. However, progress toward European integration, structural reforms, and the growing demand for sustainable policies create new opportunities for development. In the Southeast European region, where countries have transitioned from closed systems and undergone prolonged economic transitions, the role of institutions is even more crucial.

2. LITERATURE REVIEW

A growing body of literature emphasizes that institutional quality is a key determinant of long-term economic growth, particularly in developing and transition economies. North (1990) laid the foundational understanding of institutions as “the rules of the game” that shape economic performance by influencing the behavior of individuals and organizations. In the context of Southeast Europe, where countries have undergone profound political and economic transitions, the strength of

institutions especially the rule of law, regulatory quality, and government effectiveness has been shown to directly impact the ability of states to attract investment, stimulate entrepreneurship, and ensure macroeconomic stability (Bartlett W. , 2009; Radulović, 2020). Empirical studies using the Worldwide Governance Indicators (WGI) and similar metrics have consistently demonstrated that countries with more accountable, transparent, and efficient institutions tend to achieve higher and

more sustainable GDP growth rates (Khalid, 2021; Roumeen, 2013).

Moreover, the literature reveals a nuanced relationship between different dimensions of institutional quality and economic outcomes. While short-term effects may result from ex-ante institutions such as policy stability and administrative capacity, long-term effects are often tied to deeper ex-post institutions, including judicial independence and corruption control (Khalid, 2021). In Southeast European countries, where structural reforms and European integration efforts are ongoing, studies suggest that sustainable institutions are essential not only for meeting EU accession criteria but also for enabling private sector development and innovation (Cheng, 2019; Trivić, 2023). However, the persistence of institutional gaps within the region especially between EU and non-EU countries poses significant challenges. These disparities are particularly evident in areas such as the enforcement of property rights, transparency in public administration, and the effectiveness of anti-corruption measures, which remain critical to enhancing economic competitiveness and investor confidence (Baumöhl, 2019; Radulović, 2020).

According to Baumöhl (2019), based on numerous studies, it has been empirically shown that institutions with high quality have a significant impact on a country's economic growth, as well as at the corporate level. Moreover, institutions strongly influence a firm's performance. Although such evidence exists, institutions and their role have been largely neglected in relation to firm survival. Therefore, it is essential to contribute to the literature, first by researching and analyzing how institutional quality affects firm profitability and survival, and second, by examining company survival in the context of the Southeast European region and its developing markets, where institutional levels represent another important factor.

According to Cheng (2019), institutional quality is presented as a model for policy liberalization, as it serves as a detailed indicator for trade and exchange rate liberalization, privatization reforms, enterprise restructuring, general institutional reforms, and competition reforms. Through this commitment, the authors have expressed their gratitude for the support from the National Science Foundations, which have consistently shown willingness to assist in this journey.

Author Bartlett (2013) emphasizes that, in today's world, science has evolved and the business landscape has expanded, as more and more investors have begun to consider institutional quality as a highly important factor, alongside assessing the operational risks that a business or company may face. When it comes to these rules, firms are generally inclined to invest in countries that protect property rights, have strict legal frameworks, developed public services with minimal bureaucracy, and limited overregulation or corruption.

According to Radulović (2005), in transition countries, institutional quality has had a significant impact on economic growth, as it has helped these countries ensure

that their institutions function effectively in creating a market economy and in meeting the prerequisites for EU membership. A concrete example is the case of Southeast European countries, some of which are already EU members, while others are still in the accession process. Therefore, this study examines the effects of institutional quality on the economic growth of Southeast Europe and compares these effects between EU and non-EU countries for the period 1996–2017, using the Worldwide Governance Indicators (WGI) to measure institutional quality.

According to Khalid (2021), institutional quality has two types of effects on economic growth: short-term and long-term effects. The short-term effect stems from the quality of ex-ante institutions, while the long-term effect derives from the quality of ex-post institutions. Ex-post institutions are formed as a direct result of dependence on resources and the type of regime. Therefore, the aim of this study is to identify the components of institutional quality that have the greatest impact on per capita growth in resource-rich developing countries. The results show that accountability has the strongest influence in shaping institutional quality in a sample of developing countries, and there is evidence that it has the most significant and meaningful effect on growth compared to other components of institutional quality. According to Radulović (2020), based on the quality of institutions, their impact on economic growth has consistently played a significant role, particularly in transition countries. The Autoregressive Distributed Lag (ARDL) panel approach is used to analyze the relationship between institutional quality and economic growth. EU countries have shown a short-term relationship between institutional quality and economic growth, while in non-EU Southeast European countries, regulatory quality and accountability are particularly important. Therefore, every step must be carefully reconsidered, as poor decisions can lead to long-term consequences for businesses and the economy as a whole.

A practical definition of institutions is given by author Trivić (2023), who states that institutions consist of a broad set of rules and behaviors designed by humans, which help individuals understand how to interact with one another and develop patterns of interaction that allow them to anticipate others' actions. In addition, various other authors have explored the link between institutions and entrepreneurial development, which opens a new field by revealing fresh perspectives on the importance of institutional quality for a country's overall development. What is concerning is that the gap between countries in the region is widening in terms of institutional quality. Not only are we not getting closer to developed Europe, but the disparities in institutional quality are also increasing across several areas, such as rule of law, corruption control, and the effectiveness of government policies. (Canh Phuc Nguyen, et al, 2018)

2.1. Meta-analysis

Meta-analysis refers to statistically synthesized results from a series of studies gathered through a specific

methodological procedure. In particular, meta-analysis allows the individual empirical results of different studies to be compiled and compared, after being converted into a common metric known as the effect size.

Table 1: Meta analysis of the research

Author	Year	Variables	Method	Findings
(Radulović., 2005)	(1996-2017)	Government Effectiveness, Regulatory Quality, Control of Corruption	Panel Data Collection	The results show that in SEE countries there is a long-term relationship between institutional quality and economic growth for all key variables.
(Ilkin, 2022)	(1996-2021)	Regulatory Quality, Control of Corruption, Government Effectiveness, Political Instability	Autoregressive Distributed Lag (ARDL) Model	The findings provide an overview of the impact of control variables such as inflation, openness (OPE), and population growth rate on economic growth. Specifically, openness was found to have a positive effect on the dependent variable, while inflation and the population growth rate had a negative effect on economic growth
(Alexiou, Tsaliki, & Osman, 2014)	(1972-2008)	Institutional Quality, Corruption, Economic Performance, Politics	The ARDL approach to cointegration	The empirical results of the study suggest that, for the Sudanese economy, the quality of the institutional environment is one of the most important factors in determining economic prosperity.
(Nguyen, Su, & Nguyen, 2018)	(2002-2015)	Institutional Quality, Economic Growth,	Estimators of the System Generalized Method of Moments (System GMM)	Empirical results show that improving institutional quality can reduce competition and bring about trade openness in the areas where HDIs operate to optimize their spillover effects.
(Abubakar, 2020)	(1979-2018)	Economic Growth, Political Stability, Regulatory Quality, Control of Corruption	Johansen Cointegration Approach, Ordinary Least Squares (OLS)	The results show that economic growth is driven by variables such as domestic investments and foreign direct investments. The study found that approximately 34% of the changes in institutional quality balance its effects on economic growth.
(Barro, 1996)	(1960-1990)	Institutional Quality, Inflation, Government Regulations	GMM model	Empirical findings from a panel of around 100 countries strongly support the general notion of conditional convergence. For a specific level of initial conditions, institutional quality, proper maintenance of the rule of law, lower inflation, and improvements in trade conditions are essential for growth.
(Magda, 1998)	(1995-2005)	Political Stability, Government Effectiveness, Regulatory Quality, Control of Corruption	Panel data	Five measures of institutional quality significantly increase real GDP growth in the countries of the Middle East and North Africa (MENA). In contrast, institutional quality has a negative impact on private credit growth and private investments.

Source: Data processed by the authors (2025)

3. METHODOLOGY

This paper analyzes the impact of determinant factors (institutional quality, political stability, control of corruption, inflation) on economic growth in the countries of Southeast Europe. The data used in this study are secondary data, which will be obtained from the World Bank, the International Monetary Fund, and the central banks of Southeast European countries. The time period of the research will cover the years (2010-2022), and the countries to be analyzed are the following Southeast European countries: Kosovo^{7*}, Albania, Serbia, North Macedonia, Montenegro, Cyprus, Turkey, Croatia, Bosnia and Herzegovina, Bulgaria, Greece, Moldova, Romania, and Slovenia.

For extracting the results, econometric models will be applied through statistical tests in the SPSS and Excel programs, such as: linear regression, correlation analysis, heteroskedasticity, autocorrelation, and the panel effects model. These econometric tests are applied to ensure the validity and robustness of the estimated relationship between sustainable institutional quality and

economic growth in Southeast Europe. The panel regression framework allows controlling for country-specific effects, while diagnostic tests for heteroskedasticity and autocorrelation ensure the reliability of statistical inference.

The research questions for this econometric model are:

1. How has the quality of institutions affected economic growth in the countries of Southeast Europe?
2. How does the level of corruption and government effectiveness influence the pace of economic growth in the countries of Southeast Europe?
3. Is there a statistically significant relationship between political stability and foreign direct investments in the Southeast European region?

The hypotheses are:

H0: The quality of institutions does not affect the economic growth of the countries of Southeast Europe.

H1: The quality of institutions affects the economic growth of the countries of Southeast Europe.

Table 2: Description of the variables included in the econometric model

Variable	Description of the Variable	Data Source
Dependent Variable (Y)	Economic Growth (GDP)	World Bank (2010-2022)
Independent Variable (X1)	Institutional Quality (IQ)	World Bank (2010-2022)
Independent Variable (X2)	Political Stability (PS)	World Bank (2010-2022)
Independent Variable (X3)	Control of Corruption (CC)	World Bank (2010-2022)
Independent Variable (X4)	Inflation (I)	World Bank (2010-2022)

Source: Data obtained by the authors (2010-2022)

The econometric model that will be used in this study is specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

$$\ln Y(\text{GDP}) = \beta^0 + \beta_1 (\text{InstitutionalQuality}) + \beta_2 (\text{Control of Corruption}) + \beta_3 (\text{Political Stability}) + \beta_4 (\text{Inflation}) + e$$

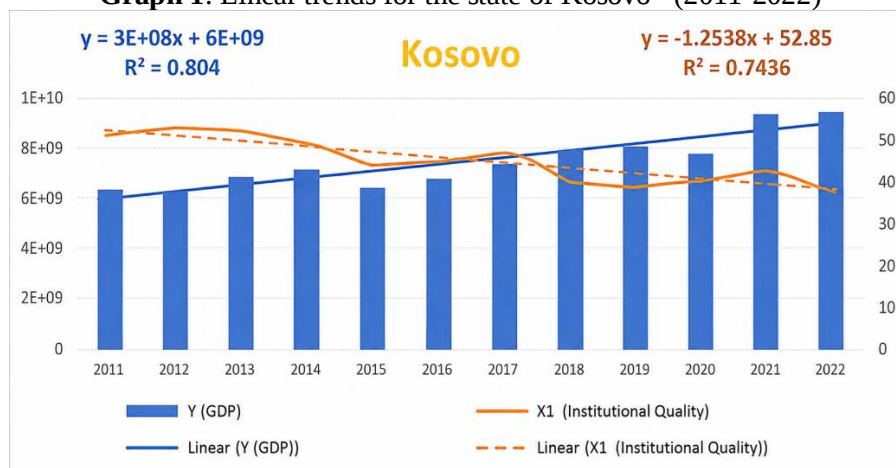
In the econometric model, the dependent variable is economic growth (GDP), while the independent variables are: Institutional Quality, Political Stability, Control of Corruption, and Inflation. 'e' refers to the error term (stochastic variables), and β_1 , β_2 , β_3 are the coefficients of the econometric model.

3.1 Comparative analysis of linear trends

The following data are presented, which will be analyzed through linear trends for the factors included in this paper for the time period (2010-2022) of four countries in Southeast Europe, and a comment will be made for each trend.

⁷ This designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo* declaration of independence.

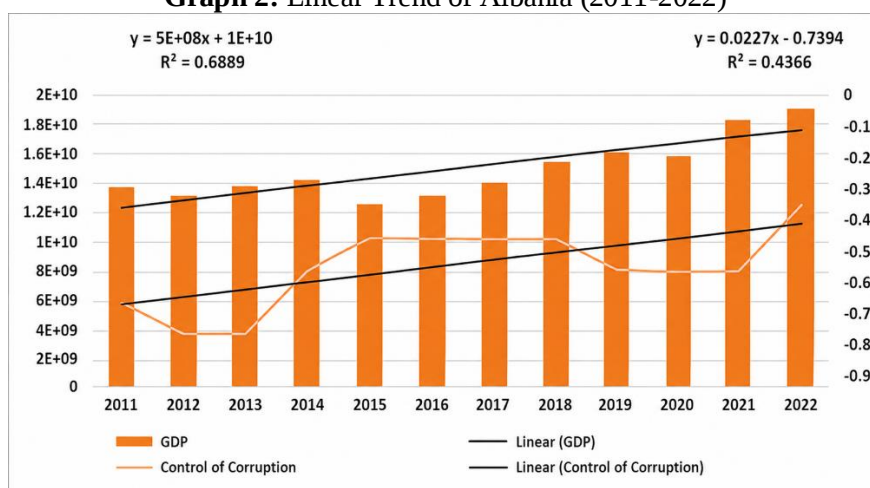
*Added by the Editorial Board and applies throughout the document.

Graph 1: Linear trends for the state of Kosovo* (2011-2022)

Source: Calculations made by the authors in Microsoft Excel (2025)

From the graphical presentation, it is evident that there are significant fluctuations in the institutional quality in the state of Kosovo*. Except for the year 2012, when Kosovo* experienced a growth of 1.2%, throughout this

entire period, Kosovo's* real economic growth has been between 3% and 4%. This growth is insufficient to keep up with the trend of new entrants into the labor market due to the country's low GDP base.

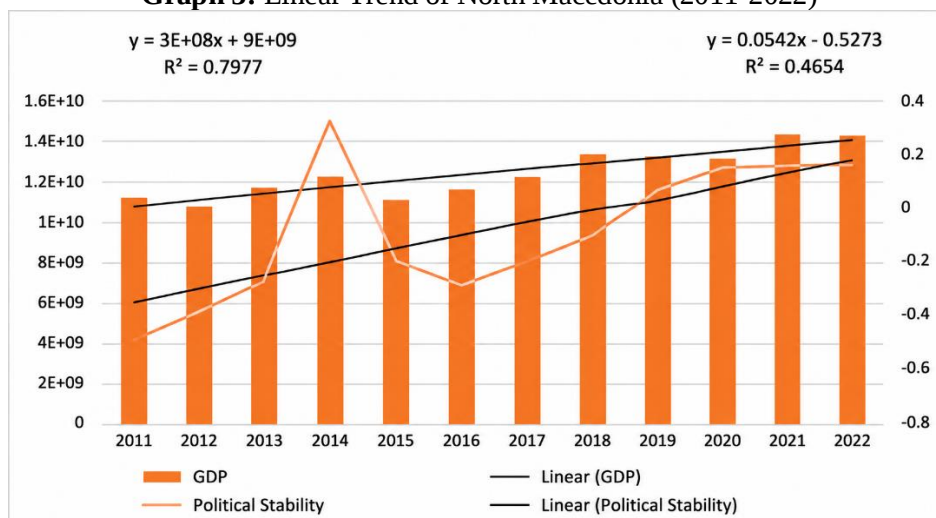
Graph 2: Linear Trend of Albania (2011-2022)

Source: Calculations of the authors using Microsoft Excel (2025)

According to the graphical presentation, it can be observed that control of corruption shows an increasing trend from 2011 to 2022, while GDP shows a rising trend for the period 2011, then again from 2015-2016-2017 up to 2021-2022.

In the first half of 2015, we observe an accelerated decline of 2.53% on an annual basis. Despite this decline,

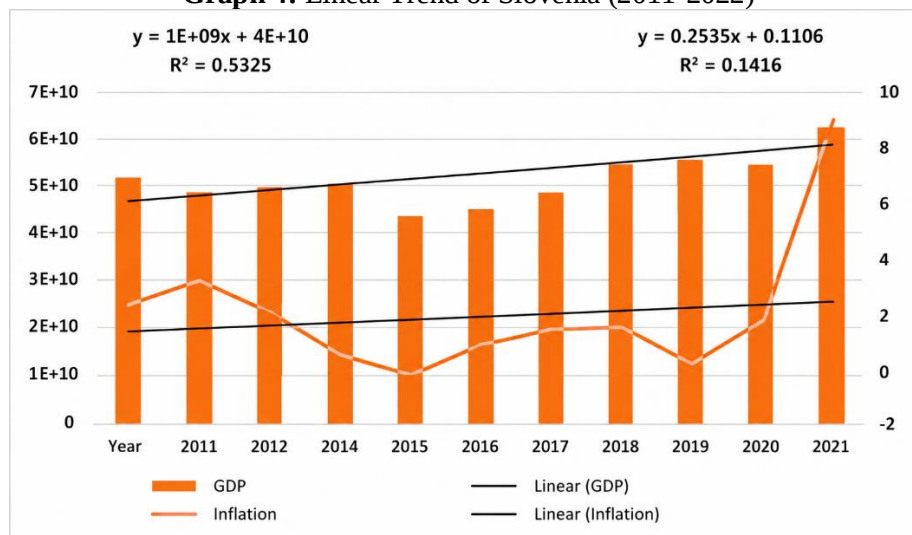
the dynamics of household consumption indicate that its level remains above the average of the last two years by 1.6%. Additionally, in 2021-2022, there was a significant increase, with this real growth in 2021 occurring mainly in the following economic activities: hotels and restaurants with 34.7%, and wholesale and retail trade.

Graph 3: Linear Trend of North Macedonia (2011-2022)

Source: Data calculated by the authors in Microsoft Excel (2025)

From this figure, we observe that the dependent variable, GDP, has shown a positive and steady upward trend, while political stability has exhibited a rapid growth trend during the period 2011-2022, reaching its highest point. Between 2009 and 2019, the inflow of

Macedonian and foreign nationals into the country increased by approximately 60%. About 90% of the foreigners entering were from European Union member states. Meanwhile, the number of Macedonian citizens leaving the country doubled, and the number of foreign nationals leaving North Macedonia increased by 25%.

Graph 4: Linear Trend of Slovenia (2011-2022)

Source: Data calculated by the authors in Microsoft Excel (2025)

According to Graph 4, we can observe that the dependent variable GDP has shown a positive growth trend, while inflation exhibits a rapid increasing trend starting from 2011, continuing through 2014-2015 and persisting until 2022. Slovenia's economy records an average

growth rate of 2.6% per decade, which is above the Eurozone average of 1.4%. In 2022, the real GDP growth was 2.5%.

4. RESULTS

In this part of the econometric analysis, the results of descriptive statistics, correlation coefficients, Pearson coefficient, R-squared, heteroskedasticity, autocorrelation, panel effect models, and hypothesis testing

through statistical tests for the variables included in the econometric models will be presented.

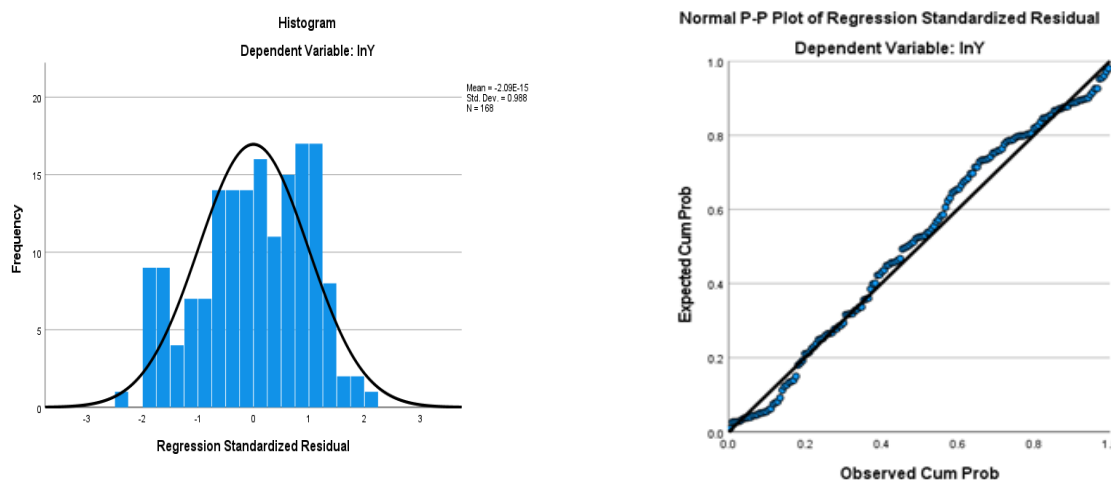
Table 3: Descriptive Statistics for the Variables Included in the Econometric Model

Variable	Mean	Standard Deviation	Number of Observations
lnY (Economic Growth, GDP)	24.6478	1.41085	168
X1 (Quality of Institutions)	62.67	10.500	168
X2 (Political Stability)	0.01	0.560	168
X3 (Control of Corruption)	-0.13	0.464	168
X4 (Inflation)	3.72	6.955	168

Source: Calculations by the authors using SPSS software (2025)

According to Table 3, we observe that there are 168 observations, with each variable presenting its mean value and standard deviation. It is important to highlight the

third variable, control of corruption, which has a negative average that differs from the means of the other variables.

Figure 6: Graphical Presentation of the Histogram

Source: Authors' calculations using SPSS software (2025)

According to the graphical presentation of the histogram, we can conclude that the data used in the study follow a normal distribution, as the histogram curve has a symmetrical (mesokurtic) shape and tends to be centered. Based on the probability plot, we can observe a

strong linear relationship between GDP and the independent variables (quality of institutions, political stability, control of corruption, and inflation), as the data points are positioned very close to the regression line. The following presents the econometric model with the coefficients obtained from the coefficients table:

$$\begin{aligned}
 Y &= \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + e \\
 \ln Y (\text{GDP}) &= \beta_0 + \beta (\text{Institutional Quality}) + \beta (\text{Corruption Control}) \\
 &\quad + \beta (\text{Political Stability}) + \beta (\text{Inflation}) + e \\
 \ln Y &= 19.713 + 0.077x_1 - 1.111x_2 + 0.432x_3 + 0.054x_4 + 0.636 \\
 e &= 100 - R^2 \\
 e &= 100 - 36.4 = 63.6\% \text{ or } 0.636
 \end{aligned}$$

Table 4: Coefficient Analysis of the Variables Included in the Econometric Model

Coefficients ^a	B	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	19.713	0.878	-	22.451	0.000
Institutional Quality	0.077	0.013	0.571	5.716	0.000
Political Stability	-1.111	0.205	-0.441	-5.424	0.000
Corruption Control	0.432	0.295	0.142	1.463	0.145
Inflation	0.054	0.014	0.265	3.895	0.000

Source: Authors' calculations using SPSS (2025)

β_0 – If all other factors remain constant (X_1, X_2, X_3, X_4), then GDP will be 19.713 units. This assumption is valid because the p-value = 0.000 < 0.05, indicating statistical significance.

β_1 – If institutional quality increases by 1 unit, while keeping the variables political stability, control of corruption, and inflation constant, then GDP will increase by 0.077 units. This assumption is statistically valid because the p-value = 0.000 < 0.05, meaning it falls within the range of statistical significance. Logically, we can say that institutional quality positively influences foreign direct investment (FDI) and trade openness, both of which enhance economic growth. However, improving institutional quality might also mitigate the competition created by trade openness in the sectors where FDIs operate, to optimize their spillover effect.

β_2 – If political stability increases by 1 unit, holding the other variables constant (institutional quality, corruption control, and inflation), then GDP will decrease by -1.111 units. This result is statistically valid because the p-value = 0.000 < 0.05. This suggests that the more frequently governments change in a country, the more unstable it becomes, and the lower the economic growth it may experience.

β_3 – If corruption control increases by 1 unit, keeping the variables institutional quality, political stability, and inflation constant, then GDP will increase by 0.432 units. However, this hypothesis is not statistically valid, as the p-value = 0.145 > 0.05, which means it falls outside the confidence interval. From an economic perspective, we can say that when a country manages to keep corruption under control, it contributes to economic stability, because resources are managed more efficiently, funds are distributed more fairly, investments are made where needed, new investors are attracted, and the business climate improves ultimately boosting economic growth through this chain effect.

β_4 – If inflation increases by 1 unit, keeping institutional quality, political stability, and corruption control constant, then GDP will increase by 0.054 units. This assumption is statistically valid as p-value = 0.000 < 0.05. However, studies show that 6 to 12 months after inflation exceeds 15%, real effects on the economy begin to be felt because people have lower income and have spent their savings, which impacts businesses. This means that businesses will face lower sales, reduced cash flow, and may even go bankrupt. Companies heavily burdened with debt are more likely to collapse, which in turn negatively affects economic growth.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.603	0.364	0.348	1.13922	1.412

Note: a. Predictors: (Constant), X4 (Inflation), X3 (Control of Corruption), X2 (Political Stability), X1 (Institutional Quality)

Source: Authors' calculations in SPSS (2025)

Correlation Coefficient R = 0.603 or 60.3%

The correlation coefficient R = 0.603 indicates a moderate positive relationship between economic growth and the explanatory variables such as institutional quality, political stability, control of corruption, and inflation in the countries of Southeast Europe. This result suggests that improvements in sustainable institutions and macroeconomic stability are generally associated with higher economic growth, supporting the important role of institutional factors in economic development. However, the moderate strength of the relationship indicates that economic growth is also influenced by other structural factors; therefore, further econometric analyses are required to confirm the stability and reliability of this relationship.

Coefficient of Determination R² = 0.364 or 36.4%

The coefficient of determination R² = 0.364 indicates that approximately 36.4% of the variation in economic growth in Southeast European countries is explained by

institutional quality, political stability, control of corruption, and inflation included in the model. This relatively limited explanatory power suggests that, although sustainable institutions play an important role in promoting economic growth, they are not the only determinants of economic performance in the region. Economic growth is also influenced by other structural and macroeconomic factors not captured in the model, such as investment, human capital, trade openness, and fiscal conditions. Therefore, the result should be interpreted as evidence of a meaningful but partial contribution of institutional factors to economic growth.

Autocorrelation

According to the Durbin-Watson statistical results, we can conclude that this econometric model exhibits a moderately positive autocorrelation (Durbin-Watson = 1.41), since the value is quite close to 0. The standard errors of this econometric model are very small. However, this value is not within the preferred range for the DW coefficient, which is between 1.5 and 2.5.

Table 6: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
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Regression	120.868	4	30.217	23.283	0.000
Residual	211.545	163	1.298		
Total	332.413	167			

Note: a. Dependent Variable: lnY (GDP); b. Predictors: (Constant), X4 (Inflation), X3 (Control of Corruption), X2 (Political Stability), X1 (Quality of Institutions)

Source: Authors' conclusions based on SPSS analysis (2025)

Based on the overall significance of the ANOVA test, we conclude that the model is generally valid because the significance value is less than the threshold ($P\text{-value} = 0.000 < 0.05$).

Another important aspect to comment on is hypothesis testing using the T-test and F-test, where the main condition is that the calculated t-value (tf) must be greater

than the critical t-value (tkr). Based on calculations, the critical t-value is $t_{kr} = 1.973$ and the critical F-value is $f_{kr} = 2.655$. Therefore, the comparison will be made with the tf values for the parameters β_1 , β_2 , β_3 , and β_4 .

T- test: Actual value <Critical value » H0 ✓, H1 x	
Actual value >Critical value » H0 x, H1 ✓	
tf	tkr
$\beta_1 = 5.716 > 1.973$	H0 x, H1 ✓
$\beta_2 = -5.424 < 1.973$	H0 ✓, H2 x
$\beta_3 = 1.463 < 1.973$	H0 ✓, H1 x
$\beta_4 = 3.895 > 1.973$	H0 x, H1 ✓

X1 – Based on the T-test results, we observe that the calculated value (5.716) is greater than the critical value (1.973), therefore the null hypothesis is rejected, and the alternative hypothesis H1 is accepted. This means that the quality of institutions affects the economic growth of the countries in Southeastern Europe.

X2 – Based on the T-test results, we observe that the calculated value (-5.424) is less than the critical value (1.973), therefore the null hypothesis is accepted, and the alternative hypothesis H2 is rejected. This means that political stability does not affect the economic growth of the countries in Southeastern Europe.

X3 – Based on the T-test results, we observe that the calculated value (1.463) is less than the critical value (1.973), therefore the null hypothesis is accepted, and the alternative hypothesis H3 is rejected. This means that control of corruption does not affect the economic growth of the countries in Southeastern Europe.

X4 – Based on the T-test results, we observe that the calculated value (3.895) is greater than the critical value (1.973), therefore the null hypothesis is rejected, and the alternative hypothesis H4 is accepted. This means that inflation affects the economic growth of the countries in Southeastern Europe.

F- test:	
Actual value <Critical value » H0 ✓, H1 x	
Actual value >Critical value » H0 x, H1 ✓	
Ff > Fkr	
$23.283 > 3.05$	

Based on the results of the Fisher test, we observe that the calculated value (23.283) is greater than the critical value (3.05), therefore the null hypothesis is rejected and the alternative hypothesis H1 is accepted, which means that the model is significant.

Table 7: Panel Effects Model – Coefficients

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound
(Constant)	23.022	0.222	-	103.653	<.001	22.573	23.471
Albania	0.689	0.116	0.202	5.916	<.001	0.453	0.924
Croatia	1.940	0.177	0.569	10.988	<.001	1.583	2.296
Montenegro	3.714	0.200	1.090	18.579	<.001	3.310	4.118
Quality of Institutions	-0.004	0.005	-0.030	-0.821	0.417	-0.015	0.006
Political Stability	0.086	0.092	0.026	0.930	0.358	-0.100	0.271
Control of Corruption	0.269	0.171	0.066	1.577	0.123	-0.076	0.615

Inflation	0.022	0.007	0.036	3.197	0.003	0.008	0.035
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Source: Authors' calculations in SPSS (2025)

$$Y_{it} = b_0 + b_1 D_{1i} + b_2 D_{2i} + b_3 D_{3i} + b_4 X_{1t} + b_5 X_{2t} + b_6 X_{3t} + b_7 X_{4t} + e_{it}$$

$$Y_{it} = 23.022 + 0.689 D_{1i} + 1.940 D_{2i} + 3.714 D_{3i} - 0.004 X_{1t} + 0.086 X_{2t} + 0.269 X_{3t} + 0.022 X_{4t} + 0.005$$

$$e = 100\% - 99.5 = 0.5\% \text{ or } 0.005$$

$\beta_0 = 23.022\%$ is the average GDP in Kosovo*. (P-value = $0.001 < 0.05$).

β_1 – This regression coefficient represents the difference in GDP between Albania and Kosovo*. In Albania, GDP increases by 0.689% compared to Kosovo's* GDP. The average GDP in Albania is: $23.022\% + 0.689\% = 23.711\%$. (P-value = $0.001 < 0.05$).

β_2 – This regression coefficient represents the difference in GDP between Croatia and Kosovo*. In Croatia, GDP increases by 1.940% compared to Kosovo's* GDP. The average GDP in Croatia is: $23.022\% + 1.940\% = 24.962\%$. (P-value = $0.001 < 0.05$).

β_3 – This regression coefficient represents the difference in GDP between Montenegro and Kosovo. In Montenegro, GDP increases by 3.714% compared to

Kosovo's* GDP. The average GDP in Montenegro is: $23.022\% + 3.714\% = 26.735\%$. (P-value = $0.001 < 0.05$).

β_4 – This regression coefficient represents the predicted value of GDP when institutional quality increases by 1 unit. (P-value = $0.417 > 0.05$).

β_5 – This regression coefficient represents the predicted value of GDP when political stability increases by 1 unit. (P-value = $0.358 > 0.05$).

β_6 – This regression coefficient represents the predicted value of GDP when control of corruption increases by 1 unit. (P-value = $0.123 > 0.05$).

β_7 – If inflation increases by 1 unit while keeping all other factors constant, GDP increases by 0.022 units. (P-value = $0.003 < 0.05$).

5. DISCUSSION

The results of this study clearly demonstrate the importance of institutional quality in promoting economic growth in Southeast European countries. Through econometric and statistical analyses, a significant and positive relationship was confirmed between institutional quality and GDP growth. The coefficient for this variable was positive and statistically significant, indicating that improvements in institutional quality contribute meaningfully to economic development. This finding aligns with existing literature, which emphasizes that the effective functioning of institutions is essential for creating a stable and predictable investment environment, as well as for the efficient allocation of resources in the economy.

Furthermore, inflation was also found to have a positive impact on economic growth, although this impact is more complex and may reflect increased aggregate demand during certain periods. However, it is important to highlight that this positive effect is valid only within a controlled range since high and uncontrolled inflation can seriously harm consumers' purchasing power and overall economic stability. This is especially true for transition economies, where supervisory institutions and monetary stability are still under development.

Although political stability is generally seen as a driver of economic development, in this analysis it showed a negative relationship with GDP. While this result is statistically significant, it must be interpreted with caution. In some cases, countries undergoing political reforms or institutional transitions may experience short-term uncertainty, which reduces economic activity. Nevertheless, this does not imply that political stability is unimportant on the contrary, in the long run, it is essential for sustainable economic growth. This result may reflect

the complexity of measuring political stability and the need for more detailed indicators to accurately capture this dimension.

Contrary to theoretical expectations, corruption control did not show a statistically significant impact in the model. This may be explained by the fact that in the analyzed countries, anti-corruption reforms are still ongoing and often occur in a fragmented or inconsistent manner. Another possible explanation is that the positive effects of corruption control take time to materialize and reflect in productivity growth and investor confidence. In some cases, strict anti-corruption measures may temporarily slow down economic activity, especially in sectors where informal practices are widespread.

The coefficient of determination (R^2) of 36.4% suggests that the model used in this study explains only a part of the variation in GDP. This indicates that while the included variables have an impact, there are other important factors not captured in the current model such as private investment, international trade, technology, or human capital. Therefore, for a more comprehensive understanding of the drivers of economic growth, it is recommended that future research expand the model.

Lastly, all statistical tests (ANOVA, t-test, F-test) confirmed the validity of the model and the significance of some of the selected variables. The Durbin-Watson value of 1.41 indicates a slight positive autocorrelation, though not severe enough to compromise the model's reliability.

6. CONCLUSION

This study highlights the essential role of institutional quality in driving economic growth in Southeast European countries. The results of the econometric analysis show a strong and significant relationship between well-functioning institutions and GDP growth, confirming that stable, transparent institutions capable of upholding the rule of law are key factors for sustainable economic development. Additionally, it was observed that controlled inflation can have a positive impact on economic growth, often reflecting increased aggregate demand. However, high and uncontrolled inflation remains a risk that must be carefully managed by the relevant institutions. Political stability, although theoretically expected to have a positive effect, showed a negative relationship

with GDP in this analysis. This may be due to temporary uncertainty during periods of reform or transition. Similarly, corruption control was not found to be statistically significant, suggesting that its impact takes longer to manifest in the economy particularly in contexts where reforms are fragmented or inconsistent. Overall, the model explains a considerable portion of the variation in GDP but also emphasizes the need to include additional variables in future studies to gain a more comprehensive understanding. Therefore, policies aimed at strengthening institutions, improving the political climate, and effectively managing inflation represent key foundations for long-term and sustainable economic growth in the region.

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HOW DOES FINANCIAL INCLUSION IMPACT ENTREPRENEURSHIP IN DEVELOPING COUNTRIES?

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Abstract

This paper aims to investigate the relationship between financial inclusion and entrepreneurship in a developing country such as Albania. Entrepreneurial activity is one of the key drivers of economic development, a catalyst of innovation and new job creation, especially in developing countries. On the other hand, financial inclusion has received a lot of attention in recent years, and it is included in every government's agenda, aiming to build inclusive financial systems. The financial system generally impacts the level of entrepreneurship; however, there is a gap in assessing the relationship between financial inclusion and entrepreneurship. This study employs a multiple regression analysis with secondary data for 14 years (2010 – 2023). The business growth rate is used as an indicator to express the entrepreneurial activity (dependent variable), and commercial bank branches (per 100,000 adults) are used as a proxy to express financial inclusion (independent variable). To increase the model's accuracy, several control variables have been included: regulatory quality, domestic financing, and GDP growth rate. The output of the regression analysis supports the positive relationship between financial inclusion and entrepreneurship growth in Albania. Meanwhile, regulatory quality and domestic financing negatively affect entrepreneurial activity, and GDP has no statistically significant effect.

Keywords: financial inclusion, entrepreneurship, developing country

1. INTRODUCTION

Entrepreneurial activity is one of the key drivers of economic development, a catalyst for innovation and new job creation, especially in developing countries (Wong, et al., 2005). Numerous studies have explored the various factors that influence the creation of new businesses, highlighting the multidimensionality of this process that varies across different sectors, countries, gender, levels of education, etc. The financial system is one of the factors that generally impacts the level of entrepreneurship; however, there is a gap in research in assessing the relationship between financial inclusion and entrepreneurship.

On the other hand, financial inclusion has received much attention in recent years and is included in every government's agenda, aiming to build inclusive financial systems. It aims to provide equal financial opportunities for all by ensuring access to financial services for all people and economic agents, including vulnerable groups, the poor and other disadvantaged segments of the population (Omar & Inaba, 2020; Jiang, et. al., 2019). Although terms such as access to finance, inclusive finance, etc. have been used interchangeably in literature to refer to the act of providing equal opportunities in formal financial services, such as making payments, saving, borrowing, investing, and managing risk, 'financial inclusion' is a more comprehensive and up-to-date term.

This paper aims to investigate the relationship between financial inclusion and entrepreneurship in a developing country such as Albania. It brings valuable research contributions for several reasons: First, limited access to

finance is considered one of the key barriers to businesses in the Western Balkans. This is particularly true for SMEs, which are more fragile to the lack of capital, leading to low levels of business growth and productivity (F4D, 2024; Moder & Bonifai, 2017). On the other hand, developing countries face difficulties in promoting an entrepreneurial culture, often more evident for women entrepreneurs (Ajide, 2020).

Second, Albania lacks current scientific evidence linking these two fields of study, although individual studies in each field may exist. Third, according to the latest Global Financial Index data (2021), only 44% of Albanians over 15 years old have an account in a financial institution or a mobile money account. Other non-EU countries in the region range from 58% (Kosovo) to 89% (Serbia). Apostu et.al. (2022) found that Balkan countries have different stages of financial inclusion depending on financial policies, internet usage by population and openness to innovative products. The average global index for developing countries is 71%, which shows that Albania has a very low level of this indicator. Therefore, it is important to understand how this level of financial inclusion affects entrepreneurial activity.

The paper is structured first to summarize the existing theories and evidence that directly relate to the focus of this research paper. Section "Methodology" gives details on the methods, data, sources of information and the econometric procedures followed to address the hypothesis of the study. Section "Results and discussion" highlights the discussion of the key findings. Conclusions and suggestions for future research are summarized in the last section.

2. LITERATURE REVIEW

The primary impact of financial inclusion is the enabling of social inclusion, poverty reduction, income inequality avoidance, and improvement of the general well-being of the population. Numerous studies have demonstrated this impact, especially in developing countries (Omar & Inaba, 2020; Jiang, et. al., 2019; Park & Mercado, 2018). Among several categories of impact of financial inclusion, Mishra et. al (2024) put a special emphasis on entrepreneurship promotion and new job creation.

Fan & Zhang (2017) also found that one important aspect of financial inclusion is to foster the creation of new businesses, especially in sectors where entry barriers are low. In their early stages, new ventures often encounter significant financial challenges, which can lead to a high failure rate among them. In this regard, access to finance is a key element that affects the success or failure of businesses, particularly in the post-Covid-19 period, which further deepened the problems of business financing. This becomes even more difficult for social entrepreneurs and entrepreneurs from disadvantaged populations (OECD/European Union, 2022). On the other hand, young entrepreneurs often face financial exclusion because they feel discriminated against in obtaining a loan, creating partnerships, and benefiting from start-up financing schemes (OECD/EU, 2023).

Entrepreneurship is influenced by the level of banking sector openness, especially in countries with developed financial markets, high economic growth and stable business environment (Ghosh, 2022). Banking system is considered the main promoter of financial inclusion, along with increased access to information technology and improved mobile infrastructure (Mishra et. al, 2024). But when referring to new entrepreneurs, most of them prefer to be financed from internal sources of capital, avoiding the financial sector to borrow (ECB, 2025) due to bureaucracy, lack of collateral, lack of experience, and low reliability (OECD, 2025; Lassébie et al., 2019).

Therefore, bank financing is not the only relevant source of financing that start-ups and SMEs should con-

sider. These businesses should also consider other alternative and innovative types of financing, such as corporate bonds, mezzanine finance, etc. (Nemoto & Koreen, 2019). However, this requires increased awareness and information about financing methods, as well as how they can be used and evaluated by businesses. At the global level, 24% of the population still do not have a bank account according to The Global Findex Database 2021.

Recent studies on entrepreneurship and financial inclusion have put a special focus on gender context. According to the OECD/EU (2019) report, women entrepreneurs in the European Union are 25% less likely to be financed by banks compared with men. Even in cases of bank financing, they are disadvantaged in terms of interest rates, amount of financing, and payment terms (Lassébie et al., 2019; Thébaud & Sharkey, 2016). Goel and Madan (2019), Fareed et al. (2017) have shown that women are empowered and tend to create new businesses when their level of social inclusion increases. Also, Fareed et. al. (2017) concluded that financial inclusion is directly related to women entrepreneurship, especially in the informal sector.

The two main mechanisms that can reduce the gap between access to finance and entrepreneurship are fintech and financial literacy (OECD/EU, 2022; Nemoto & Koreen, 2019). Digitalization can also help in increasing the competitiveness of businesses (Bianchini & Sancho, 2025). At the same time, education can be a factor that simultaneously promotes entrepreneurship. Social inclusion without the necessary financial education is not effective (WB, 2017). Nowadays, it is not enough to improve financial education in the traditional sense of increasing the knowledge of the population, but the emphasis is placed on digital financial literacy. This also constitutes a new challenge, especially for developing countries, the rural population, older people and other groups for whom access to technology is even lower. Surprising results were achieved in the study Pham et. al. (2025), according to which high levels of human capital development reduce the positive effect that financial inclusion has on entrepreneurship.

3. METHODOLOGY

This study employs a multiple regression analysis using secondary data for 14 years (2010–2023) to examine the relationship between financial inclusion and entrepreneurship in Albania, a developing country with an upper-middle-income economy. Based on the literature review and the country's development characteristics, the following variables are used in the quantitative analysis: Dependent variable:

- Entrepreneurial activity (EA): The business growth rate is used as an indicator of entrepreneurial activity. This indicator reflects the dynamics of new business formation and is calculated as the rate of change in the total number of businesses (SMEs) from one year to the previous year. Data is obtained

from the database of the National Institute of Statistics in Albania, INSTAT.

Independent variables:

- Financial inclusion (FI): Commercial bank branches (per 100,000 adults) are used as a proxy to express financial inclusion. Annual data for the specified period is retrieved from the World Bank Development Indicators. Even though it is a widely used indicator in similar previous studies, it may not reflect the complete level of financial inclusion in the country. But due to data constraints in the case of Albania (lack of a financial inclusion index, lack of annual data on mobile financial transactions, etc.), it can be considered a relevant indicator.

Based on the previous literature, it is expected that financial inclusion positively impacts the development of entrepreneurship in Albania.

Control variables: Several control variables (institutional and economic) have been included in the analysis to increase the accuracy of the model:

- **Regulatory quality (RQ):** This variable estimates the perception of the government's ability to design, develop, and implement policies to support business development. Data is obtained from the Worldwide Governance Indicators. Each country is assigned a score ranging from -2.5 to 2.5. Numerous studies (Aparicio et al., 2024; Smallbone & Welter, 2001; Charles et al., 2018; Henrekson & Sanandaji, 2010) highlight the significant impact of the institutional framework on entrepreneurial activity. The theories explaining the relationship between these factors are complex, and the findings often lead to differing conclusions. While a country characterized by fragile institutions or frequent changes in laws, rules, and norms may be viewed as high-risk, potentially increasing business costs, these same challenges

can also create opportunities for entrepreneurs to enter the market more easily (Hu, et. al., 2025)

- **Domestic financing (DF)** – This indicator reflects the availability of financing from domestic financial institutions to the private sector, and it is expressed as a percentage of GDP. Data is retrieved from the World Bank Development Indicators. The more financing opportunities to businesses, the higher the business growth rate, so a positive relationship is expected between this control variable and the dependent variable.
- **GDP growth rate (GDP)** – This indicator expresses the economic development level of a country, which influences the business environment in almost all aspects. Developed countries offer more opportunities and facilities for new business formation; therefore, the GDP growth rate is expected to have a positive impact on entrepreneurial activity.

The regression model has been tested for linearity, homoscedasticity, multicollinearity, autocorrelation and normality of residuals.

4. RESULTS AND DISCUSSION

This study takes into consideration a set of indicators that may impact entrepreneurship in Albania, emphasizing the role of financial inclusion. First, descriptive statistics have been computed, followed by the execution of the regression analysis.

The average growth rate of businesses in Albania, which was used as an indicator of entrepreneurial activity, was 3.5% from 2010 to 2023. This activity has experienced several fluctuations, with the worst value noted during the pandemic period, when a significant number of businesses were closed and there were no incentives for creating new ones. Before the pandemic period, the average growth rate was 5.90%, experiencing its peak of 22.7% in 2015. Over the last two years, the landscape of business formation has seen significant improvement and is exhibiting a favorable trend.

The average number of commercial bank branches per 100,000 adults for the period was 20.5. Again, the situation before 2020 was better than the last years in the studied period, but it is significantly lower compared to the region or other developed countries. The difficult economic situation during the pandemic year is also reflected in the GDP growth, which achieved negative values (-3.3%). Nevertheless, the macroeconomic environment started to improve in the following years.

Financing from financial institutions varied between 32% and 41% of GDP, showing a downward trend since 2015, except for 2020 when it increased due to specific measures implemented to assist businesses in overcoming liquidity challenges. Regarding the perception of the regulatory quality for the reported period, it was almost neutral, neither weak nor strong (average value of the index: 0.22).

Table 1: Descriptive statistics

	EA	FI	DF	GDP	RQ
Mean	0.035409	20.5147	36.79743	2.877387	0.223549
Standard Error	0.016893	0.718132	0.80137	0.708966	0.011561
Median	0.024059	21.04981	36.87487	2.930193	0.227625
Standard Deviation	0.063207	2.687005	2.998451	2.652709	0.043258
Sample Variance	0.003995	7.219994	8.990707	7.036863	0.001871
Range	0.258109	7.363535	8.764245	12.28327	0.124619
Minimum	-0.03127	16.39847	32.38944	-3.31372	0.159354
Maximum	0.226838	23.76201	41.15369	8.969553	0.283973

Source: Authors' calculations

The output of the regression analysis supports the positive relationship between financial inclusion and entrepreneurship growth, which aligns with the findings of

previous studies in other countries, as identified in the literature review section. The result is significant in the

case of Albania, which faces low levels of financial inclusion, because it serves as a signal for policymakers and all involved stakeholders to design and develop policies that improve financial infrastructure, system, and all components for ensuring inclusive finance. This is

also important considering the need for compliance with the Sustainable Development Goals, which are a governmental, economic, and social priority.

The results of the regression analysis are summarized in Table 2.

Table 2: Multiple regression output

Dependent Variable: EA				
Method: Least Squares				
Sample: 2010 2023				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FI	0.016461	0.005799	2.838660	0.0194*
RQ	-1.333636	0.406324	-3.282196	0.0095*
DF	-0.026519	0.011584	-2.289208	0.0478*
GDP	0.008075	0.029166	0.276848	0.7881
C	-0.008280	0.086626	-0.095583	0.9259
R-squared	0.723352	Mean dependent var	0.035409	
Adjusted R-squared	0.600397	S.D. dependent var	0.063207	
S.E. of regression	0.039956	Akaike info criterion	-3.329621	
F-statistic	5.883080	Durbin-Watson stat	1.911366	
Prob(F-statistic)	0.013109			

Note: *p<0.05

Source: Author's calculation in Eviews

As can be seen in the Table 2, for the other variables included in the study, there are mixed findings. Regulatory quality negatively impacts entrepreneurial activity in Albania. Even though literature suggests a controversial relationship between the two variables, it seems that the enforcement of the regulatory framework may bring bureaucracy and demotivation for new business creation. This finding is not surprising in the case of Albania because of the high level of informality and corruption. On the other hand, the impact of domestic financing is surprising, because it is generally expected that the higher the access to funds, the more businesses develop. However, the negative relationship may be related to the fact that financing from the banking sector is oriented toward large businesses, while SMEs are more disadvantaged in obtaining funds due to higher perceived risk, lack of collateral, etc. This means that even though the total lending to the private sector increases, the creation of new businesses is difficult, as this financing is oriented towards investments or projects of large businesses. It should be emphasized that our study considers only SMEs and excludes large businesses. Moreover, the impact of GDP growth on new business formation resulted to be statistically insignificant. In

nearly all prior studies, the stage of economic development has a direct impact on entrepreneurial activity. In the case of Albania, this suggests that entrepreneurs are not motivated to start businesses by the prevailing economic conditions. Instead, other factors may play a more influential role in their decision-making.

The regression model is followed by a series of diagnostic tests, which confirm the appropriateness of the analysis. More specifically, the results of the tests confirm that:

- The linear hypothesis of the regression model is appropriate (Ramsey Reset Test);
- The model is homoscedastic (Breusch-Pagan-Godfrey Test);
- The model does not suffer from multicollinearity (Variance Inflation Factors);
- The residuals have normal distributions (Jarque-Bera Test)
- There is no serial correlation in the errors of the regression model (Breusch-Godfrey Serial Correlation LM Test).

A summary of the diagnostic tests is part of Appendix A.1.

5. CONCLUSION

This study highlights a series of issues that policymakers can address regarding the need to enhance the financial inclusion framework and overcome the challenges associated with fostering entrepreneurship. The study

reveals that financial inclusion enables and facilitates entrepreneurship. Therefore, creating effective policies for financial inclusion and establishing an enabling environment, along with offering equal opportunities for

young people, women, the unemployed, and marginalized individuals to start and develop their businesses, can lead to inclusive entrepreneurship.

Developing countries are generally characterized by the fragile development of SMEs, which face a lack of capital, leading to low levels of business growth and productivity. Although efforts have been made to improve the business environment, there remain several challenges and difficulties for new businesses. Albania currently faces low levels of financial inclusion, which may affect entrepreneurship in the country. In addition, the study reveals that special attention should be paid to other aspects that influence entrepreneurial activity, such as regulatory quality or lending from financial institutions.

Studies related to financial inclusion in Albania are limited, indicating that this is a new field that needs to be further explored to generate valid conclusions. Some proposals for future research are:

Establishing a financial inclusion index that is comprehensive and continuous, i.e. taking into account more country-specific factors, as current indices tend to be more general and apply the same factors for different countries.

Identifying the barriers to financial inclusion at the regional level, since financial dynamics generally affect a wider market, such as the Balkan region.

Conducting studies based on primary data using questionnaires or interviews with businesses, providing a more direct view of the effect that financial inclusion has on concrete business development, etc.

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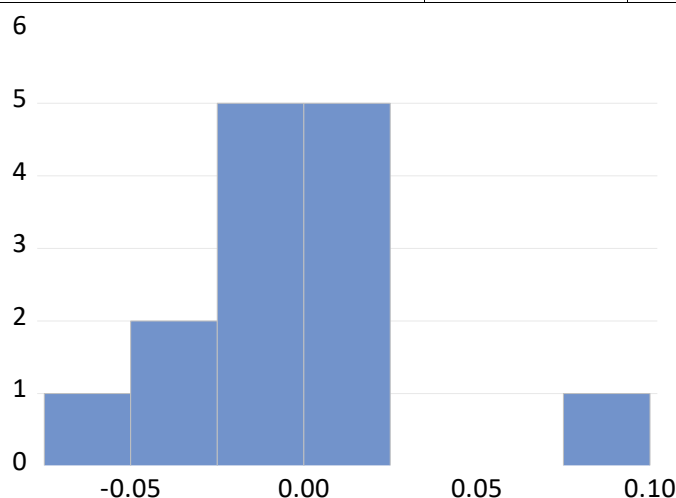
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APPENDIX A.1.

Ramsey RESET Test	Value	df	Probability
t-statistic	2.193861	8	0.0596
F-statistic	4.813025	(1, 8)	0.0596
Likelihood ratio	6.594290	1	0.0102

Variance Inflation Factors	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
FI	3.36E-05	126.0767	1.976936
RQ	0.165100	74.86798	2.515637
DF	0.000134	1.171958	1.150254
GDP	0.000851	2.032739	2.000554
C	0.007504	65.80501	NA



Series: Residuals	
Sample 2010 2023	
Observations 14	
Mean	-6.29e-17
Median	-0.000802
Maximum	0.083384
Minimum	-0.062863
Std. Dev.	0.033245
Skewness	0.640769
Kurtosis	4.480677
Jarque-Bera	2.236933
Probability	0.326780

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.891204	Prob. F(2,7)	0.4521
Obs*R-squared	2.841328	Prob. Chi-Square(2)	0.2416

Heteroskedasticity Test: Breusch-Pagan-Godfrey		
F-statistic	2.765087 0.0945	Prob. F(4,9)
Obs*R-squared	7.718953 0.1024	Prob. Chi-Square(4)
Scaled explained SS	5.551636 0.2352	Prob. Chi-Square(4)

RETHINKING MIGRATION POLICY: ALIGNING WESTERN BALKAN AND EUROPEAN UNION STRATEGIES WITH PAKISTANI MIGRATION DYNAMICS

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Abstract

Pakistan, with a population of 247 million and a land area of 881,640 km², faces persistent structural socio-economic challenges, including high unemployment, unequal land distribution, and the absence of a national digital employment registry. These factors contribute to growing irregular migration to Europe, particularly via the Western Balkan route. This study examines the structural drivers of Pakistani migration to Europe and evaluates the effectiveness of European Union (EU) and Western Balkan migration policies through a policy-oriented qualitative analysis of secondary sources from 2020 to 2025. Findings indicate that 42,956 Pakistani irregular migrants were detected on the Western Balkan route during this period, while asylum recognition rates remained low (12–14%). Existing readmission agreements have proven insufficient, focusing on returns without addressing underlying structural drivers. Underutilized land resources and weak labor market governance in Pakistan reinforce migration pressures, while EU migration policies remain predominantly security-oriented and poorly aligned with labor demand. The study advocates for a coordinated framework combining digital labor registries, land reform, structured legal migration pathways, and active participation of Western Balkan states. Aligning domestic reforms in Pakistan with European labor needs could foster sustainable, ethical, and mutually beneficial migration governance.

Keywords: irregular migration; Western Balkan route; Pakistan–European Union migration policy

1. INTRODUCTION

In recent years, the migration of Pakistani nationals to Europe, particularly through irregular channels, has attracted increasing attention from policymakers and migration scholars. Between 2020 and 2025, the number of Pakistani nationals attempting to reach the European Union via the Western Balkan route increased significantly. This study explores the structural drivers of such irregular migration and evaluates the effectiveness of EU and Western Balkan migration policies using a policy-oriented qualitative analysis of secondary sources from 2020–2025.

Migration pressure from Pakistan is largely driven by structural push factors, including unequal land ownership, high unemployment, and the absence of a real-time digital employment registry. Pakistan's population of 247.5 million resides on 881,640 km² of land, yet land resources are underutilized due to severe inequality: 2% of landowners control 45% of farmland, while 98% of households share the remaining 55% (Khan & Borisova, 2024). The lack of formal land use planning has also contributed to urban sprawl, reducing arable land for productive agriculture and job creation.

Annual employment generation in Pakistan is insufficient to meet demand. The Planning Commission estimates a need for 1.5 million new jobs annually, though actual requirements are likely higher due to unregistered labor (Khan, 2024). In the absence of a national digital registry of unemployed individuals, policymakers cannot implement targeted employment programs, leaving many potential workers vulnerable to exploitation by smuggling networks. Engineer Kamran Khan (2024) proposed a real-time, age-friendly digital employment registry at an international conference in Russia as a tool to address this gap.

The combination of structural unemployment, land underutilization, and the absence of formal tracking mechanisms has contributed to the rise of irregular migration. Pakistani nationals often pay over 3 million PKR to human smugglers for a perilous journey through the Western Balkans, which includes Bosnia and Herzegovina, Serbia, Albania, and North Macedonia, before reaching EU destinations such as Italy, Germany, and France.

Despite multiple readmission agreements between the EU and Pakistan, these have largely failed to reduce irregular migration, as they focus on returns rather than addressing root causes or facilitating reintegration (Koser, 2022). Simultaneously, the EU faces labor shortages in sectors such as agriculture, construction, and eldercare (OECD, 2024). Current EU migration policies are security-focused, emphasizing border control rather than strategic cooperation with labor-exporting countries like Pakistan.

This paper addresses the following central research question: “How can the European Union and Western Balkan countries reshape migration policies to reduce irregular migration from Pakistan while aligning labor needs with Pakistan’s human resource potential?” Secondary contextual factors, including land reform, remittance flows, and employment digitalization, are examined to understand their contribution to migration dynamics.

By integrating policy-oriented qualitative analysis with secondary data from international organizations, this study provides actionable insights for a collaborative migration framework that aligns EU labor demand with Pakistan’s domestic reforms, emphasizing sustainable employment, ethical migration pathways, and strategic inclusion of Western Balkan states.

2. LITERATURE REVIEW

Migration is commonly analysed through the push-pull framework, which examines the interaction between socio-economic pressures in sending countries and perceived opportunities in receiving countries (Lee, 1966). Push factors in the context of Pakistan include high unemployment, unequal land distribution, limited access to formal employment, low social mobility, and absence of digital labor tracking mechanisms (Khan & Borisova, 2024; Khan, 2024). These conditions reduce local economic opportunities, incentivizing individuals to seek alternative livelihoods abroad. Pull factors in Europe include labor shortages in specific sectors such as agriculture, construction, healthcare, and eldercare, higher wages, social security systems, and established Pakistani diaspora networks, which provide social capital, information, and support for incoming migrants (IOM, 2024; Eurostat, 2025).

Beyond the classical push-pull paradigm, contemporary migration scholarship emphasizes that migration is influenced by structural governance failures, demographic pressures, and geopolitical factors. Castles, de Haas, and Miller (2014) argue that migration is not merely a response to individual economic incentives but is increasingly shaped by institutional weaknesses in sending countries, such as insufficient labor market regulation, inadequate infrastructure, and limited social protection. For Pakistan, the high concentration of land ownership, coupled with underutilization of agricultural resources, creates persistent structural inequalities that exacerbate migration pressures.

Furthermore, demographic imbalances—a rapidly growing young population with insufficient employment opportunities—amplify the intensity of migration flows. Regional geopolitical factors, including instability in neighboring countries, evolving EU migration policies, and border management strategies in the Western Balkans, interact with these structural dynamics, influencing both the scale and routes of migration (Triandafyllidou, 2021; UNHCR, 2024).

Irregular migration via the Western Balkan corridor exemplifies how these combined push and pull forces operate in practice. Porous borders, limited institutional capacity in transit states, and the existence of smuggling networks create pathways that circumvent formal migration channels, allowing structural drivers in Pakistan to manifest in sustained irregular flows (Benedek et al., 2023; Koser, 2022).

Finally, migration theory increasingly incorporates the concept of migration as a development process, highlighting that migration can be both a response to structural deficits and a potential driver of economic and social change in sending countries. For Pakistan, this implies that policy interventions targeting employment, land reform, and labor market digitalization could modulate the push factors, while coordinated EU migration strategies could optimize the pull dynamics, thereby fostering more ethical and sustainable migration frameworks (Castles, de Haas & Miller, 2014; Khan, 2024).

2.1. Pakistani Migration Trends (2020–2025)

Between 2020 and 2025, Pakistani migration to Europe exhibited both regular and irregular patterns, with a particularly notable increase in irregular crossings via the Western Balkan route. According to the International Organization for Migration (IOM, 2024), this surge was driven primarily by the combination of limited legal migration channels in Europe and high demand for low-skilled labor, particularly in sectors such as agriculture, construction, healthcare, and eldercare. The scarcity of legal opportunities encouraged many Pakistani nationals to resort to informal networks and human smuggling operations, despite the significant financial costs and physical risks involved.

Eurostat (2025) reports that during this period, only 12–14% of Pakistani asylum applicants in the EU were granted protection, leaving the vast majority of applicants in irregular status. This low acceptance rate indicates that the majority of Pakistani migrants entering Europe via the Western Balkan corridor were not primarily fleeing conflict or persecution, but rather responding to structural socio-economic pressures in Pakistan, including unemployment, limited access to land, and absence of formal employment tracking.

Irregular migration patterns also shifted in response to geopolitical and enforcement dynamics. Enhanced border security in the Central and Eastern Mediterranean routes, combined with more porous borders and less stringent asylum procedures in Western Balkan countries such as Serbia, Bosnia and Herzegovina, and Albania, created preferential pathways for irregular movement. These routes often involve prolonged stays in informal transit camps, where migrants face limited access to protection, inadequate basic services, and heightened vulnerability to exploitation (UNHCR, 2024; Benedek et al., 2023).

Additionally, migration trends were shaped by transnational networks and diaspora communities in EU countries. Established Pakistani communities in Italy, Germany, and France provided social capital, employment information, and logistical support, further reinforcing the pull factors of labor demand and perceived better living standards (Castles, de Haas & Miller, 2014). These networks also facilitate circular and secondary migration, enabling migrants initially arriving in one country to move onward to other EU states where labor or social conditions are perceived as more favorable.

The interaction between push factors in Pakistan—including structural unemployment, land inequality, and unregulated labor markets—and pull factors in Europe, such as labor shortages and supportive diaspora networks, illustrates that migration during this period cannot be understood solely as a product of individual choice or opportunism. Instead, it reflects broader structural, policy, and governance dynamics operating at the national, regional, and transnational levels. These trends highlight the urgent need for coordinated policy re-

sponses, encompassing legal migration channels, domestic labor market reforms in Pakistan, and enhanced institutional capacity in transit states along the Western Balkan corridor.

Finally, the period 2020–2025 underscores the cyclical nature of irregular migration: enforcement measures, such as deportations and readmission agreements, have limited effectiveness in the absence of structural solutions in Pakistan and coordinated labor mobility schemes in Europe. The persistence of irregular flows demonstrates that policy and structural factors, rather than individual opportunistic behavior alone, are central drivers of contemporary Pakistani migration to Europe.

2.2. The Western Balkan Route: A Fragile Corridor

The Western Balkan route has emerged as one of the primary pathways for irregular migration from Pakistan to Europe, largely due to relatively porous borders, limited institutional capacity, and insufficient infrastructure for managing migrant flows (UNHCR, 2024; Benedek et al., 2023). Transit states along this corridor—including Bosnia and Herzegovina, Serbia, Albania, and North Macedonia—play a critical role in shaping migration experiences, yet face substantial challenges in providing adequate reception, protection, and legal processing for migrants.

Pakistani irregular migrants frequently experience prolonged stays in informal or semi-formal transit camps, which are often overcrowded and lack essential services such as clean water, healthcare, sanitation, and access to legal counsel (UNHCR, 2024). In addition, limited access to asylum procedures means that many migrants are unable to submit formal claims or receive timely decisions, effectively leaving them in a state of legal limbo. Reports also indicate harassment and pushbacks by border authorities, creating heightened vulnerability to human trafficking and exploitation (Benedek et al., 2023).

The fragmented cooperation among Western Balkan states and the European Union further exacerbates these challenges. While the EU has invested in border control, surveillance, and readmission agreements, these efforts are not always harmonized across the corridor. Differences in national legislation, asylum procedures, and capacity for reception services lead to inconsistent enforcement and protection measures, leaving gaps in both humanitarian assistance and legal pathways (Triandafyllidou, 2021).

Moreover, the corridor is shaped by transnational smuggling networks, which exploit migrants' lack of legal channels, knowledge of the asylum system, and limited resources. Pakistani migrants often rely on these networks despite high financial costs—sometimes exceeding 3 million PKR per journey—and substantial risks to personal safety, including exposure to violence, exploitation, and unsafe travel conditions (IOM, 2024).

Institutional limitations are compounded by geopolitical and social factors. Western Balkan states are not primary destination countries, yet they bear significant responsibility for migrant management, often without

commensurate EU support for infrastructure, capacity building, or integration initiatives. Local populations may perceive migrants as a burden, which can lead to political tension and rising xenophobia, further complicating the humanitarian environment (Benedek et al., 2023).

Finally, the Western Balkan route exemplifies how structural, policy, and enforcement factors converge to shape irregular migration. Porous borders, limited institutional capacity, and inadequate coordination with the EU create an environment in which irregular migration persists, even as migrants face significant risks. Addressing these challenges requires not only enhanced legal pathways and protection mechanisms, but also capacity building, cross-border coordination, and regional inclusion of Western Balkan states as active stakeholders in migration governance.

2.3. European Union Migration Policy Post-2015

Following the 2015 refugee crisis, the European Union (EU) implemented a series of measures aimed at strengthening border control and deterring irregular migration, including the negotiation of readmission agreements, the externalisation of asylum processes, and financial and technical support to third countries for border management (Triandafyllidou, 2021). These policies were designed to reduce sudden influxes and enhance the EU's capacity to manage migration flows, particularly from conflict-affected regions. While these measures succeeded in limiting large-scale irregular arrivals in the short term, they largely failed to address structural push factors in origin countries, such as high unemployment, land inequality, and lack of labor market regulation in Pakistan (Khan & Borisova, 2024; IOM, 2024).

Fragmentation of EU migration governance remains a significant challenge. According to Eisele and Wiesbrock (2020), EU migration policy is weakened by the retention of key competences by member states, including control over visa issuance, labor recruitment, asylum reception, and integration programs. This fragmented approach results in inconsistent implementation of legal migration pathways, limits the EU's ability to coordinate ethical and effective migration policies, and contributes to the persistence of irregular migration from countries like Pakistan.

The European Union Pact on Migration and Asylum (2021) introduced measures to enhance coordination, including shared responsibility among member states, faster border procedures, and improved asylum processing mechanisms. However, implementation has been uneven due to differences in national capacities, political willingness, and institutional constraints (Triandafyllidou, 2021; European Commission, 2023). For example, while countries like Germany and Italy have piloted bilateral labor mobility schemes targeting specific sectors, other member states have focused primarily on enforcement and deportation, creating policy asymmetries across the EU.

Beyond enforcement, EU policies have increasingly incorporated the concept of external migration management, which includes funding border security and asylum systems in transit countries, such as Serbia, Albania, and Bosnia and Herzegovina. While this approach aims to contain irregular flows outside EU borders, it has raised ethical concerns regarding human rights protection, access to asylum, and the treatment of vulnerable migrants, particularly along the Western Balkan corridor (UNHCR, 2024; Benedek et al., 2023).

Additionally, labor market dynamics in the EU have not been systematically aligned with migration policy. Persistent low-skilled labor shortages in sectors such as agriculture, construction, tourism, and healthcare contrast sharply with the limited legal migration channels available to Pakistani workers, sustaining irregular migration and reliance on smuggling networks (OECD, 2024). Scholars argue that policy coherence between labor demand and migration pathways remains underdeveloped, reducing both the effectiveness and ethical legitimacy of EU migration governance (Castles, de Haas & Miller, 2014).

Finally, the EU's post-2015 migration policy illustrates the tension between security-oriented enforcement and development-oriented migration management. While border control, readmission agreements, and deportation measures have strengthened deterrence, they do not mitigate the structural push factors that drive migration from countries like Pakistan. A more holistic approach—incorporating legal labor migration pathways, development cooperation, and capacity building in transit states—has been proposed as a potential solution to reduce irregular flows while meeting EU labor needs (Triandafyllidou, 2021; Khan, 2024).

2.4. Pakistan's Structural Issues: Land and Labor Dynamics

Structural socio-economic conditions in Pakistan play a critical role in shaping migration pressures and contribute significantly to irregular migration flows to Europe. Land distribution in Pakistan is highly unequal, with only 2% of landowners controlling 45% of agricultural land, while 98% of households share the remaining 55% (Khan & Borisova, 2024). This concentration of land ownership restricts access to productive resources, reduces employment opportunities in rural areas, and limits the potential for smallholder agriculture to provide sustainable livelihoods. Moreover, land is not recognized as a national resource in the Pakistani Constitution, which constrains the government's ability to implement comprehensive land reforms, enforce equitable redistribution, or stimulate rural economic development. As a result, structural inequalities in land access create a persistent push factor for migration, particularly among youth seeking employment or alternative income sources.

In addition to land-related constraints, Pakistan suffers from chronic unemployment and underemployment, particularly among young adults. Official statistics report an unemployment rate of approximately 5.5% in

2024, but these figures underestimate the actual jobless population due to a large informal sector and unregistered labor (Planning Commission of Pakistan, 2024). The absence of a real-time, digital registry of unemployed individuals further impedes labor market planning and evidence-based policy-making, leaving millions of potential workers outside formal employment programs. This structural gap increases vulnerability to exploitation by human smuggling networks and encourages migration along irregular pathways, including the Western Balkan corridor.

To address these challenges, Kamran Khan (2024) proposed the development of a real-time, age-friendly digital unemployment registry at an international conference in Russia. Such a system would enable the government to identify labor supply and demand mismatches, target employment programs effectively, and facilitate structured engagement with foreign employers seeking skilled or semi-skilled workers. Integrating this registry with existing national databases, such as the National Database and Registration Authority (NADRA), could also improve transparency, reduce informal employment, and indirectly mitigate irregular migration pressures.

Furthermore, Pakistan's socio-economic landscape is shaped by high dependency on remittances, which reached \$34.1 billion in 2024 (IOM, 2024). While remittances provide essential income support, they are largely directed toward consumption rather than investment in productive sectors such as agriculture, small-scale industry, or entrepreneurship. This pattern reinforces structural unemployment and limits domestic job creation, indirectly sustaining the cycle of irregular migration.

Overall, land inequality, limited employment tracking, and underutilization of remittances form a structural triad that drives migration pressures. Addressing these systemic challenges is critical for reducing irregular migration and creating a more sustainable alignment between Pakistan's labor potential and Europe's labor demand. Policy interventions that combine land reforms, digital labor registries, and productive investment of remittances could not only strengthen domestic employment but also provide ethical, regulated pathways for labor migration, reducing dependence on irregular and risky routes.

2.5. Gaps in Readmission and Reintegration

Readmission agreements between Pakistan and EU member states—including the United Kingdom, Italy, and Germany—aim to return irregular migrants (European Commission, 2023). However, Koser (2022) argues that these agreements are largely ineffective due to a lack of comprehensive reintegration plans. Returned migrants often face the same socio-economic conditions that initially prompted migration, creating cycles of repeated irregular migration.

Punitive deportation mechanisms may further marginalize migrants, increasing their vulnerability to trafficking

and informal labor exploitation (Schuster, 2022). Consequently, policy solutions should focus on creating legal migration channels, strengthening capacity in origin

countries, and promoting structural socio-economic reforms rather than relying solely on enforcement measures.

3. METHODOLOGY

This study adopts a policy-oriented qualitative research design to explore the complex dynamics of Pakistani migration to Europe via the Western Balkan route. The research aims to understand not only the structural drivers of irregular migration but also the effectiveness of European Union (EU) and Western Balkan migration policies, and the gaps that hinder strategic reform. A qualitative approach was considered most appropriate because it allows for a deep, interpretive understanding of socio-political dynamics, historical context, and institutional limitations that cannot be fully captured through quantitative measures alone. Such an approach facilitates the analysis of policy documents, migration reports, and secondary data to discern patterns, relationships, and policy implications within a broader socio-economic and geopolitical framework (Creswell & Poth, 2018).

The study relies exclusively on secondary data collected from credible international and national sources covering the period 2020–2025. These sources encompass migration statistics, government and institutional reports, and academic analyses, providing a comprehensive view of both origin and destination contexts. Data from migration monitoring agencies, policy reports, and statistical records were critically examined, with attention paid to definitions, units of measurement, and data collection methodologies, ensuring that comparisons and interpretations remained valid and reliable. Triangulation of these multiple sources enhances the robustness of findings by cross-verifying evidence, reducing potential bias, and allowing for nuanced insights into the interactions between migration drivers and policy responses (Patton, 2015).

Analytical techniques focused on thematic content analysis, identifying recurring patterns related to structural push factors in Pakistan, pull factors in Europe, and policy mechanisms along the Western Balkan corridor. Thematic coding enabled the identification of key relationships between socio-economic conditions, migration policy frameworks, and transit dynamics, while also highlighting contradictions and gaps in governance. This methodological framework ensures that the study captures the multi-dimensional nature of migration, including humanitarian, economic, and regulatory dimensions, providing a solid foundation for evidence-based recommendations.

By integrating policy analysis with secondary empirical data, this methodology allows for a holistic examination of irregular migration, situating individual migratory decisions within broader structural and institutional contexts. It also facilitates the formulation of practical policy insights aimed at harmonizing labor demand in

the EU with domestic reforms in Pakistan, while considering the strategic role of Western Balkan states as transit and potential destination countries.

3.1. Data Analysis

The study applies thematic content analysis to examine patterns, relationships, and recurring themes within the secondary data. This method allows for an in-depth exploration of the underlying socio-economic, institutional, and policy factors that shape irregular migration from Pakistan to Europe via the Western Balkan route. By systematically reviewing documents, reports, and statistical records, the analysis captures both the structural drivers of migration and the responses of destination and transit countries, providing a nuanced understanding of the broader migration landscape.

The coding process involved categorizing information according to key dimensions of migration, including structural pressures in Pakistan, labor demand and opportunities in Europe, the functioning of policy instruments such as asylum procedures and readmission agreements, and the realities of transit through the Western Balkans. Through this approach, the study identifies patterns of causation and correlation, such as how employment deficits, land inequality, and lack of digital labor registration in Pakistan interact with restrictive legal channels and limited labor mobility in Europe to sustain irregular migration.

Thematic analysis also facilitates the identification of policy gaps and contradictions. By cross-referencing data from multiple sources, the study highlights areas where current interventions—whether through border enforcement, readmission agreements, or labor migration schemes—fail to address root causes or align with structural needs. Furthermore, it allows for contextual comparison, situating Pakistan's demographic pressures, land distribution, and labor capacity relative to European countries, revealing how disparities in size, population density, and economic structures influence both migration flows and policy responses.

Overall, this approach ensures a holistic interpretation of migration dynamics, connecting micro-level socio-economic conditions in Pakistan with macro-level policy frameworks in the EU and Western Balkans. It provides the analytical foundation for evidence-based policy recommendations, highlighting how coordinated reforms in labor, land, and governance can reduce irregular migration while aligning with European labor demand.

3.2. Scope and Delimitations

This study focuses exclusively on Pakistani irregular migration via the Western Balkan route, rather than maritime or direct flight routes to the EU. This route was selected due to its increasing prominence in migration statistics and associated policy challenges.

The analysis includes the broader EU policy framework, with emphasis on Italy, Germany, the United Kingdom, and Bosnia and Herzegovina, given their active roles in readmission and border control agreements. While secondary sources provide rich insights, the study is limited by potential inconsistencies in data definitions, measurement units, and reporting methods across institutions.

4. RESULTS

Pakistani irregular migrants reach Europe through multiple migration pathways, with the Western Balkan corridor emerging as a critical overland route. Migrants traveling along this corridor move through Southeastern and Central European countries, passing through Bulgaria, Romania, Hungary, and Croatia, before traversing the Western Balkans, including Bosnia and Herzegovina, Serbia, Albania, and North Macedonia. From these transit countries, migrants aim to reach EU destinations such as Italy, Germany, and France. The popularity of this route is driven by a combination of factors, including relatively porous borders, weak institutional capacity in transit states, and the limited availability of legal migration channels from Pakistan.

In addition to overland pathways, Pakistanis also utilize maritime routes to Southern Europe, particularly Italy and Malta, known collectively as the Central Mediterranean route. While these sea crossings are associated with higher financial costs and greater risk, they remain a significant channel for irregular migration due to the absence of formal labor migration opportunities. Similarly, the Eastern Mediterranean route, which involves sea crossings to Cyprus and Greece or land crossings from Turkey into Greece and Bulgaria, continues to attract irregular migrants seeking access to EU labor markets and social welfare systems.

3.3. Ethical Considerations

As this research relies entirely on secondary data, no human subjects were directly involved, and formal consent or Institutional Review Board (IRB) approval was not required. Nevertheless, the study adheres to high standards of academic integrity, transparency, and proper citation of all sources.

Empirical data from Frontex and other migration monitoring agencies indicate a growing reliance on the Western Balkan route between 2009 and 2023, reflecting both the persistent structural pressures in Pakistan and the limitations of European migration policy in providing safe and legal alternatives. Migrants often experience prolonged periods in transit, with limited access to asylum procedures or basic humanitarian services. These flows underscore the interconnectedness of push and pull factors, as socio-economic vulnerabilities in Pakistan intersect with labor demand in Europe and the institutional capacity of transit states to shape irregular migration patterns.

Overall, the analysis of migration flows highlights the multi-dimensional nature of irregular migration, showing that it is not simply the result of individual choices but emerges from complex structural, institutional, and policy contexts. These findings set the stage for examining asylum outcomes, readmission effectiveness, and socio-economic pressures, which are addressed in the following subsections. Table 1 presents the distribution of Pakistani irregular migration across major European routes during the observed period.

Table 1: Irregular border crossings by Pakistani migrants via major routes (2009–2023)

Year	Western Balkan (%)	Central Mediterranean (%)	Eastern Mediterranean (%)	Other (%)	Total Detections
2009	0.6	0.4	93.0	6.0	1,592
2010	1.0	1.4	95.6	2.0	3,878
2011	3.9	9.2	86.6	0.3	15,375
2012	17.7	25.8	56.4	0.1	4,877
2013	60.9	34.4	4.7	0.0	5,047
2014	8.9	84.0	6.6	0.5	4,115
2015	39.4	4.6	55.9	0.1	43,310
2016	31.1	15.4	53.5	0.2	17,973
2017	43.5	30.3	26.0	0.2	10,015
2018	20.4	30.3	48.4	0.9	4,988
2019	14.2	31.9	52.8	1.1	3,799
2020	11.2	53.7	34.6	0.5	2,603
2021	26.4	57.7	13.5	2.4	3,036
2022	53.0	29.6	17.3	0.2	12,022
2023	20.1	77.1	2.6	0.2	9,812
Grand Total	142,442	-	-	-	-

The Western Balkan route has become increasingly significant due to limited legal alternatives, porous borders, and weak institutional capacity in transit states (UNHCR, 2024; Benedek et al., 2023).

4.1. Asylum Applications and Readmission Outcomes

Eurostat (2025) indicates that only 12–14% of Pakistani asylum applications were approved in the European Union between 2020 and 2024, reflecting consistently low recognition rates across member states. The majority of applications were rejected, resulting in a significant number of Pakistani nationals remaining in irregular status or becoming subject to return and readmission procedures. Despite the existence of multiple readmission agreements between the EU and Pakistan, deportation figures remained relatively high throughout the period, suggesting that enforcement mechanisms continue to play a central role in EU migration governance.

However, the persistence of re-migration following deportation highlights the limited effectiveness of return-

focused policies in addressing the underlying drivers of migration. Many returned individuals face the same structural socio-economic conditions—such as unemployment, land inequality, and lack of formal reintegration support—that initially prompted migration. As a result, deportation often functions as a temporary interruption rather than a long-term deterrent, contributing to cyclical patterns of irregular movement.

Table 2 presents an overview of Pakistani asylum applications, approval rates, rejections, and deportations between 2020 and 2024, illustrating the imbalance between restrictive asylum outcomes and sustained migration pressure. These findings underscore the disconnect between EU enforcement-oriented approaches and the structural realities in Pakistan, reinforcing the argument that asylum and readmission mechanisms alone are insufficient to manage migration effectively without complementary legal migration pathways and reintegration strategies.

Table 2: Pakistani asylum applications and outcomes (2020–2024)

Year	Applications	Approved	Rejected	Deportations
2020	15,200	2,134	11,700	3,800
2021	16,800	2,450	13,000	3,600
2022	18,100	2,700	13,900	3,900
2023	19,700	2,850	14,900	3,400
2024	20,500	2,950	15,100	3,300

Low approval rates and repeated deportations indicate that enforcement-focused policies alone do not deter irregular migration. High rates of re-migration suggest gaps in reintegration support and structural employment opportunities (Koser, 2022; Schuster, 2022).

4.2. Socio-Economic Drivers in Pakistan (2020–2025)

Socio-economic conditions in Pakistan during the period 2020–2025 reveal a set of deeply entrenched structural factors that continue to generate strong migration pressures. One of the most significant drivers is severe land inequality, where a small elite of landowners controls a disproportionate share of agricultural land, while the majority of households have limited or no access to productive resources (Khan & Borisova, 2024). This concentration of land ownership restricts rural employment opportunities, undermines agricultural productivity, and contributes to persistent income insecurity, particularly among young and landless populations. As agriculture remains a major source of livelihood in Pakistan, unequal access to land translates directly into limited economic mobility and increased incentives to seek opportunities abroad.

Unemployment and underemployment further intensify these pressures. Although official figures indicate an unemployment rate of approximately 5.5% in 2024, this statistic masks the scale of informal and unregistered labor, which dominates large segments of Pakistan's economy (Khan, 2024). Many individuals classified as

“employed” are engaged in low-paid, unstable, or seasonal work that fails to provide sustainable livelihoods. The absence of a real-time digital labor registry exacerbates this challenge, as policymakers lack accurate data on labor market participation, skills distribution, and unemployment. Without such information, targeted employment programs and international labor cooperation initiatives remain limited in scope and effectiveness, leaving large segments of the population vulnerable to exploitation by irregular migration networks.

Remittances play a dual role in shaping migration dynamics. In 2024, remittance inflows reached approximately \$34.1 billion, providing essential financial support to millions of households (IOM, 2024). While these transfers help alleviate poverty and stabilize household consumption, they are largely directed toward immediate needs such as food, housing, and education, rather than long-term productive investment. This pattern reduces pressure for structural reforms and limits domestic job creation, indirectly reinforcing migration incentives. As a result, remittances function more as a short-term coping mechanism than as a catalyst for sustainable economic development.

Taken together, land inequality, labor market informality, inadequate employment data, and consumption-oriented remittance use form a self-reinforcing cycle of structural joblessness and migration. Limited domestic opportunities push individuals toward irregular migration, while remittance inflows temporarily ease eco-

conomic hardship without addressing underlying constraints. These dynamics help explain why irregular migration from Pakistan persists despite restrictive asylum

5. DISCUSSION

This section interprets the empirical findings within the broader framework of migration theory, Pakistan's socio-economic realities, and European Union and Western Balkan migration governance. Rather than treating irregular migration as a temporary or crisis-driven phenomenon, the discussion highlights its structural, institutional, and policy-driven nature, distinguishing analytical observations from normative implications. The analysis demonstrates that persistent migration flows are the outcome of interacting governance failures across origin, transit, and destination contexts.

5.1. Structural Drivers of Migration: Persistent Push from Pakistan

The findings strongly suggest that irregular migration of Pakistani nationals through the Western Balkan route is primarily driven by entrenched structural pressures, rather than short-term economic shocks or individual opportunism. Severe land inequality remains a central factor shaping migration incentives. With a highly concentrated pattern of land ownership, access to productive agricultural resources is systematically restricted for the majority of households, particularly in rural areas where alternative employment opportunities are limited. This structural imbalance constrains income generation, reinforces rural poverty, and limits upward mobility, thereby sustaining long-term emigration pressures.

Labor market dynamics further intensify these structural push factors. Official unemployment figures underestimate the scale of joblessness and underemployment due to the dominance of informal and unregistered labor. The absence of a real-time digital unemployment or labor registry prevents effective labor market planning and targeted employment interventions, weakening the state's capacity to absorb demographic growth. In this context, migration emerges not as a discretionary choice but as a rational response to institutional gaps and governance constraints. Remittance inflows, while substantial, do not fundamentally alter these dynamics. Their primary use for consumption alleviates short-term household vulnerability but does not translate into productive investment or employment creation, reinforcing a cycle in which migration substitutes for domestic reform.

5.2. Fragmented EU Response and Policy Limitations

On the destination side, EU migration governance remains largely reactive and enforcement-oriented, prioritizing border control, readmission, and deterrence over structural alignment with labor market needs. Persistently low asylum recognition rates for Pakistani nationals indicate that asylum systems are ill-suited to address migration driven by economic and structural factors rather than individual persecution. The continued emphasis on deportation has not reduced migration pressure,

outcomes and repeated deportations, underscoring the need for integrated domestic reforms alongside coordinated international migration policies.

as re-migration following return remains common, underscoring the limited deterrent effect of return-focused strategies.

Institutional fragmentation within the EU further weakens policy coherence. While migration management is formally an EU-level concern, member states retain primary authority over labor migration schemes, visa issuance, and integration policies. This decentralization produces inconsistent practices and limits the EU's ability to develop coordinated legal pathways that could reduce irregular flows. The limited strategic engagement with Pakistan as a labor-sending country reflects a broader reliance on short-term containment measures rather than long-term mobility partnerships.

5.3. Western Balkans as Transit States

The Western Balkan countries occupy a structurally ambiguous position within European migration governance, functioning as buffer and transit zones without full inclusion in EU policy design. Limited institutional capacity, underdeveloped asylum systems, and insufficient reception infrastructure constrain their ability to manage sustained migrant presence. As a result, many Pakistani migrants experience prolonged stays in informal settings with restricted access to legal protections, healthcare, and employment opportunities.

These conditions contribute not only to humanitarian vulnerabilities but also to rising social and political tensions within host communities. The perception of migrants as a burden, combined with limited EU financial and technical support, fuels local resistance and xenophobic narratives. The marginal role assigned to Western Balkan states within EU migration planning reinforces reliance on irregular channels and ad hoc responses, rather than structured transit or labor mobility frameworks.

5.4. Irregular Migration and Labor Market Mismatch

A central contradiction highlighted by the findings is the disconnect between European labor demand and restrictive migration channels. Despite well-documented shortages in sectors such as agriculture, construction, and eldercare, legal access for low- and medium-skilled workers from countries like Pakistan remains limited. This structural mismatch creates conditions in which irregular migration becomes a functional, albeit risky, mechanism for labor market entry.

The underdevelopment of seasonal, circular, or temporary migration schemes further exacerbates this gap. Rather than reflecting a lack of willingness to work among migrants, persistent irregular flows indicate institutional rigidity and policy misalignment. Smuggling networks exploit this disconnect, filling the space left by inadequate legal mobility options.

5.5. Remittances and Domestic Structural Reform

Remittances occupy a paradoxical position within the migration-development nexus. While they provide essential income support and macroeconomic stability, their consumption-oriented use limits their transformative potential. In the absence of land reform, employment expansion, and institutional modernization, remittances act as a safety valve that reduces immediate economic pressure without challenging underlying structural inequalities.

This dynamic indirectly sustains irregular migration by normalizing outward mobility as a household survival strategy. Without mechanisms to channel remittances into productive investment or job creation, migration remains a substitute for domestic reform rather than a complement to development.

5.6. Policy Gaps and Contradictions

Overall, the findings reveal significant policy gaps and contradictions across the Pakistan–EU–Western Balkans migration system. Origin-country structural constraints remain unaddressed, transit countries lack institutional support and strategic inclusion, and destination policies prioritize control over coordination. These fragmented approaches collectively reproduce irregular migration rather than mitigating it. The persistence of migration flows despite enforcement measures underscores the need for integrated governance frameworks that align labor markets, development strategies, and mobility pathways across regions. Table 3 provides an overview of the key structural and policy gaps identified in the analysis.

Table 3: Key Structural and Policy Gaps Identified in the Analysis

Area	Observed Gap
Legal migration	Demand exists, but formal agreements are missing
Land reforms	Critical in Pakistan, but ignored in migration dialogue
Border control	Increased budgets, yet re-migration persists
Readmission	High volume, low reintegration support
Digital labor registry	Proposed by Khan (2024), not implemented
Development aid	Not linked to migration cooperation

Misaligned priorities between sending and receiving countries limit the effectiveness of current migration governance frameworks.

5.7. Towards an Analytical Framework for Ethical Migration (Expanded)

The preceding discussion underscores the need for an analytical framework that situates irregular migration within broader developmental, institutional, and governance contexts, rather than treating it primarily as a security or border management issue. An ethical migration framework must recognize that migration is not an isolated phenomenon but a structural outcome of uneven development, labor market imbalances, and policy misalignment across origin, transit, and destination regions. In line with Castles, de Haas, and Miller (2014), migration should be understood as both a consequence and a component of development processes, requiring integration into long-term economic planning rather than episodic crisis responses.

Central to such a framework is the role of data-driven labor governance. The absence of comprehensive, real-time labor market data in countries like Pakistan limits the ability of both domestic authorities and international partners to design targeted employment interventions or legal mobility schemes. Digital labor and unemployment registries can serve as foundational tools for aligning labor supply with international demand, improving transparency, and reducing reliance on informal or exploitative migration channels. Without accurate labor

data, migration governance remains reactive and fragmented.

An ethical approach further necessitates the expansion of legal and regulated migration pathways that correspond to actual labor market needs in Europe. Restrictive entry channels, particularly for low- and medium-skilled workers, do not eliminate migration pressures but instead redirect them into irregular routes managed by smuggling networks. Legal pathways—such as seasonal, circular, or skills-matched mobility schemes—can reduce human vulnerability while meeting European labor shortages, thereby aligning ethical considerations with economic rationality.

Equally important is the institutional inclusion of transit regions, particularly the Western Balkan states, within migration governance frameworks. Their marginalization in EU planning undermines regional stability and creates humanitarian bottlenecks. Strengthening institutional capacity, asylum systems, and labor governance in these countries is essential for ensuring ethical treatment of migrants and consistent policy implementation across borders.

A holistic and ethical understanding of irregular migration requires moving beyond enforcement-driven paradigms toward integrated frameworks that combine development policy, labor market coordination, and regional governance. Only by addressing structural inequalities, institutional data gaps, and policy fragmentation can migration be managed in a manner that is both effective and ethically sustainable.

6. RECOMMENDATIONS

This study recommends a shift from enforcement-centred migration management toward coordinated, development-oriented governance linking Pakistan, the European Union, and the Western Balkan states. Central to this approach is the expansion of legal and regulated migration pathways that align European labor shortages with Pakistan's surplus workforce, thereby reducing reliance on irregular routes and smuggling networks. Such pathways should be supported by pre-departure training, skills certification, and ethical recruitment mechanisms. At the domestic level, Pakistan requires structural reforms that address persistent unemployment and land inequality, including the introduction of a real-time digital unemployment registry and policies that promote the productive use of remittances. Without these reforms, remittances will continue to function as short-term household support rather than as a driver of sustainable employment and economic transformation.

7. CONCLUSION

This study examined Pakistani irregular migration to Europe via the Western Balkan route during the period 2020–2025, with the aim of identifying the structural, policy, and governance dynamics that sustain these migration flows. The findings demonstrate that irregular migration is not primarily the result of isolated individual decisions or temporary crises, but rather a predictable outcome of long-standing structural constraints in Pakistan combined with fragmented and enforcement-oriented migration governance in Europe. Deep land inequality, persistent unemployment, and the absence of a comprehensive digital labor registry continue to limit domestic livelihood opportunities, particularly for young and underemployed populations. In this context, irregular migration emerges as a rational response to constrained economic mobility rather than an exceptional or deviant behavior.

On the destination and transit side, European Union and Western Balkan policy frameworks have largely emphasized containment, border enforcement, and readmission mechanisms, while offering limited legal alternatives that correspond to labor market demand. Persistently low asylum recognition rates for Pakistani nationals and the cyclical nature of deportation and re-migration highlight the limited effectiveness of deterrence-based approaches in addressing structurally driven mi-

gration. At the regional level, the findings underscore the necessity of integrating Western Balkan countries as full stakeholders in migration governance, rather than treating them solely as transit zones. Strengthening institutional capacity, asylum infrastructure, and labor coordination in these states is essential for reducing humanitarian gaps and improving policy coherence. More broadly, enhanced regional coordination among Pakistan, the EU, and the Western Balkans—supported by shared data systems, regular policy dialogue, and migration literacy initiatives—can improve transparency and public understanding while countering misinformation and xenophobia. Taken together, these recommendations advocate for a holistic and ethical migration framework that balances labor market needs, human security, and long-term development objectives, while acknowledging the qualitative nature of the evidence and avoiding claims of direct causality.

gration. At the same time, substantial remittance inflows provide short-term household stability but do not translate into productive investment or employment generation, particularly in a context where significant land resources remain underutilized. These dynamics reflect broader policy misalignment and governance fragmentation across Pakistan, the European Union, and the Western Balkan states, which collectively enable irregular migration networks to persist.

The study therefore underscores the importance of ethical, development-oriented, and cooperative migration strategies that align labor supply with demand while addressing root causes at their source. Legal migration pathways, data-driven labor governance through digital registries, land reform initiatives, and the institutional inclusion of Western Balkan states emerge as complementary components of a more coherent migration framework. Although the qualitative methodology does not allow for formal causal inference, the evidence provides a robust analytical foundation for actionable policy design. Overall, the findings reaffirm that irregular migration is a multi-dimensional phenomenon shaped by structural inequalities and policy fragmentation, and that future migration governance must move beyond narrow enforcement-based measures toward sustainable, ethical, and mutually beneficial approaches for both origin and destination countries.

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TOWARD CONTEXT-SPECIFIC EVALUATION TOOLS: THE CASE OF MOLDOVA'S ENTREPRENEURIAL ECOSYSTEM

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Abstract

Entrepreneurial ecosystems have become the object of particular interest in research and policy over the past decade, as a thriving entrepreneurial ecosystem (EE) can spur innovation, job creation, and regional development. This has led to an increase in the number of methodological frameworks and indices aimed at measuring the quality of entrepreneurial ecosystems across countries, based on a common set of entrepreneurship conditions. However, a growing critique in the literature is that “one-size-fits-all” models may obscure local contextual differences. As a result, a need has been identified for context-specific local entrepreneurial ecosystem assessment tools that can provide nuanced insights, reflecting the heterogeneity of relevant factors within a country. The case of the Republic of Moldova illustrates this need. To bridge this gap, a group of researchers from the National Institute for Economic Research of ASEM developed and tested a multidimensional assessment methodology for Moldova's EE. It was designed to cover eight key components of the ecosystem – Financing, Human Capital, Infrastructure, Innovation, Entrepreneurial Culture, Markets, Legal Framework and Regulation, and Exposure to Internal and External Risks – broken down into 134 context-relevant indicators. Using a nationwide survey of 204 entrepreneurs, we assessed each component via a composite coefficient that reflects entrepreneurs' evaluations. Based on the results obtained for each component of the EE, the Entrepreneurial Ecosystem Evaluation Coefficient (Kee) was calculated, representing the weighted average evaluation of the entrepreneurial ecosystem per component. The obtained results highlight specific strengths and weaknesses in Moldova's ecosystem and underscore the importance of localized diagnostic tools.

Keywords: entrepreneurial ecosystem; assessment framework; Republic of Moldova

1. INTRODUCTION

Entrepreneurial ecosystems – the networks of enterprises, entrepreneurs, institutions, and enabling conditions that support new firm creation and growth – have attracted growing attention from researchers and policy-makers. A vibrant ecosystem is believed to spur innovation, generate new jobs, and promote regional development (e.g. Isenberg 2011; Stam 2015). In response, many standardized frameworks and indices have been developed to measure ecosystem quality across countries. Prominent examples include the Global Entrepreneurship Monitor (GEM) and the Global Entrepreneurship Index (GEI), which benchmark countries on common entrepreneurship pillars (e.g. finance, talent, infrastructure) using uniform indicators. Such universal models advance our understanding of key ecosystem elements and allow cross-country comparison of performance.

However, a rising body of work argues that these “one-size-fits-all” approaches can mask important local differences. National entrepreneurial environments differ markedly: each economy has its own institutional and legal framework, cultural norms, market size, and level of development. In particular, small or developing economies like Moldova may face unique challenges (e.g. large-scale emigration, nascent innovation systems, historical attitudes toward entrepreneurship) that significantly affect entrepreneurial development but are not captured by global indices. These critiques echo calls for more context-sensitive diagnostics. For instance, the recently published OECD report on entrepreneurial eco-

systems emphasizes a multidimensional approach tailored to country-specific conditions (OECD, 2025). Such efforts seek to complement broad benchmarking with actionable local insights – for example, by identifying bottlenecks in specific ecosystem elements.

The Republic of Moldova, a small emerging economy in Eastern Europe, illustrates the need for local analysis. Moldova either does not participate in some global surveys (like GEM) or scores modestly on international rankings (e.g. 99th out of 137 countries on GEI in 2019, and 90th in the 2025 Global Startup Ecosystem Index). These rankings hint at systemic weaknesses but offer little actionable guidance for Moldovan participants in the local entrepreneurial ecosystem. Global indices typically use generic indicators or expert opinions that may not reflect Moldova's realities. Key questions remain unanswered: Which factors most constrain Moldovan entrepreneurs? Do entrepreneurs in the capital municipality, Chişinău, face the same challenges as those in rural regions? How do needs differ between microenterprises and larger firms? Broad international frameworks cannot address these granular issues without local adaptation. In practice, this gap means that policy reforms targeting the business environment in Moldova have often followed general prescriptions rather than evidence grounded in the country's specific context.

To address this, the team of researchers (led by the author) from the National Institute for Economic Research of the Academy of Economic Studies of Moldova developed and applied a custom evaluation tool for Moldova's entrepreneurial ecosystem. The methodology

was informed by international best practices but tailored to Moldova's context. It covers eight components (Financing, Human Capital, Infrastructure, Innovation, Entrepreneurial Culture, Markets, Regulatory Framework, and Exposure to Internal and External Risks), further divided into 134 context-relevant indicators. Through a nationwide survey of entrepreneurs, we elicited firms' assessments on each indicator and aggregated them into composite scores.

The objective of the present study is to develop and test a context-specific methodology for evaluating the entrepreneurial ecosystem of the Republic of Moldova, as well as to demonstrate how an adapted diagnostic tool

makes it possible to identify structural constraints and development opportunities that are not reflected in global comparative indices.

The paper is structured as follows. The second section examines global and contextual approaches to the assessment of entrepreneurial ecosystems. The third section describes the research methodology and the principle of calculating the Kee coefficient. The fourth section presents the results of the empirical study. The fifth section discusses the findings in comparison with international models and formulates practical implications. The final section contains methodological conclusions, research limitations, and directions for further research.

2. LITERATURE REVIEW: GLOBAL FRAMEWORKS OR CONTEXTUAL APPROACHES

Over the past decade, entrepreneurial ecosystem assessment has rapidly evolved. Early approaches sought to define universal pillars essential for any ecosystem. For example, Daniel Isenberg's influential framework identified six domains (Policy, Finance, Culture, Supports, Human Capital, Markets) based on qualitative analysis of various ecosystems, serving as a checklist for ecosystem conditions. Similarly, large-scale initiatives like GEM (Global Entrepreneurship Monitor) and GEDI (Global Entrepreneurship and Development Index) constructed standardized indices.

GEM's National Expert Survey (NES) asks local experts to rate 12 Entrepreneurial Framework Conditions (such as finance, government support and policies, taxes and bureaucracy, R&D, commercial and professional infrastructure, services, entrepreneurial education, internal market characteristics, and cultural and social norms) on a Likert scale, rating them from completely false to completely true; these are aggregated into scores and a composite index (NECI) which is the arithmetic mean of these components and allows country comparisons (Global Entrepreneurship Monitor, 2024; Global Entrepreneurship Monitor, 2025; Global Entrepreneurship Monitor, 2020).

The Global Entrepreneurship Index (GEDI/GEI) combines survey data with institutional indicators across 14 pillars (grouped into entrepreneurial Attitudes, Abilities, Aspirations) to rank countries from 0-100 (Global Entrepreneurship and Development Institute, 2025a). These tools provide broad coverage and benchmarking: for instance, GEDI consistently ranks the United States and Switzerland at the top, and indicates that many developing countries lag in either entrepreneurial capacity or support structures (for instance, the score of the Republic of Moldova in GEI 2019 was 21.2, ranked as 92 of 137 countries) (Global Entrepreneurship and Development Institute, 2025b).

While valuable for global comparison, these top-down models have limitations for local policy. GEM relies on subjective expert assessments and on surveys of adult respondents in each country, who are not necessarily entrepreneurs. GEDI's pillar structure is predetermined globally, and its complex algorithm (with "penalty for bottlenecks", where good performance in a pillar can

only partially neutralize the badly performing element) can be hard to interpret for policymakers. Importantly, a factor crucial in a specific country (for example, Moldova's youth emigration) may not appear explicitly in these global metrics.

The new OECD Entrepreneurial Ecosystem Diagnostics (2025) acknowledges such issues by adopting a multi-dimensional framework tailored to national contexts (OECD, 2025). The OECD tool covers inputs (ten elements: Institutions, Culture, Networks, Infrastructure, Markets, Finance, Knowledge, Talent, Leadership, Intermediate Services) and outputs, aiming to highlight strengths, weaknesses, and bottlenecks in each country (OECD, 2025). Although ambitious and grounded in hard data, it remains cross-country in scope, which could sideline country-specific issues not captured in international databases.

Recognizing these trade-offs, development practitioners have advocated complementary approaches. For instance, the World Bank recommends a two-tier analysis: a high-level international benchmark followed by in-depth local studies to capture subnational heterogeneity (Cruz & Zhu, 2023). The German development agency GIZ provides a practical "ecosystem mapping" guide for regions, emphasizing stakeholder mapping, qualitative interviews, and adapted scorecards to produce actionable, locally relevant insights rather than global rankings (Kreuzer et al., 2018). This context-driven approach has been applied in places like Jordan, yielding detailed diagnostics of stage-specific support gaps (e.g. lack of incubators in certain cities).

In academic studies, researchers have similarly stressed that informal institutions, history, and governance quality critically shape ecosystem function, especially in emerging markets (Levie & Autio, 2011; Audretsch et al., 2021; Eesley et al., 2018).

In Central and Eastern Europe, sub-national and country-specific tools have begun to emerge. For example, GEDI's Regional Entrepreneurship Development Index (REDI) has been used to reveal large urban-rural disparities in Hungary (Komlósi et al., 2015). An EU-supported SME policy index in the Eastern Partnership countries (including Moldova) benchmarks areas like business regulation and finance (OECD et al., 2020);

Moldova's 2020 results showed relative progress in start-up procedures but weaknesses in innovation and export orientation, echoing patterns we also find below. However, prior to our work, no comprehensive, tailored ecosystem assessment had been carried out for Moldova. Existing analyses were fragmented. For instance, GEM country reports provided some high-level metrics in certain years, and separate studies examined business climate or innovation policy, but they were not integrated into a unified framework. This gap is notable since many smaller or lower-income countries lack inclusion in global surveys and have limited resources to

conduct their own studies. We suggest that global indices should be supplemented by customized tools to inform local action. The OECD's framework and GIZ's guides imply that benchmarking data alone are a starting point, but targeted dialogue and deep dives are needed to diagnose country-specific bottlenecks (OECD, 2025). Our contribution is to advance such a context-specific approach by creating and applying a detailed EE assessment for Moldova, combining international best practices with local knowledge.

Thus, despite the availability of international indices, context-specific diagnostic tools for small transition economies remain insufficiently developed.

3. METHODOLOGY

3.1. Structure of the Survey Questionnaire

Our methodology centers on an entrepreneur survey covering Moldova's entire territory (including the Autonomous Territorial Unit (ATU) Gagauzia). The survey was conducted in 2022 under the auspices of the National Institute for Economic Research of ASEM. It was designed to elicit entrepreneurs' perceptions of the strengths and weaknesses of various ecosystem factors. We constructed a questionnaire comprising 134 factors grouped into eight thematic pillars (components of EE): (1) Access to Finance; (2) Human Capital; (3) Infrastructure; (4) Innovation; (5) Entrepreneurial Culture; (6) Markets; (7) Legal Framework and Regulation; and (8) Exposure to Internal and External Risks. These pillars (components) and indicators were selected based on international frameworks and adapted to the Moldovan context (for example, including questions on the impact of emigration; access to financing through government programs; access to services and membership in specific local entrepreneurship support organizations; assessment of external threats related to political conflicts, etc.). Respondents rated each factor on a 5-point Likert scale from 1 ("very negative") to 5 ("very positive").

3.2. Justification of the Sample

The sample was formed taking into account the territorial, sectoral, and size structure of the entrepreneurial sector of the Republic of Moldova. Despite the intention to achieve maximum representativeness, participation in the survey was voluntary, which may give rise to a self-selection effect. Therefore, the obtained results should be interpreted as a diagnostic assessment of entrepreneurs' perceptions rather than as a strictly statistically representative model of the ecosystem.

We surveyed 204 enterprises, a mix of large firms and SMEs (micro, small, and medium) to reflect Moldova's

entrepreneurial sector. By design, the sample composition closely matched national enterprise statistics by region, firm size, and sector. In the sample, 5.9% were large enterprises and 94.1% were SMEs (the majority being microenterprises – 66.7%). About 73% of respondents were based in urban areas and 27% in rural areas. Geographically, the distribution was: Chisinau (the capital) 59.3%, Central region 13.2%, North 11.8%, South 12.3%, and ATU Gagauzia 3.4%. The predominant sectors were services (including transport 4.4%, IT 2.9%, HORECA 2.5%) and trade (approximately 71.5% combined), with manufacturing (15.2%), agriculture (10.8%), construction (2.5%), and other sectors making up the remainder. Most participating firms were mature, over six years old.

3.3. Methodological Rationale for the Kee Coefficient

Based on the generalized results obtained for each factor / component of the entrepreneurial ecosystem, the Entrepreneurial Ecosystem Evaluation Coefficient (Kee) was calculated. It shows the weighted average assessment of the entrepreneurial ecosystem by component and factor, as well as the generalized assessment of the ecosystem as a whole. Kee is defined so that positive values indicate overall positive evaluation and negative values indicate barriers, weaknesses. The coefficient yields a value between -2 and +2 (with 0 meaning balance between positive and negative views) (Figure 1). The exclusion of neutral evaluations from the calculation of the coefficient makes it possible to focus on the direction of perception, i.e., the predominance of positive or negative evaluations, rather than on the averaged central tendency. Thus, the Kee coefficient provides a clearer interpretation of the evaluations for the purposes of policy adjustment and strategic planning.

Figure 1: Formula for calculating the Entrepreneurial Ecosystem Evaluation Coefficient

$$Kee = \frac{(-2) * \% \text{ score "1"} + (-1) * \% \text{ score "2"} + (+1) * \% \text{ score "4"} + (+2) * \% \text{ score "5"}}{100\%}$$

were:

Kee - Entrepreneurial ecosystem evaluation coefficient;

% score "1" - the share of responses, with "very negative" evaluation of a factor (score 1);

% score "2" - the share of responses, with "somewhat negative" evaluation of a factor (score 2);

% score "4" - the share of responses, with "somewhat positive" evaluation of a factor (score 4);

% score "5" - the share of responses, with "very positive" evaluation of a factor (score 5).

Note: Author's elaboration

We calculated Kee for each of the eight ecosystem components listed above as the weighted average of its underlying indicators. The overall EE "score" is the vector of these component Kee values (neutral responses of the "3" score do not directly enter the calculation but they dilute the shares.)

This method yields a quantitative snapshot of entrepreneurs' qualitative judgments. It combines the granularity of a detailed survey with a simple, interpretable index. The Kee values for each component thus reflect the

average sentiment of the business community about that area of the ecosystem, in Moldova's context. Importantly, this approach differs from expert-based indices: it directly captures the views of actual entrepreneurs rather than relying solely on official statistics or a few experts. Calculating the average scores for each factor also allows for interpreting its condition and influence on the entrepreneurial ecosystem as a whole.

4. RESULTS

The survey results reveal a mixed picture of Moldova's entrepreneurial ecosystem, with notable variation across components. Entrepreneurial Culture scored highest overall: Kee = +0.43, indicating that entrepreneurs on balance feel positively about cultural factors. Conversely, Innovation scored lowest with Kee = -0.71,

signaling a significant perceived barrier. And, of course, entrepreneurs see threats, related to the exposure of the country to internal and external conflicts and risks (Kee = -1.54). Table 1 summarizes the Kee values for all components.

Table 1: Entrepreneurial Ecosystem Evaluation Coefficient (Kee) by Component (Republic of Moldova, 2022)

	Component of EE	Kee
1	Entrepreneurial Culture	+0.43
2	Infrastructure	+0.25
3	Legal Framework and Regulation	-0.10
4	Access to Finance	-0.19
5	Markets	-0.26
6	Human Capital	-0.50
7	Innovation	-0.71
8	Exposure to Internal and External Risks	-1.54
	Total EE	-0.33

Note: Author's calculation

These scores indicate that entrepreneurs view the cultural environment (attitudes, skills, etc.) as a relative strength, while innovation and human capital factors are seen as major weaknesses. Below we highlight key findings within each component.

4.1. Access to Finance (Kee = -0.19)

On average, finance is rated slightly negatively, despite the relatively high ratings for the availability of bank loans (average item score/mean = 3.32) and credits of microfinance institutions (mean = 3.59). The greatest difficulties were reported in accessing risk capital (mean 2.12), foreign donor funding (mean 2.41), and

modern financing channels (e.g. crowdfunding, crypto platforms) (mean = 2.47). High collateral requirements by banks and microfinance institutions were also cited as an obstacle. In short, entrepreneurs felt that traditional and innovative financing sources remain insufficient in Moldova.

4.2. Human Capital (Kee = -0.50)

The overall human capital component scored well into the negative. All three underlying groups of factors (availability of personnel, competency/training, and brain drain) received negative Kee values. A frequent concern was the shortage of highly qualified specialists:

over one-third of respondents rated the availability of skilled workers as a significant problem. Inadequate competency of graduates was also flagged: many entrepreneurs felt that university and vocational training did not equip students with job-ready skills (mean 2.35). In contrast, some positive notes emerged: many respondents appreciated that employees had good digital skills (mean 3.22) and that on-the-job training was available (mean 3.0). A particularly critical issue was labor migration: 40.7% of respondents reported emigration as a major obstacle, and rural firms felt this more acutely (90.9% of rural vs. 74.1% of urban entrepreneurs). The Kee for the “migration/emigration” item was -1.16 , the most negative of any single factor, underscoring how losing human capital harms the ecosystem’s potential.

4.3. Infrastructure (Kee = +0.25)

Infrastructure was seen slightly positively overall. Access to various elements of the infrastructure is characterized by a fairly high average score: 3.9/5. Entrepreneurs rated telecommunications (Internet and mobile networks) as the most accessible infrastructure element (mean 4.2). Among business services, accounting/auditing (mean 3.74) and training services for entrepreneurs (mean 3.45) were relatively available. The most difficult infrastructure-related services were those for crisis management and insolvency (mean 2.15), as well as services to adopt new innovations (mean 2.62), and export promotion services (mean 2.75). Notably, road quality – both in local and national level – was the lowest-rated item across all indicators (mean 2.55). Firms – especially in the Northern region and Gagauzia – gave roads very low scores, reflecting poor physical connectivity.

4.4. Innovation (Kee = -0.71)

Innovation was rated the weakest component. All factors here had overwhelmingly negative Kee values. For example, the degree of cooperation between firms and institutions (business associations, government agencies, universities) for innovation scored Kee = -0.66 . Cooperation with the Chamber of Commerce was slightly more positive, but collaboration with research institutes and universities was seen as almost non-existent. Entrepreneurs highlighted that the state incentive system and innovation infrastructure (grants, R&D support) were poorly developed. Only 36% of firms were familiar with the patent/intellectual property registration process, and more than half of those found the process too complex or costly. Moreover, 40.7% of firms reported not using IT technologies at all, reflecting gaps in digital adoption. Taken together, these results indicate that Moldova’s innovation ecosystem is underdeveloped from the entrepreneurs’ perspective.

4.5. Entrepreneurial Culture (Kee = +0.43)

This component received the highest (positive) score. Entrepreneurs gave high ratings to factors like existing entrepreneurial culture in enterprises (mean 3.79), media promotion of entrepreneurship (mean 3.22), and overall societal attitudes toward entrepreneurial success

(mean 3.67). For instance, mass media coverage of entrepreneurship was seen as having a significant positive influence on entrepreneurial spirit. Within the personal skills dimension, many business leaders rated their own entrepreneurial traits highly: abilities such as learning from experience, communication, and spotting opportunities were seen as strengths (mean varies from 3.81 to 4.0). Some skill gaps were noted – for example, willingness to restart after failure (mean 3.37) and risk management ability (mean 3.33) were less pronounced – but overall the cultural environment (including within firms) was considered favorable. One notable worry was social stigma around failure: the indicator “societal attitude toward entrepreneurs who have failed” was rated negatively by many, whereas attitudes toward successful entrepreneurs were positive. In summary, Moldovan entrepreneurs are proud of their personal initiative and supportive local networks, but they recognize that fear of failure remains a cultural barrier.

4.6. Markets (Kee = -0.26)

Market conditions were viewed slightly negatively. Domestic competition (including from the informal sector) is intense (mean 3.74), yet demand is relatively high (mean 3.50). Collaboration between firms (especially linking large enterprises and SMEs) was underdeveloped (mean 2.29). Access to external markets is problematic: most respondents found it hard to enter CIS* markets (mean 1.94), and even EU markets were difficult for 59% of firms (due to standards, logistics, etc.). As one measure of regional attractiveness, respondents felt that only climatic conditions (good weather) were a draw (mean 3.30). State support for investment (e.g. guarantees, promotion agencies) (mean 2.30) and factors like living costs (mean 2.31) and ecological conditions (mean 2.84) were seen as negative influences on regional attractiveness.

4.7. Legal Framework and Regulation (Kee = -0.10)

The legal and regulatory environment scored moderately negative. Entrepreneurs rated the quality and stability of laws governing business mostly negatively (mean 2.74 and 2.44). Taxation was particularly cited as burdensome: unpredictability of tax changes and burdensome procedures (mean 2.48) were frequently mentioned. Other problematic procedures included equipment certification (mean 2.64), business liquidation (mean 2.64), export procedures (mean 2.73), and obtaining construction permits (mean 2.52). By contrast, company registration (mean 4.12) and acquiring basic business licenses (mean 3.84) were rated relatively easy. Governance issues also surfaced: firms complained about problems with court dispute resolution (mean 2.36), low consideration of entrepreneurial input in policymaking (mean 2.11), and high bureaucracy (mean 3.6) and corruption (mean 3.28) at local levels. These factors contribute to a slightly negative overall view of the business regulatory climate.

* CIS - Commonwealth of Independent States

4.8. Exposure to Internal and External Risks (Kee = -1.54)

Many entrepreneurs reported that external shocks (the COVID-19 pandemic and the war in Ukraine) influenced their evaluations. For example, higher fuel prices and disrupted trade routes (due to the war) exacerbated the market challenges; meanwhile COVID-19 led some firms to adopt digital tools, highlighting both progress in digital infrastructure and the remaining digital divide. Respondents also frequently mentioned the role of informal networks (friends, family) and informal payments: on one hand, close personal networks helped entrepreneurs cope with challenges (a cultural asset), but on the other hand “informal payments” (bribes) still sometimes expedite bureaucratic processes, indicating persistent institutional weaknesses. Finally, despite many criticisms, some entrepreneurs expressed optimism and resilience. This entrepreneurial spirit is consistent with the high score for culture and suggests a valuable human asset in Moldova’s ecosystem – one that

5. DISCUSSION

Our evaluation tool differs from global frameworks such as GEM, GEDI, or the OECD Diagnostics. While GEM relies primarily on expert opinions to assess 12 standard framework conditions, our tool is based on direct surveys of entrepreneurs, capturing the lived experience of those operating within the ecosystem. This bottom-up orientation ensures that the findings reflect actual constraints faced by firms, rather than perceptions of a small panel of experts. GEDI, by contrast, combines institutional data and survey results in a sophisticated algorithm with penalties for bottlenecks; however, its globally predefined pillars omit country-specific factors such as labor migration, emigration, or informal practices that are highly salient in Moldova. OECD’s diagnostics aim to benchmark countries with comparable indicators, but again emphasize international comparability over local nuance.

By explicitly including factors such as migration/emigration, informal networks, quality of local infrastructure (roads, export services), and awareness of intellectual property rights, our tool captures dimensions absent from standard models. The use of the Kee coefficient also makes interpretation simpler for local policymakers than complex algorithms. In this way, the Moldovan tool complements global indices: it cannot provide cross-country rankings, but it delivers actionable, context-sensitive insights that international benchmarks overlook.

Our context-specific assessment of Moldova’s entrepreneurial ecosystem yields several noteworthy insights, with implications both locally and more broadly. The results underscore that global indices may overlook or understate certain national issues.

In subsequent studies, it would also be advisable to re-introduce into the methodology a section assessing the trends in factor changes over the previous period (2

our context-specific tool can capture even through qualitative comments.

Overall, the aggregated Kee for Moldova’s entire EE (taking a weighted average across components) is slightly negative (Kee = -0.33, reflecting that the predominance of negative evaluations outweighs positives. In other words, entrepreneurs on average see more obstacles than advantages in the current ecosystem. However, the distribution of scores highlights targeted areas for improvement: innovation and human capital are the weakest links, while culture and infrastructure are relative strengths (see Table 1).

Overall, the obtained results indicate an asymmetry in the structure of Moldova’s entrepreneurial ecosystem: despite the presence of a relatively favorable cultural environment and basic infrastructure, systemic constraints remain in the areas of innovation development, human capital, and institutional regulation.

years), as was done in our pilot phase in 2020 (see Stratan et al., 2021).

The high score for Entrepreneurial Culture is a promising sign that Moldova has fertile social soil for entrepreneurship. This aligns with anecdotal evidence of vibrant startup meetups and growing business competitions in Chisinau. It suggests that human attitudes and networks as an intangible asset are strong. From a policy standpoint, this cultural capital can be leveraged. For example, success stories and mentorship could be widely promoted to normalize risk-taking and reduce stigma around failure. At the same time, the lower sub-scores within culture (e.g. limited risk tolerance, sensitivity to failure) point to specific cultural barriers. Addressing these might involve entrepreneurship education that teaches resilience, or legal reforms to simplify bankruptcy so that failure carries fewer personal consequences.

The weakest scores at Innovation (-0.71) and Human Capital (-0.50) signal critical bottlenecks. The innovation findings reveal a striking lack of linkages between entrepreneurs and the research/academic sector, as well as inadequate public incentives for R&D. More than half of entrepreneurs either do not know how to protect intellectual property or find the process too burdensome. This suggests that Moldova’s nascent innovation system is not yet providing tangible support to businesses. In practice, this could hinder the country’s transition to a knowledge economy. Remedies may include creating awareness and assistance programs for patents and trademarks, funding collaborative projects between universities and firms, and enhancing support for tech startups (incubators, grants, etc.). Such measures would be highly context-specific: for instance, a tailored incubator program might target Gagauzia or North regions where entrepreneurs reported especially low scores, ensuring that support reaches beyond Chisinau.

Similarly, the negative view of human capital reflects the combined challenge of skills gaps and emigration. With 90% of rural firms viewing emigration as a serious obstacle (versus 74% of urban firms), and with entrepreneurs citing shortages of skilled workers, Moldova's economy is losing talent faster than it can replenish it. Policies to address this could include improving STEM and vocational education quality, creating incentives for diaspora professionals to return (or at least contribute remotely), and promoting digital work that can engage those who have emigrated (for example, enabling remote startups funded or run partly by Moldovan expatriates). The relatively positive ratings for digital skills and on-the-job training indicate some assets to build on: these strengths could be expanded through targeted programs (e.g. subsidized digital upskilling for SMEs). The moderately negative scores for Finance (-0.19) and Markets (-0.26) suggest that firms encounter obstacles but also some room for competitive activity. Difficulty accessing venture capital and modern financing is a common theme in many developing economies. In Moldova's case, policy could support the emergence of angel investor networks, credit guarantee schemes for SMEs, or partnerships with diaspora investors. On the market side, the finding that export markets are hard to reach (59% of firms struggle with EU export) implies that export promotion services need strengthening. This might involve trade missions, help with certification for

EU standards. The domestic market is characterized by high informal competition; thus, reducing informality (through better regulation and enforcement) could benefit formal SMEs.

Finally, the relatively small negative Kee for Legal Framework and Regulation (-0.10) indicates frustration with bureaucracy and taxation. Entrepreneurs pointed to unpredictable tax policy changes and slow judicial processes as pain points. These issues fall under governance reform: streamlining licensing procedures, ensuring tax stability (through transparent consultation processes), and reinforcing rule of law could help. Notably, registering a new company was not seen as difficult, which suggests that the fundamental legal infrastructure for entrepreneurship is in place – the challenge is in the details of regulation and administration.

In summary, the assessment reveals that Moldova's ecosystem cannot be characterized as uniformly strong or entirely dysfunctional. Cultural and some infrastructural elements provide a foundation, but substantive weaknesses in innovation support, human capital, and regulation stand in the way of stronger entrepreneurial activity. These findings carry lessons beyond Moldova. They illustrate how a tailored evaluation can surface country-specific constraints and priorities. As other scholars have suggested, complementing broad international comparisons with localized diagnostics can lead to more effective, context-sensitive strategies.

6. CONCLUSION

6.1. Methodological and Theoretical Contribution

The central methodological contribution of this study lies in the design of a context-specific evaluation tool tailored to Moldova's entrepreneurial ecosystem. Unlike global indices that rely on a fixed set of universal pillars, our framework was built bottom-up from Moldova's context and realities. It integrates 134 indicators across eight components of the entrepreneurial ecosystem (Finance, Human Capital, Infrastructure, Innovation, Entrepreneurial Culture, Markets, Regulatory Framework, and Risks).

A distinctive element of the tool is the use of the Entrepreneurial Ecosystem Evaluation Coefficient (Kee) as the aggregation metric. The Kee formula translates survey responses on a five-point Likert scale into a composite score ranging from -2 to +2, reflecting the balance between positive and negative perceptions. This allows policymakers to immediately see whether entrepreneurs view a component as enabling or constraining, while also enabling comparison across components and over time.

By combining a wide set of context-relevant indicators (e.g. labor migration, availability of digital skills, access to non-traditional financing such as crowdfunding) with a straightforward aggregation method, the tool provides both granularity and interpretability. Importantly, it is designed to be replicable: the survey can be repeated periodically to track dynamics, and the tool can be adapted

to other small economies with similar structural challenges. In this sense, the Kee methodology represents not only an assessment exercise but also a new diagnostic framework for entrepreneurial ecosystems in transition economies. Our findings highlight the importance of listening to local entrepreneurs: their collective voice through this survey has identified actionable priorities such as improving university-industry links, addressing skills shortages, and facilitating finance and exports.

From a theoretical point of view, the results confirm the limitations of universal models for assessing entrepreneurial ecosystems. In the case of Moldova, the key factors are active migration processes, informal/grey practices, and regional infrastructural specificity, which are not directly reflected in global indices. This indicates the need to integrate contextual factors into the methodology for assessing ecosystems in transition economies.

6.2. Practical Implications for Public Policy

The empirical evidence points to a differentiated ecosystem structure in which existing cultural capital and basic infrastructure provide a platform for business activity, yet persistent constraints in innovation systems and human capital limit long-term competitiveness.

The practical conclusions of the study indicate the need for:

- strengthening innovation support policies and developing mechanisms for cooperation between universities and business;

- developing measures to reduce the shortage of qualified personnel and improving mechanisms for the return and involvement of the diaspora in business;
- developing alternative and venture forms of financing;
- strengthening export infrastructure and supporting SMEs' access to external markets;
- introducing regionally differentiated instruments for supporting entrepreneurship.

The proposed assessment tool can be used as a basis for monitoring the state of the entrepreneurial environment and adjusting policy documents in the current context of the European integration of the Republic of Moldova.

6.3. Research Limitations

Despite the obtained results, the study has a number of limitations. First, the analysis is based on entrepreneurs' subjective evaluations, which reflect their perception of current conditions but do not replace objective macroeconomic and institutional indicators. Second, the survey

was conducted in 2022 during a period of significant external shocks (the COVID-19 pandemic and the military conflict in a neighboring country), which may have intensified the negative perception of certain components of the ecosystem. Third, despite the structured sample, the number of surveyed enterprises limits the possibilities for full statistical extrapolation of the results to the entire entrepreneurial sector.

6.4. Directions for Further Research

Accordingly, the following can be identified as promising directions for further research:

- Conducting repeated surveys to analyze the dynamics of changes in the entrepreneurial ecosystem over time.
- An in-depth analysis of regional differences within the country.
- Integrating entrepreneurs' perception data with objective institutional and macroeconomic indicators.

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THEORETICAL AND APPLICATIVE APPROACHES TO BUSINESS COMBINATIONS: A CASE STUDY FROM THE REPUBLIC OF MOLDOVA

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Abstract

The emerging economy of the Republic of Moldova constitutes a favorable environment for mergers and acquisitions (M&A), governed by specific regional factors, local economic opportunities, and the population's aspirations toward European integration, as well as recent global disruptions (including the pandemic crisis, regional instability, and the armed conflict in the neighboring country). Motivated by the international research in this field, we aimed to conduct an exhaustive empirical study on the financial performance of M&A transactions for a sample of 375 enterprises from the Republic of Moldova, specifically during the period from 2019 to 2024, a time interval marked by economic volatility and strategic significance.

The research objective is to establish and conditionally validate the variation in return on assets and capital indicators in Moldovan mergers, as well as to investigate how capital structure and the size of the acquirers and acquirees influence the performance of these transactions.

Research methodology: The quantitative research includes systematization and grouping of data from financial statements provided by the National Bureau of Statistics for entities participating in M&A, as well as multiple linear regression analysis to assess the dependence of return on assets (ROA) and return on equity (ROE) as a result of changes in independent variables. Additionally, R Studio, JASP, and Excel applications were used as statistical data processing tools, while the Bibliometrix tool and Web of Science database were applied for bibliometric analysis.

The research results support the purpose and hypotheses of the paper through three multiple linear regression models, which established the significant dependence of ROA and ROE, determined by gross commercial margin, asset size, and debt ratio.

Keywords: mergers and acquisitions (M&A); business combinations; financial performance.

1. INTRODUCTION

Mergers and acquisitions (M&A) at the global level represent a complex and profound domain, utilized and applied with progressive intensity in recent times.

Recent studies in the field provide a clear picture of the interest from both the academic community and the business environment regarding the quantification of efficiency and quality of these processes, as well as the definitive impact on decision-makers and synergies of the parties involved.

A significant contribution to the research of M&A globally is made by the team of researchers led by Bauer F. and others (Bauer et al., 2025), having the most publications in Web of Science over the last 5 years, focusing on the correlation between managerial factors and post-merger performance or corporate synergies (Bauer & Friesl, 2024). They are followed by Hussain T. and Kumar N. (Hussain & Kumar, 2025), who have specialized in ecological mergers and innovations in hostile takeovers (Hussain et al., 2024). A research alliance including Tarba S.Y. has also outlined the correlations of the human factor in global mergers and acquisitions (Tarba et al., 2020) and human resource management versus cross-border performance (Tian et al., 2021).

Romanian studies in the field are becoming more competitive and attractive to the international community through the achievements of authors Aevoae M.G., Robu I.B., and others (Robu et al., 2025) through a series of publications in the field of Romanian energy

mergers, as well as circular analyses of corporate performance and accounting quality in mergers (Herghiligi et al., 2024) and research equally significant for merger performance in small Romanian entities (Maha et al., 2023).

In the Republic of Moldova, although this field has an economic context, qualitative and quantitative empirical research has not been conducted previously. However, this subject has been tangentially reflected in articles by authors Hromei and Cuza (Hromei & Cuza, n.d.), Grigori L., and Lazari L., outlining the accounting treatment of business combinations according to national and international regulations (Lazari & Grigori, 2016).

In this paper, we propose to analyze the quality and performance of business combination processes based on financial data of companies participating in absorption mergers and a case of consolidation merger from the Republic of Moldova during 2019-2024, a period characterized by multiple crises and economic instabilities. The purpose of this research is to conduct a descriptive and in-depth analysis of financial indicators before and after the merger process and to assess their quality for entities in the Republic of Moldova.

The scientific approach was made possible through the following research objectives:

- Identification of the sample of entities participating in mergers in the Republic of Moldova for the period between 2019 and 2024 and collection of statistical data;
- A detailed and descriptive analysis of the collected data will be conducted by sorting, filtering, and grouping it to verify the research hypotheses.
- Application of simple linear regression, verification, and assessment of the quality of the econometric model;

2. LITERATURE REVIEW

In the last five years, the number of publications related to this topic has been growing rapidly. Thus, by conducting a simple bibliometric analysis on the Web of Science database, approximately 679 articles published from 2019 to the present can be identified that meet the

- Analyzing statistical results to determine key drivers of M&A efficiency in Moldova through regression modeling and contextual conclusions.

The originality of this paper consists in conducting a unique case study for the economic environment of the Republic of Moldova in the field of M&A, using multiple techniques and tools for collecting and processing statistical data, such as R Studio, regression analysis through Excel and JASP, and bibliometric analysis using Bibliometrix and Web of Science.

search criteria for the keywords "mergers and acquisitions" and "performance," as shown in Figure 1. Therefore, the interest in this subject among researchers is superior.

Figure 1: Number of Publications in Web of Science (2019–2025)



Source: Author's illustration.

Starting points for this task are the results of researcher Chiriac I (Chiriac, 2023), regarding the significant relationship between government investments in human capital and the number of mergers from the EU, which includes a detailed analysis of the typology of government expenses for the 27 European states and the number of M&A between 2012 and 2020, conducted using the panel regression method. This paper is remarkable due to its method of grouping and analyzing government expenditures, as well as the way it presents and displays the results.

Contrarily, the author Aevoae G. M. (Aevoae, 2024) studied the dynamics of the M&A market in Romania during the period from 2010 to 2018, using a multiple linear regression model. In this case, the characteristics of the premium paid by acquirers in Romanian mergers were studied in correlation with the following variables: the number of shares controlled, the percentage of shares acquired, the size of the target entity, and the accounting regulations applied during the respective period.

The authors Chernenko N., Moiseienko T., and others (Chernenko et al., 2021) managed to identify an optimal solution in the case of the linear regression model for

assessing the degree of investment capitalization and the technological development of the enterprise in the post-merger stage. The results of this study demonstrate that the most significant investments obtained from mergers primarily refer to hostile takeovers of enterprises in the United States and Asia.

From another perspective, the authors Lin J.L., Yen Y.H., and Chan C. (Lin et al., 2025) structure their research on corporate social responsibility by defining the fees from mergers depending on the size of the entity, market value of shares, shareholding, type of participant (governmental or private capital), and dummy variables introduced for hostile or horizontal takeover, type of payment in cash or stocks, etc. Additionally, the methodology estimates financial indicators such as asset turnover rate, marginal profit, leverage ratio, or cash ratio, which define the quality of the independent variable of corporate social responsibility.

In the analysis conducted by Chen R., Wang X., et al. (Chen et al., 2025) to determine the influence of the tax regime on corporate M&A in China for the period 2015–2021, the authors used control variables through the indicators: leverage, return on assets, cash ratio, and current liquidity. Therefore, the financial information of

entities quantifies and describes the extent of the M&A process through the numerical materialization and coding of transactions.

Similarly, Bai Y. and Zhang H. (Bai & Zhang, 2024), as well as Chakraborty I. and Kattuman P. (Chakraborty & Kattuman, 2023), use control variables in their studies, such as operating marginal profit, firm size (logarithm of total assets), Tobin's Q ratio, and the number of firms. The impact of these studies targets, on one hand, the effect of mergers and acquisitions on technologization and innovation (Bai & Zhang, 2024) for listed enterprises in China, and on the other hand, the consequences of India's implementation of the Agreement on Trade-Related Aspects of Intellectual Property Rights, which substantially affects post-merger performance (Chakraborty & Kattuman, 2023).

Another form of research exposition is presented by Can R. and Dizdarlar H.I. (Can & Dizdarlar, 2022), where three econometric models are employed to highlight the negative impact of managerial overconfidence on the value of the target entity. All three multiple linear regression models include calculations based on financial

indicators such as Tobin's Q ratio, the stock value of the target entity for 12 months before and after the transactions, and the market value of the entity expressed in liquidity. The results of these studies demonstrate the negative influence of managers' overconfidence on the estimated value of the target entity.

The attribution of return on assets (ROA) as the key indicator for analyzing the efficiency and performance of M&As was identified in the work of researchers Lachwani V.M., Tiwari S., and Jauhari S. (Lakhwani et al., 2018). This publication examines the impact of the following indicators: ROA, marginal net profit, and asset turnover on merger performance, based on a study of 24 acquiring firms during the period 2005 to 2006.

In conjunction with multiple previous studies, Faccio M. and Masulis R. (Faccio & Masulis, 2005) described the factorial dependence of managerial decision-making regarding the choice of payment method in M&A, quantified based on asset growth, liquidity, leverage ratio, cash weight, and market value of shares.

3. METHODOLOGY

Our research is focused on establishing the efficiency of the M&A process in the Republic of Moldova from 2019 through 2024, a time when the country's economy was shaken by multiple phenomena such as the COVID-19 pandemic crisis, followed by an energy, logistical, and socio-political emergency resulting from the outbreak of the war in Ukraine, which disrupted the normal functioning of the economic activities of many local enterprises.

Since the purpose of this study is to assess the efficiency of local mergers and acquisitions operations, it is appropriate to develop the following research hypotheses:

Hypothesis 0: Corporate M&A is conditioned by the variation of the return on assets and equity.

Hypothesis 1: The efficiency of a merger is determined by changes in the capital structure and the company size of the acquirer or acquiree.

Therefore, in this paper, we will assess the extent to which the ROA and ROE indicators are properly measurable and timely for evaluating the success of M&A, as well as whether changes in the capital structure and size of the merged enterprises correlate with the performance of this process.

3.1. Sample selection

The purpose of this study is to identify the resultant influence of the return on assets and equity indicators for merged enterprises in the Republic of Moldova during the period 2020-2024. The selected data includes a sample of 375 enterprises, of which 164 are acquirers, 209 are acquirees, and just 2 are mergers by consolidation. We collect data from the publicly available financial statements of the National Bureau of Statistics for the year before and following the acquisition.

3.2. Analysis Method

Guided by the ideas of Aenoae G.M. (2024), Chen R., Wang X., et al. (2025), Lakhwani V.M. (2017), and Fuad, J.A. (Fuad & Jatmiko, 2022), we define the dependent variables: return on assets (ROA) and return on equity (ROE) for assessing the quality of a merger.

The independent variable Year is a binary (dummy) variable, estimated as 1 for the year in which the merger was finalized and 0 for the preceding year. Such a dummy variable more easily defines the opportunity for grouping companies to assess the impact of the end of the process and individual financial performance. All the variables used in the research are defined in Table 1.

Table 1: Meaning and explanation of the variables

Variable type	Variable symbol	Formula	Meaning of variable
Dependent variable	ROA	$\text{Net Profit} \div \text{Assets}$	> ROA – efficient use of assets, < ROA – inefficient use of assets
Dependent variable	ROE	$\text{Net Profit} \div \text{Equity capital}$	> ROE – Increased return on capital investment < ROE – low return on capital investment
Control Variable	LogAssets	Ln (Assets)	Target company size
Control Variable	LogDebts	Ln (Debts)	Effects of indebtedness
Independent variable	Profitmarginal	$\text{Net profit} \div \text{Sales revenue}$	Proportional increase in capital

Independent variable	Gross marginal	(Sales revenue – Cost of sales) ÷ Sales revenue	Degree of coverage of costs from sales
Independent variable	Leverage	Debts ÷ Equity capital	< 1 – low financial risk = 1 financial balance > 1 increased financial risk
Dummy	Year	Year of M&A	1 – Merger completed 0 – year before the merger

Source: Author's aggregation

As mathematical modeling options, the following multiple linear regression models have been established.

The ROA efficiency model is defined as follows:

$$ROAi = \beta_0 + \beta_1 \times \text{Grossmarginal}_i + \beta_2 \times \log(\text{Debts}_i) + \beta_3 \times \text{Year}_i + \epsilon_i$$

The defined ROE efficiency model:

$$ROE_i = \beta_0 + \beta_1 \times \text{Profitmarginal}_i + \beta_2 \times \text{Leverage}_i + \beta_3 \times \text{Year}_i + \epsilon_i$$

And the ROE combined model:

$$ROE \text{ combined}_i = \beta_0 + \beta_1 \times \text{Profitmarginal}_i + \beta_2 \times \text{Leverage}_i + \beta_3 \times \log(\text{Assets})_i + \beta_4 \times \text{Grossmarginal}_i + \beta_5 \times \log(\text{Debts})_i + \beta_6 \times \text{Year}_i + \epsilon_i$$

As mentioned before, we used to validate the research hypotheses and model the R Studio, Excel, and JASP tools.

4. RESULTS

Due to structuring the research based on the three multiple linear regression models, the independent verification stages are applied consecutively and identically for each case, and finally, the data and results are compared reciprocally.

Hypothesis 0 regarding the efficiency of applying the dependent variables, asset return, and capital return, can be tested and validated through the development of the ROA and ROE models using various tools. Initially, the data collected in an Excel file was tested using linear

regression. Through multiple exclusions and repetitive checks, the indicators presented in Table 1 were deemed appropriate for analysis.

The analysis of asset return is defined by the gross margin and the debt structure, which, to reduce data dispersion, is mathematically manipulated through the natural log of total debt and Year, a binary variable specifying the period of the merger and the previous one. The descriptive statistical data of the variables are specified in Table 2.

Table 2: Descriptive statistical results of the variable

Variable	Min	Max	Mean	Std. Dev.	Median	No. of observations
ROE	-1357,0940	8173,9072	16,9928	337,219025	0,0350	645
ROA	-1357,0940	8173,9072	16,3782	337,010863	0,0000	645
LogAssets	0,0000	10,4730	6,4940	2,1404778	6,8520	645
Profitmarginal	0,0000	10,8420	5,3520	330,066937	6,3840	645
Leverage	-1554,0124	8173,9072	9,7221	344,908686	0,3428	645
LogDebts	0,0000	10,3220	5,9890	2,19962437	6,390	645
Grossmarginal	-5794,1459	1,38100	-8,7225	227,448757	0,1552	645
Year	0,0000	1,0000	0,4576	0,4985855	0,0000	645

Source: Author's calculation.

Subsequently, to verify the accuracy of the instruments and assess the reliability of the econometric and statistical applications, the same stages were simulated using

R Studio. In this regard, Table 3 and Table 4 include the values of the coefficients and the results of these tests.

Table 3: Impact of debts and gross margin on ROA

Variable	Coefficient	Standard Error	T value	P value	Significance
Error ϵ	44,087314	12,914216	3,413859	0,0006806	***
LogDebts	-5,376292	1,859033	-2,891983	0,0039571	**
Grossmarginal	-1,412047	0,017796	-79,346533	0,0000000	***
Year	-17,100050	8,208745	-2,083150	0,0376308	*
R ²	0,9071				
R ² adjusted	0,9067				

F-statistic	2101				
p-value	<0,001				
Note: Significance: 0 '***', 0,001 '**', 0,01*', 0,05 '.', 0,1 ' ', 1					

Source: Author's calculation with R Studio.

Therefore, we obtained a regression model, calculated using the Ordinary Least Squares (OLS) method, which estimates the values of return on assets (ROA) based on the commercial gross margin, debts, and the year of the merger. The model explains a statistically significant proportion of the variance in the dependent variable ROA, justified by the R^2 coefficient of determination, as well as the adjusted R^2 of 91%, and the p-value < 0.001. The standard error, corresponding to the values of zero, is 44,09 within the confidence interval from 18,73 to 69,45 in this model:

The effect of the gross margin is statistically significant and negative, with a beta parameter value of -1,41 and a p-value < 0,001. The obtained data confirms an inverse relationship, meaning that in this model, an increase in the gross margin is associated with a decrease in asset profitability.

The impact of logarithmically transformed debt is statistically significant and negative, due to the beta parameter slope of -5,38, $p = 0,004$. Therefore, an increase in the company's debt conditions a decrease in ROA, although the effect is smaller than that of the gross margin.

And the year effect is statistically significant and negative, which means that ROA will decrease over time, according to the obtained model.

The standardized parameters were applied by adjusting the model, and the 95% confidence intervals and p-values were calculated using a Wald t-distribution approximation with the help of the R Studio tool.

All the variables in the ROA model have a negative slope, which explains the inverse relationship with the dependent variable. Similar to this analysis, we will proceed with the ROE model.

Table 4: Impact of variation of debts and profit margin on ROE

Variable	Coefficient	Standard Error	t-Value	p-value	Significance
Error ϵ	4,82799	0,52509	0,272	0,0234	*
Leverage	0,25719	0,03277	0,848	0,0000	**
Profitmarginal	0,70283	0,03426	0,517	0,0000	***
Year	12,60466	0,65261	1,306	0,1921	
R^2	0,8689				
R^2 adjusted	0,8683				
F-statistic	425,00				
p-value	0,001				
Note: Significance: 0 '***', 0,001 '**', 0,01*', 0,05 '.', 0,1 ' ', 1					

Source: Author's calculation with R Studio.

Similarly, this model was obtained using the ordinary least squares (OLS) method to describe the dependence of return on equity (ROE) on leverage, profit margin, and year. The model explains a statistically and substantially significant proportion of the variance in the ROE variable by the selected independent variables for analysis (R^2 and adjusted $R^2 = 0,87$, $p < 0,001$). The model error term, corresponding to the zero values for all defined variables, is 14.83, with a moderate significance level $p = 0,023$. Within this model:

The effect of the debt ratio is statistically significant with a positive elasticity of 0,26, $p < 0,001$. This means that with the increase in debt, the return on equity will also increase, albeit insignificantly.

The impact of the profit margin on ROE is statistically significant and positive, and the slope of the beta parameter also has a positive value of 0,70 with $p < 0,001$. An

increase in the profit margin by 1000 c.u. will result in an approximate increase in profitability by 700 c.u.

The effect of the year is statistically insignificant and negative. The slope of this variable is negative at -12,60, and due to the p-value of 0,192, the impact on the change in ROE over time will not be felt.

All calculations were performed by adhering to the standardized adjustment parameters of the model with 95% confidence intervals (CI), similar to the previous model.

The results obtained statistically inform us that the independent variables have a significant impact on the profitability of assets and capital, either positively or negatively, depending on the values of the coefficients, except for the Year variable in the ROE model; therefore, this indicator does not produce changes or effects for analysis.

Table 5: Impact of variation of debts and profit margin on ROE combined

Variable	Coefficient	Standard error	t-value	p-value	Significance
Error ϵ	0,243	0,450	0,237	0,025649	*
LogAssets	0,070	0,372	0,097	0,036409	*
Profitmarginal	0,547	0,308	0,104	0,916810	
Leverage	8,178	0,221	0,025	0,979752	
LogDebts	1,111	0,251	3,417	0,00673	***
Grossmarginal	1,410	0,955	15,750	0,0000	***
Year	1,564	0,314	1,881	0,060439	.
R2	0,9066				
R2 adjusted	0,908				
F-statistic	39				
p-value	0,001				

Note: Significance: 0 '***', 0,001 '**', 0,01 '*', 0,05 '.', 0,1 ' ', 1

Source: Author's calculation with R Studio.

The third linear regression model was also estimated using the ordinary least squares (OLS) method to predict return on equity (ROE) based on firm size (LogAssets), profit margin (Profitmarginal), leverage (Leverage), debt value (LogDebts), gross margin (Grossmarginal), and year (Year). The model explains a statistically and substantially significant proportion of the coefficient of determination, with an adjusted R^2 close to 1 (R^2 and adjusted $R^2 = 0,91$) and a p-value close to zero ($p < 0.001$). The corresponding standard error for the null values of the indicators is 32,43, and the p-value is 0,026. In this model:

The effect of enterprise size is statistically significant and positive; the slope value β is 7,07 and meets the high significance level ($p = 0,036$).

The influence of the variation in debts and gross margin is also statistically significant but inversely proportional

due to the negative slope, with β for debts being -11 and for gross margin, $\beta = -1,41$.

The effects of profit margin, leverage, and the year of merger are statistically insignificant. For the profit margin, the slope has a positive value of $\beta = 0,00555$, while the other mentioned variables have negative values of -0,000818 and -15,64, respectively.

Due to the fact that the variation of the independent variables for all three linear models is highly significant at approximately 90%, we need to determine whether they are econometrically efficient.

In this case, the specialized literature suggests that we apply tests for heteroscedasticity, normality, and covariance. Using the same calculation R Studio tool, we illustrate the results of these tests in Table 6.

Table 6: Results of econometric tests on ROA, ROE, and ROE combined

Model type	ROA	ROE	ROE combined
P-value	0,0001	0,0001	0,0001
F-statistic	2101	1425	1039
R2	0,9071495	0,86888	0,9066281
R2 adjusted	0,9067176	0,86827	0,9057555
Shapiro–Wilk Test	No, W= 0,12526	No, W= 0,16115	No, W= 0,1467
Durbin–Watson Test	Yes DW = 1,9871, p-value = 0,4373	Yes DW = 2,003 P-value = 0,5077	Yes DW = 1,997, p-value = 0,4861
Homoscedasticity	Yes, Chi-square = 1,4885, DF=1	Yes, Chi-square = 62,9109, DF = 1	Yes, Chi-square = 2,0125 DF = 1
Multicollinearity	Weak: Grossmarginal, LogDebts si Year	Moderate: Leverage și Profitmarginal Slabă: Year	Weak: LogActive, LogDebts, Year, Moderate: Leverage High: Profit marginal, Gross Marginal
Autocorrelation	No, p=0,378	No, p=0,752	No, p=0,770

Source: Author's calculation with R Studio.

However, some of the tests mentioned here present uncertainties in application; intuitively, if errors had been admitted in the processed financial data, the respective data would not have been sufficiently well corrected and filtered, and therefore these effects would produce residual and marginal values that have a high degree of deviation, which causes the impact of homoscedasticity.

5. DISCUSSION

We recognize the extensive variety of regression models that exist, each distinguished by its unique typology, methodological application, validation techniques, and economic interpretations. However, the models presented in this scientific endeavor were developed to assess the variation in asset and capital profitability for mergers in the Republic of Moldova, original and unique empirical research for the local academic environment.

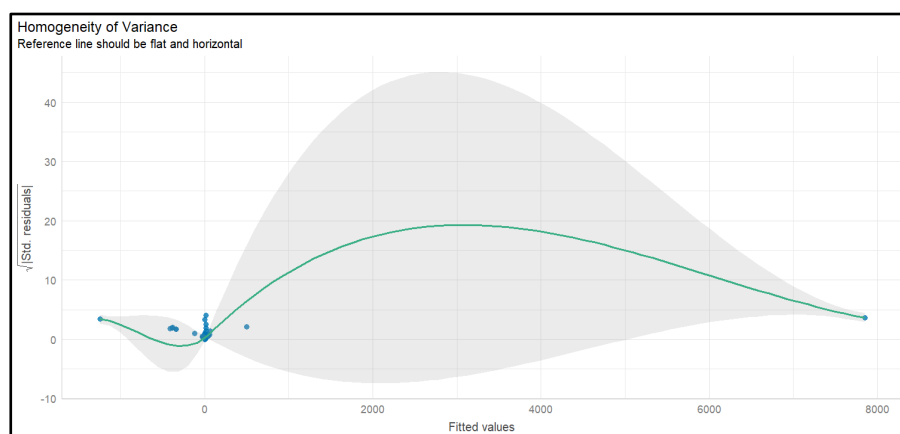
This result's validity is further corroborated by diverse non-linear studies and research findings that have reached comparable conclusions. The regression analyses of Gu Y., Xie W., and others (Gu et al., 2022) argue that the impact of independent variables sometimes does not have mandatory normality and heteroscedasticity. Therefore, there are determining factors that can distort some results, or by invalidating standard hypotheses, it can suggest another way of addressing the situation itself.

Concluding at this stage of the analysis, we can ascertain that the presented models largely meet the criteria for acceptance and validation through the validation of the significant influence of dependent variables on independent ones, and the application of other statistical tests does not suggest clarity due to the degree of dispersion and variety of entities in the sample.

As a result, obtaining a probabilistic value of the model (p-value) for all three models less than 0,001 indicates the existence of an imminent dependence between the ROA or ROE variable and at least one of the independent variables. A p-value so low (well below the conventional threshold of 0,05) indicates that the models are extremely statistically significant, supported by the results presented by Fuad J. (2022) and Agyei-Boapeah et al. (2019). These findings, coupled with the 90% coefficient of determination and its adjusted value across all three models, validate the high predictive and explanatory capabilities of our analysis, representing a significantly positive outcome for our research.

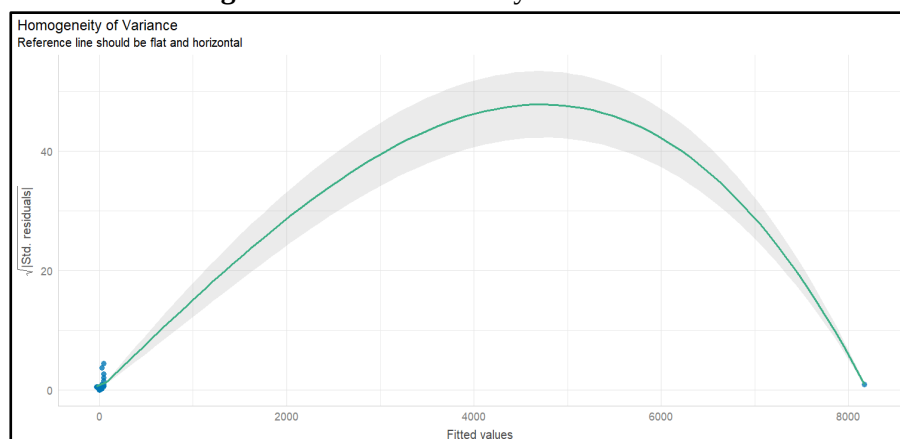
We obtained the same result for the homoscedasticity test for all models, but the illustrations can explain the differences in Figures 2 and 3.

Figure 2: Homoscedasticity for the model ROE



Source: Author's illustration with R Studio.

Figure 3: Homoscedasticity of the model ROA



Source: Author's illustration with R Studio.

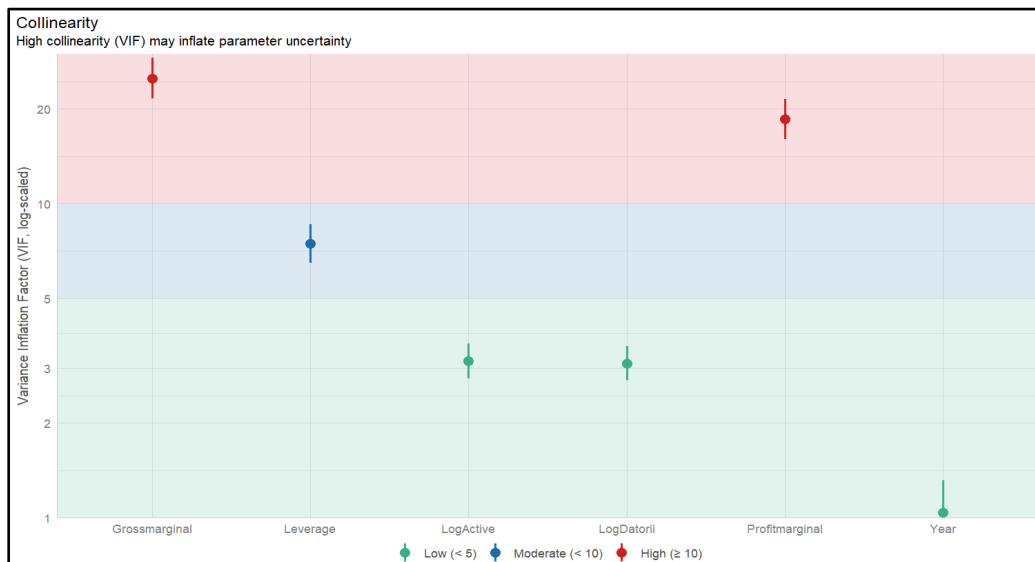
This means that the variance of the errors (residuals) is constant throughout the range of values of the independent variables. There is no "funnel" in the residuals plot. Implication: This is a key assumption of OLS linear regression. The fact that it is met means that the model coefficient estimates are efficient and that the standard errors and p-values associated with the individual coefficients are reliable. It is an excellent result.

In parallel with these assessments, the results obtained for the multicollinearity test for the ROA model are outstanding; therefore, all indicators have values below 5, which demonstrates the lack of connection between the independent variables. However, the ROE model is less advantageous in this regard, as there is a moderate but acceptable connection without distorting the overall image of the model. The combined ROE model involves

multiple instances of collinearity, including between gross commercial margin and marginal profit indicators, which demonstrate the direct relationship between indicators such as net profit and sales revenue, as presented in image 3.

The collinearity between marginal profit and gross commercial margin can also be influenced by the financial instability of enterprises caused by external economic effects, such as the COVID-19 crisis and the war in the neighboring country. The most basic explanation for this phenomenon is insolvency or cessation of activities due to the loss of markets, distribution networks, or leverage effect, resulting from rapidly escalating inflation in energy resources and territorial trade limitations and restrictions.

Figure 4: Multi-collinearity of the ROE combined model

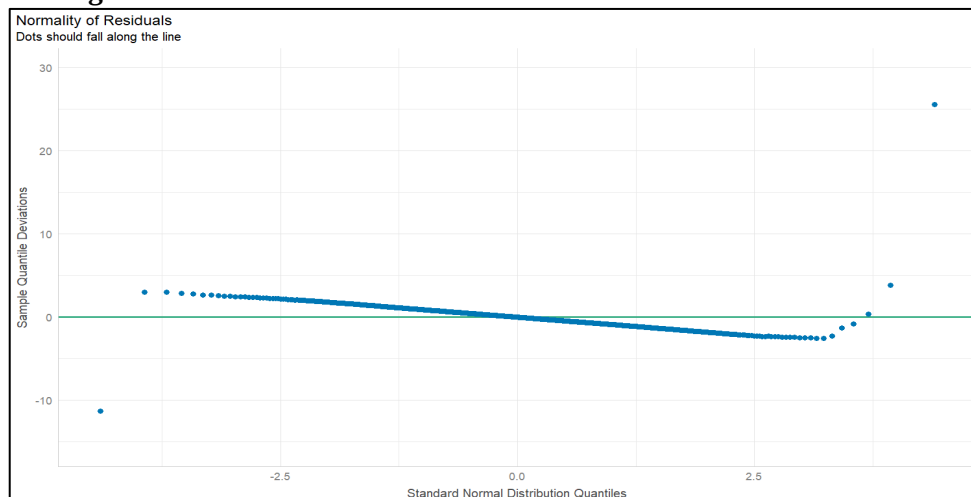


Source: Author's illustration with R Studio.

And finally, the negative result of the Normality Test—the Shapiro-Wilk Test—for all the models studied confirms that in the process of systematizing primary data and calculating financial indicators, in the case of obtaining an unassigned result, the respective data were

supplemented with zero, which produces certain non-normal deviations of the residual and marginal values. Figure 5 supports this hypothesis and addresses these side effects for multiple linear regression models.

Figure 5: Distribution of residual values of the ROE combined model



Source: Author's illustration with R Studio.

Returning to the subject of hypothesis validation, Hypothesis 0 is justified by the support of the quality of the ROA, ROE, and combined ROE research models presented through descriptive and econometric analysis. However, the second hypothesis, which establishes a direct dependence of the variation of performance indicators on the variation of capital or the size of the enterprise, requires attention. In this case, it is necessary to focus attention on the descriptive results of the LogDebts and LogAssets indicators. To understand how these variables affect ROA and ROE, it is appropriate to separate and analyze them distinctly. The independent variable LogAssets mathematically defines the size of the sample enterprises. Thus, this indicator is included in the combined ROE model, and the p-value of 0,03, acceptable within the confidence interval, justifies a partially significant influence on the resulting indicator. Moreover, the coefficient $\beta = 7,07$ suggests that the slope of this variable is positive; however, if we forecast an increase in assets by 1%, this will result in an ROE increase of 0,07 units, when ceteris paribus.

The second variable, LogDebts, was stipulated in both the combined ROA and ROE models. As the natural

logarithm of assets, this indicator is meant to provide calibration and statistical manipulation. For both models, the slope of this indicator is negative and can describe an inverse influence. The real increase in debt leads to a decrease in the return on equity and assets. Thus, with a 1% increase in corporate debt, ROE will decrease by 0,01 units, while ROA will decrease by 0,05 units, when ceteris paribus. However, the variation of this indicator is extremely significant for both outcome variables.

The arguments presented above for Research Hypothesis 1 validation demonstrate a significant connection between the debts and assets of the analyzed companies to the return on assets and equity, as the resulting indicators of the linear regression analysis.

Therefore, these investigations have allowed us to conclude that the purpose and objectives of the research fully encompass the analyzed domain. However, we must point out that these three linear regression models are not entirely perfect and unique, but they do serve as a starting point for future case studies and deterministic analyses of mergers and acquisitions in the Republic of Moldova.

6. CONCLUSION

This research allows us to conclude that the efficiency and performance of a merger and acquisition procedure in the Republic of Moldova are determined by the quality of the information presented and contained in the financial statements. The descriptive analysis conducted based on three multiple linear regression models, which target the variation in asset and capital profitability strictly dependent on marginal profit, gross commercial margin, debt variation, and the size of the participating companies' assets, is supported by statistical results and the validity of the tests.

The decrease in asset return is conditioned by all independent variables, including the gross commercial margin and the passage of time, as well as the debt variation. While the return on equity (ROE) model shows that

marginal profit and the degree of leverage have a significant positive impact, the combined ROE model reveals significant implications of debt, enterprise size, and gross commercial margin.

In this paper, we have attempted to highlight the importance of the financial performance of mergers and acquisitions in the Republic of Moldova, carried out during a period of social, economic, and geographical instability due to multiple crises and the situation in the neighboring country.

In the following studies, we will develop new statistical analysis models and establish the degree of volatility of financial indicators for mergers and acquisitions in the Republic of Moldova.

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DIGITAL TRANSFORMATION OF PUBLIC MONEY: A COMPARATIVE ANALYSIS OF THE ROLE OF CENTRAL BANK DIGITAL CURRENCIES

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Abstract

The digital transformation of public money driven by the development and adoption of central bank digital currencies (CBDC), represents a major development in contemporary monetary systems. This paper provides a qualitative comparative analysis of selected international CBDC initiatives with the aim of assessing their impact on payment system efficiency, monetary policy transmission and financial inclusion. The central research question concerns how CBDCs, as a digital extension of sovereign money, can contribute to a more efficient, secure and accessible payment system while preserving the fundamental characteristics of public money. The study is based on a structured review of secondary sources and applies a consistent comparative framework across selected jurisdictions, including China, the European Union, Sweden, Nigeria and the Bahamas. The analysis evaluates CBDC models using common criteria: policy objectives, implementation model, technological design as well as observable outcomes. The findings emphasize that CBDCs can enhance transaction efficiency, increase financial inclusion and strengthen monetary policy transmission mechanisms. However, these benefits are accompanied by significant challenges, including cybersecurity risks, privacy concerns as well as the need for international regulatory coordination. The paper contributes by clarifying the multidimensional nature of CBDC impact and by providing a more structured comparative framework linking empirical cases with theoretical implications. The results highlight that successful CBDC implementation depends on context-specific design choices, supported by robust regulatory and technological foundations.

Keywords: Central bank digital currency (CBDC), public money, digital transformation, monetary policy, financial innovation.

JEL: E58, F65, H83

1. INTRODUCTION

Central banks play a crucial role in maintaining monetary and financial stability, while ensuring broad access to safe and efficient payments. Traditionally, they provide central bank money through cash for the public and reserve accounts for banks, enabling secure transactions across the economy. However, the digitalisation of payments and the decline in cash usage, accelerated by events such as the COVID-19 pandemic, are transforming how people transact. To adapt, central banks are exploring a new form of money, Central Bank Digital Currency (CBDCs), which could complement traditional cash and offer a secure, efficient means of digital payment for the public (Bank for International Settlements, 2020).

The concept of CBDCs widely discussed in the monetary economics and financial innovation literature (Auer et al., 2020; BIS, 2021; World Bank, 2021; IMF, 2022), is increasingly recognized as a transformative instrument in the digitalization of public money. CBDC is a safe and liquid asset reducing the number of financial intermediaries and the settlement risk. In a CBDC framework, end users would hold a direct liability of the central bank, similar to holding cash, while the central bank would likely play a significant role in designing, establishing and operating the associated infrastructure and system (Reslow, Söderberg, & Tsuda, 2024).

CBDCs carry profound implications for monetary policy, payment system efficiency and financial

inclusion (Fan, 2022; Armelius et al, 2020; Opare & Kim, 2022). World Bank (2021) emphasizes that CBDCs can substantially improve financial inclusion by offering secure and low-cost payment services to underserved populations, while the International Monetary Fund (2022) highlights their role in broadening economic participation and fostering resilience in both advanced and emerging economies. Fan (2022) documents how China's Digital Yuan has advanced to large-scale trials, clearly improving payment efficiency, whereas Sveriges Riksbank (Armelius et al, 2020) notes that Sweden's e-Krona responds to the challenges of an increasingly cashless society. Similarly, Bergara and Ponce (2018) show that Uruguay's e-Peso confirmed the feasibility of CBDCs in improving access to financial services, especially among the unbanked.

At the same time, Kiff et al. (2020) emphasize that the introduction of CBDCs amplifies both cybersecurity vulnerabilities and risks to user privacy, while Carstens (2021) stresses that robust international regulatory coordination is essential to prevent jurisdictional fragmentation and ensure coherent global standards. Bindseil (2020) and Keister & Sanches (2022) warn that CBDCs might trigger disintermediation by redirecting deposits from commercial banks to central banks, thereby altering traditional credit allocation. These concerns shape the central research problem of this study: how CBDC design and implementation can

advance the digital transformation of public money while balancing their benefits with the regulatory, technological and financial-stability risks involved?

Although the body of literature on CBDCs has grown rapidly, important gaps remain. Opare and Kim (2022) point out the scarcity of empirical evaluations of CBDC adoption, while Gertler and Karadi (2023) stress that the long-term implications for monetary policy transmission and financial stability are not yet sufficiently understood. Chaum, Grothoff and Moser (2021) emphasize that the social and political implications of diminished financial privacy under CBDC regimes require much deeper analysis. These gaps justify the need for a comprehensive study that integrates theoretical perspectives, empirical evidence and policy considerations.

In this paper, impact is defined across three analytical dimensions, derived from the existing body of literature and grounded in the main issues examined by researchers:

- payment system efficiency (cost, speed, accessibility),
- monetary policy transmission (control, liquidity management, transparency),
- financial inclusion (access to financial services for underserved populations).

The central research question is therefore refined as follows:

How do different CBDC designs affect monetary policy transmission and financial inclusion across jurisdictions?

To address this question, the paper adopts a structured comparative approach, moving beyond a purely descriptive literature review. It systematically evaluates selected CBDC initiatives using a consistent set of analytical criteria, allowing for clearer cross-country comparison and stronger analytical conclusions.

2. LITERATURE REVIEW

The literature on CBDCs encompasses a broad range of topics, from technical design and implementation challenges to economic and policy implications. Academic contributions have investigated the foundational theories underpinning digital currencies alongside their prospective operational roles in present-day monetary systems. Early contributions to this discourse emphasized the capacity of CBDCs to advance financial inclusion by providing secure and accessible digital payment infrastructures to populations historically excluded from formal banking systems. In this regard, Ghosh and Sharma (2021) argue that CBDCs hold the potential to substantially reduce transaction costs while simultaneously extending access to financial services for marginalized groups, thus positioning them as critical instruments for narrowing structural gaps in economic participation.

The aim of this paper is to analyze the role and impact of CBDCs in the ongoing digital transformation of public money, with a focus on their potential to improve monetary policy transmission, strengthen payment system efficiency and promote financial inclusion. The subject of research is the design, implementation form and implications of CBDCs, while the geographic scope encompasses both advanced and developing economies, thus enabling a comparative assessment. The implications of this research are manifold. At the theoretical level, the study contributes to a deeper conceptual and analytical understanding of digital money within contemporary monetary systems. From a policy perspective, the study offers grounded insights to central banks and regulatory authorities in navigating the delicate balance between fostering financial innovation and safeguarding macroeconomic as well as systemic stability. At the practical level, the findings yield insights for financial institutions and market participants as they adapt their operations, strategies and infrastructures to the transformative dynamics introduced by CBDCs.

The structure of the paper is organized to ensure a coherent progression of the argument. The literature review provides a critical examination of academic and institutional contributions on CBDCs, highlighting both the opportunities they present and the challenges they entail. The methodology section delineates the qualitative research design and data sources underpinning the analysis. This is followed by a comparative examination of selected national cases, which situates the study within diverse empirical contexts. The subsequent analysis and results section synthesizes the principal findings, while the discussion addresses unresolved regulatory dilemmas and broader questions of systemic stability. Finally, the conclusion outlines its theoretical, policy and practical implications.

2.1. Regulatory and Operational Considerations

The regulatory landscape for CBDCs is complex and rapidly evolving. Scholars emphasize that successful implementation requires a coordinated regulatory framework addressing not just technological factors but also broader economic, fiscal, legal and policy considerations (BIS, 2021; Mancini-Griffoli et al., 2018). Chapman et al. (2020), alongside recent contributions from Auer, Cornelli and Frost (2020), underscore the necessity of proactive measures to strike a balance between innovation and financial stability, suggesting that clear regulatory standards and rigorous oversight mechanisms are critical for mitigating systemic risks. In a similar vein, Carstens (2021) underscores that effective international regulatory coordination is indispensable for mitigating the risks of regulatory arbitrage and for securing coherence in cross-border CBDC frameworks.

Furthermore, the interplay between retail and wholesale CBDC models adds additional complexity to regulatory and operational frameworks. Recent analyses by Adrian and Mancini-Griffoli (2021) and Bindseil (2020) illustrate that some jurisdictions are exploring a "two-tier" approach, where central banks first issue CBDCs to commercial banks or regulated payment providers, which then distribute them to the public. This model, advocated by Bindseil and Panetta (2020), promises to minimize risks associated with direct central bank-citizen interactions, such as operational bottlenecks, cybersecurity vulnerabilities and potential banking sector disintermediation. Thus, ongoing empirical research and pilot studies (e.g., Sand Dollar in the Bahamas; digital Yuan in China, as examined by Fan, 2022) offer practical insights into how various regulatory frameworks can effectively accommodate innovation while maintaining system stability.

Benefits of CBDCs

CBDCs are praised in recent scholarly discussions for several potential financial and societal benefits. One significant advantage highlighted by researchers is the enhancement of payment system efficiency. CBDCs, operating on advanced digital platforms, can facilitate near-instantaneous, low-cost transactions, significantly improving the speed, reliability and security of domestic and cross-border payments (BIS, 2021; Auer & Böhme, 2020; Adrian & Mancini-Griffoli, 2021). Empirical evidence from Fan's (2022) study of the Digital Yuan in China and from the Riksbank's (2020) e-Krona pilot report demonstrates that CBDC trials have already yielded significant efficiency improvements, most notably in transaction speed and cost reduction. Another notable benefit of CBDCs lies in their capacity to modernize monetary policy frameworks.

Recent research by Bordo and Levin (2017) and Dyson and Hodgson (2017) argues that the digital infrastructure inherent in CBDC systems enables central banks to conduct monetary policy operations more directly and transparently, potentially reducing dependence on conventional policy tools such as interest rate adjustments and quantitative easing. Further elaboration by Engert and Fung (2020) points to programmable features within CBDCs that could enable targeted policy measures, such as precise economic stimulus distribution during financial crises.

Moreover, CBDCs are increasingly regarded as powerful tools for enhancing financial inclusion. Scholars, including Barontini and Holden (2019) and Ozili (2022), emphasize CBDCs' potential to bridge significant gaps in financial service accessibility, particularly in developing economies where traditional banking infrastructure remains sparse or inadequate. CBDCs offer previously unbanked populations the opportunity to participate in digital financial ecosystems, facilitating access to savings, payments and credit-building opportunities (World Bank, 2021; Demirgüç-Kunt et al., 2022). Empirical analyses further reinforce this view, identifying positive correlations

between CBDC initiatives and increased financial inclusion metrics across multiple case studies, including initiatives in the Bahamas (Sand Dollar) and Nigeria (eNaira) (IMF, 2022; Opare & Kim, 2022).

Current literature reveals a multifaceted landscape where the functional gains of CBDCs are balanced by inherent risks. The theoretical contributions largely circle around two themes: the potential for enhancing the efficiency of monetary transactions and the inherent risks posed to traditional financial systems by digital disruption. Although centralized digital currencies hold the promise of significant economic transformation, they require careful calibration of technology, policy and regulation to ensure that they fulfill their potential without destabilizing existing financial structures.

Risks and Challenges

Despite these advantages, CBDCs come with a variety of significant risks and challenges that must be carefully addressed. Several studies highlight the potential for increased financial volatility associated with CBDC issuance, noting that improper management of liquidity and issuance dynamics could compromise monetary policy effectiveness (Agur, Ari, & Dell'Ariccia, 2022; Kumhof & Noone, 2018). As argued by Fernández-Villaverde et al. (2021), the destabilizing effects of CBDC-related volatility are most pronounced during crises, when deposit flight from commercial banks into CBDCs threatens to exacerbate liquidity shortages and magnify systemic vulnerabilities.

Bindseil (2020) and Keister & Sanches (2022) warn that the integration of CBDCs into existing financial ecosystems poses serious risks of bank disintermediation, as depositors may reallocate funds from commercial banks to central bank accounts, thereby destabilizing the traditional model of financial intermediation. Niepelt (2020) and Brunnermeier and Niepelt (2019) further argue that such a reallocation could significantly constrain banks' lending capacity and credit provision, with adverse consequences for economic growth and financial stability. In response to these risks, Adrian and Mancini-Griffoli (2021), alongside the Bank for International Settlements (2021), emphasize the urgent need for new regulatory and operational frameworks capable of managing transitional disruptions and safeguarding systemic resilience.

Cybersecurity represents another critical risk associated with the introduction and operation of CBDCs. According to Kiff et al. (2020) and Lagarde (2021) digital currencies heighten vulnerabilities to cyber threats, including hacking, fraud and large-scale data breaches. Central banks would therefore face substantial operational and reputational risks unless robust cybersecurity protocols and resilient technological infrastructures are implemented (Auer & Böhme, 2020; Bossu et al., 2020).

Allen et al. (2020) and Chaum, Grothoff and Moser (2021) contend that privacy constitutes one of the most pressing concerns in current academic and policy

debates on CBDCs, cautioning that their implementation could substantially expand governmental surveillance capacities and thereby erode financial anonymity. Garratt and van Oordt (2021), as well as European Central Bank (2020), highlight the persistent tension between transparency and privacy, emphasizing that policymakers must carefully balance the imperatives of regulatory oversight with the protection of individual rights to financial confidentiality.

Reslow, Söderberg and Tsuda (2024) explain that in a CBDC setting—particularly in the context of retail CBDCs—end users would directly hold a central bank liability, like holding cash, while the central bank would

likely play a major role in designing and operating the system. They argue that such an arrangement could enhance the efficiency of cross-border payments by reducing costs, settlement risks and intermediary dependence. Nonetheless, they acknowledge that some design and policy considerations also apply, at least indirectly, to potential wholesale CBDC models. The authors emphasize that despite these advantages, significant challenges remain, including interoperability between jurisdictions, regulatory alignment and the risk of currency substitution in smaller economies.

The following table summarizes the key features, benefits and risks associated with CBDC implementations in various national contexts:

Table 1. Overview of CBDC Features, Benefits and Risks

Feature	Benefits	Risks/Challenges
Digital Representation of Fiat	Increased liquidity and accessibility	Volatility impacting monetary policy transmission
Payment Efficiency	Lower transaction costs and faster settlement times	Cybersecurity vulnerabilities and data privacy risks
Financial Inclusion	Expanded financial inclusion for unbanked populations	Potential exclusion due to uneven digital infrastructure
Regulatory Framework	Enhanced transparency in policy implementation	Regulatory integration and operational disruptions
Cross-Border Payment Capability	Reduced costs and dependency on correspondent banks; Increased speed of transactions	Complex international coordination

Source: Author's compilation

Table 1 presents a synthesized view of the primary features of CBDCs as identified in the literature, highlighting both the significant benefits and the

challenges that need further regulatory and technological interventions.

3. METHODOLOGY AND DATA COLLECTION

This study employs a qualitative research methodology primarily based on an extensive literature review. The research strategy involves systematically gathering secondary data from scientific articles, technical reports, institutional publications and government documents published over the past decade. The selection criteria emphasized the relevance of each source to the central theme of CBDCs implementation, monetary policy and financial inclusion. Data were collected from multiple academic databases, focusing on studies that analyze the digital transformation of public money through CBDCs. Emphasis was placed on sources that provided empirical evidence, detailed case studies and theoretical models related to the subject matter.

The analytical framework for this research is based on thematic synthesis and comparative analysis. The paper qualitatively reviews the literature and compares international CBDC initiatives to assess their effects on monetary policy transmission, financial inclusion, payment system efficiency and emerging regulatory challenges within the broader digital transformation of public money. Each theme was then examined in detail to extract insights on both the benefits and challenges posed by CBDCs. The analysis also considered the specific context of various countries, highlighting differing approaches to CBDC implementation and the unique challenges encountered across regions.

Figure 1. CBDC Adoption Process Flow

Figure 1 depicts the sequential steps a central bank might follow to deploy a CBDC, highlighting the importance of each phase in ensuring a stable and efficient digital monetary system.

3.1. Comparative analysis

The analysis that follows examines the evolution and institutional design of CBDCs initiatives across a selected group of countries that are currently implementing or piloting such digital monetary instruments. The selected cases were chosen to capture variation across advanced and emerging economies, as well as different stages of CBDC development (pilot, live and design phases), allowing for a meaningful comparison of implementation models, policy priorities and observed outcomes.

Each case is analyzed using the following standardized criteria:

1. Policy objectives
2. Implementation model
3. Technological approach
4. Measurable outcomes (e.g. adoption, efficiency gains where available)
5. Key risks and challenges.

By comparing national contexts, objectives and implementation approaches, the analysis highlights both common patterns and distinctive national trajectories. Drawing on a wide range of scholarly and policy literature, complemented by illustrative case studies, the study seeks to provide comprehensive insights into the policy rationales, developmental pathways and key factors that shape the progress of contemporary CBDCs experiments.

Table 2. Comparative Analysis of CBDCs Implementations

Country / Union	CBDC Name / Status	Main Objective(s)	Implementation Model	Outcomes	Key Challenges
China (PBoC)	Digital Yuan (e-CNY) - Advanced Pilot	Payment efficiency, monetary control, digital competitiveness	Two-tier retail model via banks and telecoms	Large-scale use in cities; tested for cross-border trade	Privacy concerns, user surveillance, platform dominance - Alipay/WeChat
Sweden (Riksbank)	e-Krona - Pilot	Prepare for cashless society, resilience	Retail token-based pilot, intermediated access	Positive test feedback; raised public trust debates	Requires legal support; slow political momentum
European Union (ECB)	Digital Euro - Design/Consultation	Digital euro sovereignty, offline payments, privacy	Retail CBDC; intermediated via banks/PSPs	Legislative proposal (2023); privacy-by-design commitment	Harmonizing regulation across EU; bank disintermediation concerns
United Kingdom (BoE)	Digital Pound ("Britcoin") - Consultation	Future-proof money, innovation, competitiveness	Retail CBDC; intermediated model	Completed public consultation; next phase of development	Public trust, integration with fintech sector

Uruguay	e-Peso - Completed Pilot	Financial inclusion, digital payments	Direct issuance via mobile wallets	Pilot showed success with unbanked communities	Limited scalability; infrastructure constraints
Nigeria	e-Naira - Live	Financial inclusion, modernize public payments	Central bank issues via banks; wallet-based	Uptake among unbanked; promoted via social programs	Low adoption due to awareness gaps and trust
Bahamas	Sand Dollar - Live	Reach remote islands, reduce cash dependency	Retail CBDC via mobile wallets	Improved access in outer islands	Internet connectivity, user education
Ghana	e-Cedi - Pilot	Foster innovation, inclusion	Hybrid access (banked/unbanked)	Strong institutional support	Digital infrastructure development needed
Brazil	Real Digital - Pilot	Wholesale innovation, tokenized assets	DLT-based wholesale CBDC pilot	Sandbox projects with success	Legal framework for smart contracts
India	Digital Rupee - Pilot (Retail + Wholesale)	Payment modernization, resilience	RBI pilot with phased retail + wholesale rollout	Interbank clearing and retail wallet integration ongoing	Privacy safeguards and scaling
France (Banque de France)	Wholesale CBDC - Pilot	Improve financial market infrastructure	Token-based settlement of securities	Collaborated with MAS, Banque Centrale de Tunisie	No retail focus; integration with ECB
Switzerland (SNB)	Project Helvetia (Wholesale)	Test interbank clearing and DLT	Wholesale-only, via SIX Digital Exchange	Successful cross-border pilots	Not planning retail; legal clarity needed
Norway (Norges Bank)	No official name - Test phase	Digital resilience, future cash alternative	Exploring token and account-based pilots	Technical success in test environments	Public perception, legislative gaps
Lithuania (Bank of Lithuania)	LBCOIN - Pilot (2020)	DLT innovation, public education	Blockchain-based semi-retail experiment	Pioneer in Eurozone; limited rollout	Not scalable; ended as proof-of-concept

Source: Author's compilation based on data from Atlantic Council (CBDC Tracker, 2024), BIS (Auer et al., 2023), ECB (2023), IMF (2023)

In light of the preceding review, the thematic synthesis that follows critically examines the main comparative dimensions of CBDC initiatives, underscoring areas of strategic convergence as well as contextual specificities distinguishing global and European approaches.

Table 3. Thematic Synthesis: Key Comparative Dimensions of CBDC Implementation

Dimension	Global Trend	European Approach	Examples
CBDC Type	Mostly retail (plus some wholesale)	Retail focus with exceptions (France, Switzerland)	Retail: China, Nigeria, ECB, Sweden; Wholesale: France, SNB
Implementation Model	Two-tier or hybrid (banks + wallets)	Two-tier with intermediaries prioritized	China, ECB, UK, India
Technology	Distributed Ledger Technology (DLT) (often private), mobile-based wallets	DLT trials + privacy-focused programmable platforms	Bahamas (mobile), France (blockchain), ECB (offline + privacy)
Financial Inclusion	Strong goal in Global South	Not primary driver in EU; more focus on innovation, monetary sovereignty	Nigeria, Ghana, Uruguay vs ECB, Sweden
Legal Readiness	Often lacking, developing post-launch	Emphasis on pre-launch legislative framework	ECB, UK conducting legal consultation phases
Public Communication	Varies (low in Nigeria, high in EU)	Strong focus on stakeholder involvement	ECB, BoE public consultations; Bahamas public education

Source: Author's synthesis based on data from selected central bank reports (e.g., PboC 2022, Riksbank 2020, ECB (2023) and IMF (2023))

Global development of central bank digital currencies (CBDCs) shows two broad directions: a diverse, experimentation-driven approach across the world and a more structured, regulation-focused approach in

Europe. Most countries concentrate on retail CBDCs, while only a few explore wholesale versions. Europe follows this same pattern, with the digital euro conceived primarily as a retail instrument,

complemented by a small number of wholesale experiments in countries such as France and Switzerland.

A key feature of nearly all CBDC projects is the two-tier or hybrid model, in which the central bank issues the digital currency but does not interact directly with users. Instead, commercial banks and licensed payment providers operate digital wallets, perform customer verification and provide payment services. This arrangement allows the central bank to preserve monetary control while relying on existing financial infrastructure and avoiding disruption to the banking system. It also enables a competitive ecosystem of wallet providers, supporting innovation without centralizing operational responsibilities.

Technologically, many global pilots deploy Distributed Ledger Technology (DLT). Distributed Ledger Technology (DLT) is a method of record-keeping in which data is stored simultaneously across many connected computers rather than in a single central database. This creates a system where all participants share the same information and any change must be collectively verified, increasing security and reducing the risk of manipulation. DLT enables faster and more reliable transaction processing and makes the system more resilient to technical or operational failures. Europe engages with DLT more cautiously, testing its potential while prioritizing privacy, security, programmability and offline functionality for the digital euro.

Motivations for CBDC adoption likewise diverge: countries in the Global South often seek to expand financial inclusion, while European authorities focus on strategic autonomy, system resilience and regulatory clarity. Correspondingly, Europe invests heavily in pre-launch legal frameworks and extensive public communication, contrasting with more variable communication strategies found elsewhere.

In summary, although global CBDC experiments are varied and technologically adaptive, Europe pursues a structured, privacy-oriented model grounded in the two-tier distribution system and carefully evaluated technological choices such as private DLT and secure mobile-based wallets.

3.2. Bosnia and Herzegovina: A Brief Overview

Bosnia and Herzegovina is examined within the same comparative framework applied to other jurisdictions in order to ensure analytical consistency and comparability of findings. In this context, the potential introduction of a central bank digital currency would primarily aim to enhance cross-border payment efficiency and

strengthen integration with European financial systems, particularly in light of developments related to the digital euro. The most feasible approach would involve a two-tier retail model, in which the central bank issues the digital form of sovereign money, while intermediaries such as commercial banks and licensed payment providers facilitate distribution and user access.

From a technological standpoint, such an arrangement would likely rely on mobile-based solutions, supported by a high degree of interoperability to ensure compatibility with international payment infrastructures. Expected benefits include faster and more cost-effective remittance flows, along with broader improvements in payment system efficiency as well as accessibility. At the same time, these developments could contribute to the gradual modernization of the financial sector and support greater participation in formal financial services.

However, several structural and behavioral constraints may limit the effectiveness of such an initiative.

These include the population's strong preference for cash in everyday transactions, relatively low levels of trust in digital financial instruments, and potential implications for financial stability arising from shifts in deposit allocation. As a non-euro area economy with close economic ties to the European Union, Bosnia and Herzegovina would benefit from improved cross-border transactions and regulatory alignment with European standards. Nevertheless, challenges related to cybersecurity, data protection and the potential impact on bank intermediation remain significant. Impact on bank intermediation refers to the potential shift of deposits from commercial banks to central bank digital currency accounts, as households and firms may prefer holding risk-free central bank liabilities. This reallocation can reduce banks' funding base, increasing their reliance on more expensive or volatile sources of financing. As a result, banks may face constraints in credit creation, which could weaken their traditional role in financial intermediation and affect overall lending to the real economy. The magnitude of this impact depends on CBDC design features, such as holding limits, remuneration policies and the role assigned to intermediaries.

Consequently, adoption is likely to be gradual and concentrated in specific use cases, particularly international transfers and business-related payments, while cash would continue to play a dominant role in daily economic activity.

payment infrastructures, whereas advanced economies (e.g., European Union, Sweden, Switzerland) emphasize resilience, monetary sovereignty and innovation within established financial systems. This prioritization is based on the level of development of these countries, demonstrating that the implemented

4. RESULTS AND DISCUSSION

The comparative analysis of CBDCs initiatives demonstrates significant variation in strategic objectives, implementation models and policy frameworks across jurisdictions. Emerging economies (e.g., Nigeria, Bahamas, Ghana, Uruguay) tend to prioritize financial inclusion and improved access to

model should be tailored to the specific characteristics of each country.

Implementation models also reveal a global divergence. Many countries adopt two-tier structures, where central banks issue CBDCs through intermediaries such as commercial banks and payment service providers, to mitigate risks of disintermediation and operational overload. Conversely, selected pilots (e.g., Uruguay's e-Peso, Bahamas' Sand Dollar) experimented with direct issuance, showing benefits for inclusion but also scalability and infrastructure constraints.

Technological choices are similarly diverse. While several global South initiatives rely on mobile-based wallet solutions to address inclusion gaps, European pilots emphasize DLT and privacy-preserving programmable features. This contrast underscores different policy priorities: accessibility and adoption in developing contexts versus trust, privacy and stability in advanced jurisdictions.

The comparative synthesis yields three principal clusters of findings. First, with respect to monetary policy implications, CBDCs demonstrate considerable potential to enhance the transmission of monetary policy by enabling real-time monitoring and management of money flows. Empirical evidence from China's e-CNY and India's digital rupee pilots suggests improvements in transparency and transaction speed; however, these advances are tempered by concerns over financial volatility and the potential for destabilizing liquidity shocks.

Second, regarding financial inclusion and payment efficiency, experiences in the Bahamas, Nigeria and Uruguay underscore CBDCs' capacity to broaden access for previously unbanked populations by reducing transaction costs and promoting the widespread use of mobile wallets. In contrast, the primary rationale within advanced economies such as the EU and Sweden is not inclusivity but rather payment system modernization,

5. CONCLUSION

The digital transformation of public money driven by central bank digital currencies (CBDCs) represents a structural shift in the architecture of monetary systems. This study has shown that the impact of CBDCs is multidimensional, primarily manifesting through improvements in payment system efficiency, the strengthening of monetary policy transmission mechanisms and the potential expansion of financial inclusion. Comparative evidence across jurisdictions confirms that these effects are neither uniform nor automatic, but contingent on specific design and policy choices.

The findings indicate that CBDCs can significantly reduce transaction costs and increase payment speed, particularly in cross-border contexts, while also enhancing transparency and control within monetary policy frameworks. At the same time, their role in advancing financial inclusion is more pronounced in emerging economies, whereas in advanced economies

efficiency gains and preparedness for a predominantly cashless society.

Third, in terms of operational and regulatory challenges, the analysis reveals cross-cutting risks across jurisdictions, notably cybersecurity vulnerabilities, threats to data privacy and the potential disintermediation of the banking sector. European initiatives exhibit a greater degree of legal and regulatory preparedness, as reflected in the ECB's legislative proposals and the UK's consultative processes. By comparison, many pilots in the Global South have advanced without fully developed legal frameworks, thereby generating uncertainties concerning long-term scalability, systemic integration and institutional resilience.

The results suggest that CBDCs are not a monolithic policy instrument but a context-dependent innovation shaped by distinct socio-economic priorities. For the global South, CBDCs represent a tool for financial democratization, extending digital payment access and supporting development agendas. However, adoption has been uneven, constrained by infrastructure, public trust and digital literacy gaps.

In contrast, European and advanced economy approaches frame CBDCs as a means of safeguarding monetary sovereignty, enhancing systemic resilience and preparing for a cashless society. This orientation demands strong legal frameworks and an emphasis on privacy-by-design, reflecting political sensitivities about state surveillance.

A central dilemma cutting across cases is the balance between innovation and stability. While CBDCs can enhance transparency, efficiency and inclusion, they simultaneously raise risks of bank disintermediation, cybersecurity breaches and erosion of privacy. These trade-offs underline the necessity of robust regulatory coordination at both national and international levels.

the emphasis shifts toward system resilience, monetary sovereignty and innovation. These results underscore that CBDCs are not a homogeneous instrument, but a context-dependent policy tool shaped by differing socio-economic priorities and institutional environments.

However, the analysis also highlights a set of persistent trade-offs. Gains in efficiency and control are accompanied by risks related to cybersecurity, data privacy and the potential disintermediation of the banking sector. In particular, shifts in deposit allocation toward central bank liabilities may weaken banks' intermediation capacity and affect credit provision, thereby introducing new dimensions of financial stability risk. These challenges point to the necessity of carefully calibrated design features, including intermediated distribution models, holding limits and robust regulatory frameworks.

Despite the absence of a universal implementation model, certain convergences are evident across jurisdictions, notably the predominance of two-tier architectures, ongoing experimentation with distributed ledger technologies and an increasing emphasis on privacy-preserving design. These elements suggest the gradual emergence of global standards, albeit adapted to national contexts and policy objectives.

In the case of Bosnia and Herzegovina, the analysis suggests that a gradual and intermediated introduction of a retail CBDC represents the most feasible pathway. Given the country's currency board arrangement, strong reliance on cash and close economic integration with the European Union, the primary benefits would arise from improved cross-border payment efficiency and

alignment with European financial infrastructures. Policy priorities should therefore focus on targeted use cases, particularly international transactions and public-sector payments, where efficiency gains are most evident and adoption barriers relatively low.

Overall, while CBDCs present substantial opportunities for modernizing public money, their successful implementation depends on balancing innovation with financial stability. For policymakers, the central challenge lies not in whether to adopt CBDCs, but in how to design them in a way that aligns with national economic structures while addressing the broader risks inherent in the digital transformation of monetary systems.

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HOW TAXPAYERS PERCEIVE DIGITAL TAX ADMINISTRATION IN SLOVENIA?

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Abstract

The OECD (2022) predicts the automation of tax procedures, which opens up the possibility of removing many structural constraints of existing systems. This involves moving from complex, sequential procedures to more inclusive, user-friendly solutions that are integrated into individuals' business and everyday digital systems (OECD 2025). This paper examined taxpayers' perception of digital tax administration (TA) in Slovenia. Using a structured questionnaire, an empirical study in the first half of 2025 on a sample of taxpayers on two specific groups of taxpayers was conducted. The results of the survey showed that user satisfaction with the information provided by the TA is positively linearly correlated with their satisfaction with the services provided by the TA. Taxpayers' satisfaction with the ease of use of the Slovenian digital system is positively linearly correlated with their intention to fulfill their tax obligations on time. High quality information and systems ensured by TA can maintain taxpayer compliance and prevent dissatisfaction with digital services. The results of the study can help tax policymakers and TAs to improve the user experience with digital services and provide useful guidance for developers of digital solutions and researchers in the field of public administration and digital transformation.

Keywords: digital tax administration, accountants, Slovenia, tax compliance

1. INTRODUCTION

Tax administrations around the world should follow the OECD's vision in the digital transformation process ('Tax Administration 3.0: The Digital Transformation of Tax Administration'). Therefore, they incorporate advanced technologies such as artificial intelligence, cloud computing, and blockchain technology into their processes with the aim of improving the taxpayer experience and simplifying procedures (Belahouaoui & Attak, 2024). The aim of digital transformation is to leverage digital progress to reduce administrative burdens and promote policy innovation to address gaps in the existing system. OECD (2020) promotes the introduction of six fundamental building blocks that are key to an effective and simplified tax administration system, such as digital identity, taxpayer contact points, data management and standards, tax rule management and application, and new skills and management frameworks. According to OECD (2024) data, tax administrations that manage the affairs of more than 900 million taxpayers and process more than 2.3 billion online interactions operate extremely efficiently. They operate with a budget of approximately €95 billion, which is only 0.7% of total collected revenues of €13.4 billion, indicating extensive digital dependence and exceptional efficiency of administrations in the era of digital transformation (OECD, 2024). However, digital transformation is not based solely on technological improvements, but also on increasing the efficiency and trustworthiness of tax systems, i.e. improving tax compliance.

Recent research in the field of artificial intelligence reveals significant progress in promoting tax compliance. Digital tools improve companies' tax compliance, and

technology plays an important role in reducing compliance costs and improving enforcement (Bellon, Dabla-Norris, Khalid & Lima, 2022; Murorunkwere, Haughton, Nzabanita & Yego, 2023). Artificial intelligence increases transparency and reduces the possibility of tax evasion (Aladebumoye, 2025). Artificial intelligence may be positively received by taxpayers, especially if they perceive it as consistent and less biased than human decisions (Decuypere & Van de Vijver 2025). The importance of trust in the tax administrations and citizens' attitudes toward artificial intelligence is emphasized (Decuypere & Van de Vijver, 2025). Mazur (2022) study estimates that blockchain-based solutions could significantly improve tax compliance. This type of technology can contribute to greater efficiency, transparency, and compliance among taxpayers (Belahouaoui & Attak, 2024).

However, taxpayers have different perceptions of the use of digital technologies by tax administrations in terms of services. The study Syahrizal, Supriyadi & Lukmanul (2023) on the effectiveness and quality of the e-filing system for completing tax forms in Indonesia revealed that there are three main quality factors that influence user-taxpayer satisfaction. These are the quality of information, the quality of the system, and the quality of services, which have a significant and positive impact on taxpayer satisfaction (Syahrizal, Supriyadi & Lukmanul, 2023). The quality of information has the greatest impact on satisfaction, followed by the quality of the system and then the quality of services. Increased satisfaction leads to higher tax compliance, which means that taxpayers are more likely to file their forms on time and correctly. The e-filing system can be improved by

the tax administration focusing its investments on information support, reliable technology, and a better user experience (Syahrizal, Supriyadi & Lukmanul, 2023). Le Quang & Nguyen Thanh (2025) examined six factors that are believed to influence taxpayer satisfaction with electronic tax services in the logistics and import-export industry in Vietnam, such as efficiency, accessibility, website appearance, security, interactivity, and feedback. They found that feedback has no impact on taxpayer satisfaction with e-tax services, while website appearance and accessibility have the greatest impact. This means that online tax platforms must be simple, aesthetically pleasing, and secure. A thorough understanding of the influencing factors enables the improvement of digital tax services (Le Quang & Nguyen Thanh, 2025).

Companies' satisfaction with the digital tax service (e-tax) in Vietnam may also be influenced by perceived quality, ease of use, security, trust, service quality, and support from the tax administration (Phuong Nguyen, 2023). According to the study Phuong Nguyen (2023), perceived quality, trust, and security have the greatest impact, with the development of useful, secure, and trustworthy technology being key (Phuong Nguyen, 2023).

User satisfaction can be influenced by perceived ease of use and perceived usefulness (Maulani Ramadhan & Rachma Agusti, 2021). Users who perceive the application as useful (e.g., to speed up work and improve productivity) show a higher level of satisfaction. Perceived ease of use does not have a significant impact on satisfaction, but it does have a positive impact on behavioral intention to use. Perceived usefulness is therefore not sufficient if the user experience does not meet expectations (Maulani Ramadhan & Rachma Agusti, 2021).

The tax administration in Slovenia uses artificial intelligence (AI) systems to process huge amounts of data related to tax returns, payments, and customs procedures, detecting irregularities, potential tax evasion, suspicious transactions, and routine tasks such as form verification, data reconciliation, and issuing decisions (Kovač, Babšek & Aristovnik, 2025). In 2025, the tax administration in Slovenia introduced conversational AI, which provides taxpayers with 24/7 access to information, better informed taxpayers, and consequently

fewer incorrectly submitted applications and less burden on taxpayers with corrections (GOV.si, 2025b). Despite all the advantages of using AI, the tax administration emphasizes the importance of high transparency, explanation of decisions, and human oversight (Kovač, Babšek & Aristovnik, 2025). In this article, we will limit ourselves and not examine this aspect, but it could be an upgrade to existing research.

Most taxpayers in Slovenia see failure to meet tax obligations as a criminal offense, while others see it as a deprivation (Čokolec & Križman, 2014). In the past, taxpayer satisfaction with the services provided by the tax administration in Slovenia was measured by the tax administration itself, which found that taxpayers were most satisfied with data protection and confidentiality, and least satisfied with accessibility, employee responsiveness, and the comprehensibility of information (FURS, 2022). The weakness of this study was that it did not measure the relationship between variables, but rather the perception of variables such as information, service quality, system quality, and trust specifically. The study Hauptman, Vetrih & Kavkler (2024) partially eliminated these weaknesses in measuring the variables of information, service quality, system quality, and trust in particular, and examined the relationship between these variables, but did not include a measurement of taxpayers' intentions to comply with their tax obligations.

The purpose of this article is to re-examine the perception of satisfaction with the use of digital services provided by the tax administration among taxpayers in Slovenia. We were interested in the connection between taxpayer satisfaction with the information and services provided by the tax administration and the impact of satisfaction on the intention to comply with tax regulations.

The paper is structured so that the introductory part is followed by a second part, which provides an overview of the literature. In the third part, we present the research methodology. This is followed by the results and key findings. The results of the research can help tax policy-makers and tax administration improve the user experience with digital services and provide useful guidelines for developers of digital solutions and researchers in the field of public administration and digital transformation.

2. LITERATURE REVIEW

2.1. User attitude towards the use of artificial intelligence by tax administrations in tax proceedings

Artificial intelligence is transforming society and the economy, bringing benefits but also risks. While most uses are safe and contribute to solving challenges and improving well-being, some types of artificial intelligence use pose risks to society. That is why the European Council has adopted the Artificial Intelligence Act, the first law of its kind in the world, which sets conditions for certain uses of artificial intelligence and prohibits certain practices in order to address potential risks

while supporting investment and innovation in the sector (Evropski svet, 2025).

Pamisetty (2023) describes artificial intelligence as a key catalyst for change in public financial management. It enables real-time tracking of public finances, improved transparency and accountability in the public sector, and advanced analytics for decision monitoring and budget planning. In conjunction with cloud computing, it represents the foundation of digital transformation (Pamisetty, 2023).

Aladebumoye (2025) defines artificial intelligence as a broad concept that encompasses a range of technologies, each of which contributes in its own way to the transformation of tax systems around the world. The use of these artificial intelligence technologies in the tax system is diverse and has a significant impact. They are used to optimize audit selection processes by predicting which tax returns are most likely to contain inaccuracies or outright fraud, thereby improving the efficiency and effectiveness of audits. They are used in automated customer service applications that help taxpayers navigate the complexity of tax returns and ensure that they comply with tax regulations without the need for direct human intervention. At the same time, big data analysis is used to support real-time decision-making in tax administration, enabling tax administrations to respond quickly and accurately to emerging economic trends or tax avoidance strategies (Aladebumoye, 2025; Belahouaoui & Attak, 2024). Together, these technologies improve the operational capabilities of tax administrations by processing information with a level of efficiency and accuracy that far exceeds traditional methods. With the continuous development of artificial intelligence technologies, their integration into tax systems around the world will bring about profound changes in the functioning of tax administrations. In turn, continuous progress in artificial intelligence technologies will contribute to greater fairness in the enforcement of tax regulations, as the greater accuracy and objectivity of artificial intelligence systems help to ensure that all taxpayers are treated equally (Aladebumoye, 2025). At the same time, the tax administrations must ensure that the rights of taxpayers are protected and that their personal data is handled with care (Belahouaoui & Attak, 2024). Artificial intelligence supports the automation of tax return assessment, tax risk identification (e.g., tax evasion risk), and determining which cases require further review (Pamisetty, 2023). Pamisetty (2023) describes the DDCM (Data-Driven Compliance Monitoring) framework, which uses NLP (natural language processing) to automatically track legislation and compliance in municipal administrations. This enables automation support (Pamisetty, 2023).

Artificial intelligence also enables tax revenue forecasting using neural networks, revenue modeling based on dual calendar systems (fiscal and civil), and assessment of future trends to assist in budget planning (Pamisetty, 2023). Artificial intelligence can help detect tax fraud, as AI methods analyse transactional, social, mobile, and profile data, use machine learning to detect anomalies, and enable automatic classification of fraud and alerts (Pamisetty, 2023). Artificial intelligence assists the tax administration in checking income tax, VAT refunds, and identifying fraudulent claims (e.g., tax refunds). Artificial intelligence provides a risk assessment for fraud, money laundering, or integrity, which guides further procedures (Pamisetty, 2023). Despite all the advantages offered by artificial intelligence in tax systems, Pamisetty (2023) warns that artificial intelligence

should complement rather than replace human judgment. He also draws attention to the training of employees, especially in the use of artificial intelligence in a regulatory context (Pamisetty, 2023; Belahouaoui & Attak, 2024).

The Technology Acceptance Model (TAM) argues that the acceptance of technology, digital tax systems, is primarily influenced by perceived usefulness and ease of use, which shape users' attitudes and intentions regarding their behavior toward a given system (Mandasari, 2024). Similarly, the adoption of digital systems remains heavily dependent on external factors such as taxpayer education, digital literacy, and the role of government in promoting and facilitating technological adaptation (Scherer, Siddiq & Tondeur, 2019). These elements are key to shaping taxpayer behavior and influence whether digital tax systems are widely accepted and used effectively (Mandasari, 2024).

2.2. Quality of services and quality of the system

The quality of the system is the second part of the user experience of taxpayers with the information system provided by the tax administration. The success or quality of the information system is difficult to assess (Syahrizal, Supriyadi & Lukmanul, 2023). The Syahrizal, Supriyadi & Lukmanul (2023) study measures quality using variables such as information quality, system quality, service quality, and task and technology suitability. These are designed to measure dimensions such as user satisfaction with information, perceived usefulness and ease of use, task suitability, and technology suitability (Syahrizal, Supriyadi & Lukmanul, 2023).

By rationalizing and improving the reporting process, reducing human error and reducing personal visits to the tax administration, the digital tax system is the right approach to saving taxpayers money. The implementation of a digital tax system should be geared towards the interests of taxpayers as users, including reducing compliance costs (Saptono et al, 2023). It is crucial that the information system is fast, stable, secure, accessible, and user-friendly (Connolly, Bannister & Kearney, 2010; Horan & Abhichandani, 2006), and that it operates efficiently and flawlessly, as technical problems diminish the user experience and, consequently, trust in the tax administration's digital services (Connolly, Bannister & Kearney 2010).

The quality of tax administration services has a significant impact on taxpayer satisfaction. High-quality services increase trust and satisfaction, which in turn leads to greater tax compliance to fulfill tax obligations in a timely and correct manner (Saptono et al, 2023). It is related to how well the tax administration provides support and communication to users who use its digital services (Connolly, Bannister & Kearney, 2010). Service quality, together with system quality and information quality, shapes the overall user experience (Horan & Abhichandani 2006).

Part of the user experience of taxpayers with the information system in Slovenia provided by the tax admin-

istration is the eDavki portal. It enables simple and secure submission of tax forms and receipt of documents delivered by the tax administration in Slovenia (FURS). The legal representative of a business entity logs into the eDavki portal using the business entity's profile with a qualified digital certificate for employees, a classified digital certificate for natural persons, a natural person's user account, or the eDavki mobile app. Others, such as employees of the business entity or external contractors, can only log into the eDavki portal using a qualified digital certificate, but must first be assigned the appropriate EDP rights. This ensures the security and confidentiality of the personal data of eDavki portal users (GOV.si, 2025a). The eDavki portal also offers other services such as income tax test calculations, informative interest calculations and data insights, as well as tools, aids and technical specifications for checking and performing tax certification of invoices (FURS, 2025). The use of the eDavki portal is mandatory for all business entities. If a business entity does not have the necessary equipment to access the eDavki portal, it may appoint an authorized representative. Natural persons access the portal using their tax number as their username and a password (GOV.si, 2025a). The eDavki portal mobile app offers forms, contacts, general information, and a personalized calendar through which users receive notifications about their specific obligations and rights. It enables users to submit, receive, and review data (GOV.si, 2025a).

2.3. Quality of information provided by the tax administration

High-quality information is the foundation of trust in the tax administration's digital services (Connolly, Bannister & Kearney, 2010). They depend on the value of the output data produced by the system as perceived by the user. Users define the quality of information by characteristics such as accuracy, precision, timeliness, currency, reliability, completeness, conciseness, relevance, sufficiency, impartiality, comparability, and quantifiability (Syahrizal, Supriyadi & Lukmanul, 2023; Horan & Abhichandani, 2006).

Quality has a significant direct impact on user satisfaction. Information also contributes significantly to taxpayers' greater willingness to comply with their tax obligations (Saptono et al., 2023). The Saptono et al., (2023) study showed a positive correlation between e-invoicing and taxpayer compliance. Perceived usefulness reflects an individual's belief that the system improves decision-making efficiency. If users of an information system believe that it is useful, they are more likely to accept it and use it consistently. Conversely, if they do not trust the reliability of the information system, they may hesitate to use it. The same applies if we define the perception of the use of an information system on a scale. If users perceive the information system as user-friendly, they are more likely to continue using it. However, if they perceive it as difficult or complicated, they may stop using it. Although the quality of the system alone is not sufficient, it contributes significantly to greater compliance among taxpayers through

user satisfaction (Saptono et al., 2023). In the Connolly, Bannister & Kearney (2010) study, the variable of information proved to have a strong influence on user experience, as users need clear, simple, and reliable instructions for fulfilling their tax obligations.

In a recent survey conducted by the tax administration in Slovenia, the information factor received the lowest rating (FURS, 2022). They also gave the lowest ratings to accessibility and responsiveness of employees (FURS, 2022). The information that users of the eDavki portal can obtain relates to the list of forms that taxpayers must submit, a calendar for submitting forms, which reminds you when you need to submit which form and fulfill your obligation, as well as all information related to the document submission process, and all news and notifications about the eDavki portal. In addition, taxpayers receive notifications about new features on the portal, updates, errors, problems, any changes in the submission of forms or the composition of forms or in the instructions for submitting documents, and all changes relating to transactions with the FURS due to changes in legislation (FURS, 2025). The information provided by the tax administration via the eDavki portal is just one part of the overall user experience of taxpayers with the information system provided by the tax administration.

Based on this data, we assumed in the article that user satisfaction with the quality of information provided by the tax administration is related to satisfaction with the services provided by the tax administration, since if users are more satisfied with the quality of information provided by the tax administration, they will also be more satisfied with the services provided by the tax administration. This will also allow us to verify whether the results have improved compared to the survey FURS (2022). This is how we formulated our first hypothesis (H1: User satisfaction with the information provided by the tax administration is positively linearly correlated with satisfaction with the services provided by the tax administration).

2.4. Tax compliance intention

Tax compliance refers to the willingness of taxpayers to fulfill their tax obligations voluntarily and on time. It is a combination of internal factors, such as morality, ethics, and social norms, and external factors, such as penalties, supervision, and benefits (Sadress & Juma, 2019). The quality of digital tax systems and the perception of lower compliance costs due to digital tax systems influence taxpayers' intention to comply with tax regulations (Saptono et al., 2023). It is important that taxpayers fulfill their tax obligations in accordance with applicable regulations, so it is crucial that the tax system complies with applicable tax regulations (Mandasari, 2024).

Contemporary views argue that psychological and behavioural aspects, such as trust in tax administrations, moral obligations, perceived fairness, and social norms, also influence the behaviour of taxpayers (Mandasari,

2024; Sadress & Juma, 2019). In this regard, digitization has proven to be a strategic approach to increasing compliance by simplifying the tax administration and improving transparency (Magribi & Yulianti, 2022). If taxpayers consider digital tax systems to be efficient and useful, they will be more inclined to comply with tax regulations and fulfill their tax obligations. However, this also poses a challenge for those taxpayers who have low tax literacy or who resist technological change (Mandasari, 2024).

Studies have shown that the successful implementation of digital tax systems depends on technological infrastructure and taxpayer confidence in data security and government integrity (Mandasari, 2024). The more taxpayers perceive the quality of digital tax system services

to be fair and taxes to contribute to the common good, the more likely they are to have a greater intention to comply with their tax obligations (Saptono et al., 2023; Sadress & Juma, 2019).

Taxpayers rated data protection and confidentiality highest in the FURS (2022) survey, which is part of the system quality measurement instrument (FURS, 2022). Based on this, we assumed in the article that user satisfaction with the quality of the eDavki system is positively correlated with their intention to fulfill their tax obligations on time. Thus, we formulated a second hypothesis (H2: User satisfaction with the quality of the eDavki system is positively linearly related to their intention to fulfill their tax obligations on time).

3. RESEARCH METHODOLOGY

In our study, we examined how taxpayers perceive the use of digital services by the tax administration in Slovenia. We selected accountants and self-employed persons as the group of taxpayers. These are two specific groups of taxpayers who are most directly and frequently in contact with the tax administration and its digital services. Accountants usually manage tax obligations for multiple clients and regularly use various digital services provided by the tax administration. Their opinion reflects their personal experience and professional view of the tools offered by the tax administration. Self-employed persons are often responsible for fulfilling their tax obligations themselves and are direct users of digital services when submitting returns, calculations, and other applications. Their opinion reflects the perspective of individuals who are not necessarily experts. This allows us to capture both the professional and non-professional user perspectives, enabling a more comprehensive assessment of the user experience and perceived value of the tax administration's digital services in Slovenia.

Data collection took place in the first half of 2025 using a questionnaire. We used the snowball method. We sent the structured questionnaire to the Slovenian Chamber of Commerce, which forwarded it to its members. Respondents were guaranteed anonymity and a high level of data security and confidentiality, which enabled the research to be conducted in accordance with ethical research principles. The questionnaire was sent to 488 taxpayers, and 264 responded, representing a 54.10 % response rate of all taxpayers.

To assess taxpayer satisfaction with the use of digital services provided by the tax administration, we used a structured questionnaire (Table 1). In this article, we have included the part of the questionnaire that covers information (part A), system quality (part B), service quality (part C), and intention to comply with tax obligations (part D). We designed the questionnaire with the help of previous studies, Saptono et al. (2023), FURS

(2022), Connolly, Bannister & Kearney (2010), Horan & Abhichandani (2006), Sadress & Juma (2019), Aladebumoye (2025), Belahouaoui & Attak (2024), Decuypere & Van de Vijver (2025), Hauptman, Vetrih & Kavkler (2024). Part A focused on the information that users of the eDavki portal receive from the tax administration. In this part, we used five statements to examine whether the information is flexible, accurate, reliable, sufficient, and in accordance with current legislation. Part B contained 11 statements and focused on the quality of the system. We used these to measure users' perceptions of the quality, ease of use, functionality, and reliability of the eDavki portal, as well as their overall satisfaction with it. The focus was primarily on ease of registration, use, content organization and functionality, complexity of use and security, and reliability. Part C, with 11 statements, referred to the quality of the tax administration's services. With these, we focused on the overall reliability of users with the eDavki portal and the services of the tax administration, as well as the benefits of digitization. Their purpose was to measure overall satisfaction with the eDavki portal and the services provided by the tax administration, to identify the practical benefits of digitization, and to assess the broader impact of service modernization. Part D contained eight statements and related to the intention to fulfill tax obligations. Their purpose was to determine compliance with tax obligations, responsible tax payment, measure tax awareness and risk prevention, and acceptance of obligations to the tax administration.

The questionnaire also included sociodemographic factors (gender, age, education, personal income, religion, marital status, type of settlement, employment status, employment sector, statistical region, and industry of the company in which the taxpayer is employed). Using a five-point Likert scale (1 – strongly disagree, 5 – strongly agree), we obtained quantitative data on the attitudes and opinions of taxpayers regarding various aspects of the tax administration's services.

Table 1: Questionnaire

A: Information
A1. The e-tax system's information is tailored to the users's demands.
A2. I am generally satisfied with the accessibility and up-to-dateness of the information.
A3. The e-tax system provides precise information.
A4. The e-tax system provides reliable information.
A5. The e-tax system provides sufficient information.
B: System quality
B1. On the eDavki portal, user registration with a digital certificate is easy.
B2. Tax documents (DDV, REK...) are easy to access for the users of the eDavki portal.
B3. I found that the content in the eDavki portal was organized appropriately.
B4. The eDavki portal enables me to file my tax returns quickly.
B5. The e-tax system has readiness in filing tax return services.
B6. The e-tax system is accessible anytime.
B7. Submitting forms via the eDavki portal requires professional knowledge and experience.
B8. The e-tax system is easy to use.
B9. The e-tax system contains the complete feature to file tax returns.
B10. The e-tax system is secure and safe to use.
B11. The performance of the e-tax system is as expected.
C: Service quality
C1. The e-tax system is user friendly.
C2. I am generally satisfied with the services of the FURS.
C3. In general, I am satisfied with the simplification and modernization of customer operations by FURS.
C4. I am generally satisfied with the accessibility and responsiveness of the employees at FURS.
C5. I am generally satisfied with the legal, impartial and equal treatment of clients by FURS.
C6. I am satisfied with the flexibility in solving cases on the part of FURS.
C7. The e-tax system allows for saving more room for physical tax return storage.
C8. The eDavki portal protects my personal information well.
C9. Never experiencing any problems in filing the tax return.
C10. Feeling satisfied in filing tax returns through the e-tax system.
C11. Filing tax returns through the e-tax system is less expensive than does it in person at the Tax Office.
D: Tax compliance intention
D1. Disclose all tax liabilities in the tax return.
D2. Disclose all income in the tax return.
D3. File tax returns on time.
D4. File tax return before the due date.
D5. Pay taxes before the tax return due date.
D6. Prioritize paying taxes over other bills.
D7. Paying taxes correctly will prevent future tax penalties/fines.
D8. We pay actual tax assessed to URA.

Source: Saptono et al. (2023), FURS (2022), Connolly, Bannister & Kearney (2010), Horan & Abhichandani (2006), Sadress & Juma (2019), Aladebumoye (2025), Belahouaoui & Attak (2024), Decuypere & Van de Vijver (2025), Hauptman, Vetrih & Kavkler (2024).

To check the internal consistency of the questionnaire, we calculated Cronbach's alpha coefficient for each of the five sets. This estimates the extent to which the items within a set are interrelated and measure the same construct (Vaske, Beaman & Sponarski, 2016). To test the

hypotheses, we performed a correlation analysis. This method allows us to examine the strength and direction of the linear relationship between variables. A positive correlation coefficient means that higher values of one variable are associated with higher values of the other

variable. Since the data did not deviate from the assumptions for performing a correlation analysis, we used Pearson's correlation coefficient (r). This measures the degree of linear relationship between two continuous variables, with values ranging from -1 (perfect negative correlation) to +1 (perfect positive correlation).

4. RESULTS AND FINDINGS

4.1. Descriptive statistics

The results of descriptive statistics showed that the majority of taxpayers surveyed were female (83.33 %), while 15.15 % of taxpayers surveyed were male, and 1.52 % of taxpayers surveyed did not want to answer the question. We divided the surveyed taxpayers into two

Values closer to the extreme limits indicate a stronger relationship. We checked the statistical significance to determine whether the observed correlations were unlikely to be the result of chance (Statistične Analize, 2025).

specific groups of taxpayers: accountants and self-employed persons. Accountants represent 65 % of the surveyed taxpayers, while 35 % of the surveyed taxpayers represent the group of self-employed persons. More detailed results are presented in Table 2.

Table 2: Number and percentage of taxpayers by group and gender

Group/Gender	Men	Women	I do not want to answer
Group 1: accountants	17 (9.88%)	155 (90.12%)	/
Group 2: self-employed	23 (25%)	65 (70.65%)	4 (4.35%)
Together	40 (15.15%)	220 (83.33%)	4 (1.52%)

Source: Author's calculations.

We calculated Cronbach's alpha for each section of the questionnaire. In section D, the value was lower than 0.7, specifically 0.696, which is below the lower limit for good reliability. However, the value is very close to the limit, so we left the result as it was and did not exclude certain statements. Taber (2018) explains that the

threshold values serve only as a rule of thumb and that some authors consider a Cronbach's alpha value of 0.61 to be moderately reliable. Thus, all values obtained are within the range and reliable. The data are presented in more detail in Table 3.

Table 3: Cronbach's alpha by sets

Set	Cronbach's alpha	Reliability
A Information	0.855	Good
B System quality	0.795	Good
C Quality of the services	0.867	Good
D Tax compliance intention	0.696	Acceptable

Source: Author's calculations.

4.2. Results

User satisfaction with the information provided by the tax administration is positively linearly correlated with satisfaction with the services provided by the tax administration (H1). We verified this using correlation analysis, as we wanted to verify the strength of the correlation between the variables of information and service qual-

ity. Pearson's correlation coefficient is 0.642, which indicates a strong positive linear relationship between the variables. The p-value is less than 0.001, which means that the correlation coefficient is statistically significantly different from 0. Therefore, we can confirm hypothesis 1, as greater satisfaction with information is associated with greater satisfaction with services. The results are presented in Table 4.

Table 4: Correlation analysis for hypothesis 1

Information	Quality of the services	
	Pearson correlation	0.642
	Sig. (2-tailed)	<.001
	N	264

Source: Author's calculations.

A positive linear relationship between the variables of information and quality of the services was confirmed (H1), as the Pearson correlation coefficient is 0.642.

This gave us results showing that taxpayers who are more satisfied with the flexibility, accuracy, reliability,

adequacy, and consistency of information are, on average, also more satisfied with the quality of the tax administration's services. The fact that the information variable is of key importance for taxpayer satisfaction with the efficiency and quality of the information system was also confirmed by a study by the authors Syahrizal, Supriyadi & Lukmanul (2023) and Horan & Abhichandani (2006). In addition to the information variable, the variables of system quality and service quality were also highlighted. The variable that had the greatest impact among these variables was information, as reliable, accurate, complete, and timely information enables taxpayers to fulfill their obligations more efficiently and accurately and to use tax systems. Research results Syahrizal, Supriyadi & Lukmanul (2023) showed that these three variables together account for as much as 69 % of user satisfaction. If we compare this result with our study, the aforementioned variables account for 74 % of satisfaction. The fact that the variables

of information and service quality have a significant impact on user satisfaction was also confirmed by the study Connolly, Bannister & Kearney (2010).

We also tested the second hypothesis (User satisfaction with the quality of the eDavki system is positively linearly correlated with the intention to fulfill tax obligations on time) was also verified using correlation analysis, as we wanted to verify the strength of the relationship between the variables of system quality and the intention to fulfill tax obligations on time. The Pearson coefficient is 0.567, which indicates a strong positive linear relationship between the variables (Table 5). The p-value is less than 0.001, which means that the correlation coefficient differs statistically significantly from 0. Therefore, we confirmed hypothesis 2, as if taxpayers are more satisfied with the quality of the system, they also have a greater intention to fulfill their tax obligations.

Table 5: Correlation analysis for hypothesis 2

		Tax compliance intention
System quality	Pearson correlation	0.567
	Sig. (2-tailed)	<.001
	N	264

Source: Author's calculations.

Hypothesis 2 confirmed a positive linear relationship between the variables of system quality and intention to comply with tax obligations on time, as the Pearson correlation coefficient was 0.567. The results thus showed that taxpayers who are more satisfied with the quality of the system also have a greater intention to fulfill their tax obligations on time. System quality was measured by user satisfaction with the quality, ease of use, functionality, and reliability of the eDavki portal, as well as their overall satisfaction with it. The positive relationship between system quality and taxpayer compliance was also confirmed by a study Saptono et al (2023).

Our research confirms the results of Le Quang & Nguyen Thanh (2025) study, that the quality of the system significantly affects taxpayer satisfaction. The authors

measured the quality of the system in terms of website appearance, accessibility, security, interactivity, and efficiency. The appearance of the website, accessibility, and security proved to be highly influential factors, while interactivity and efficiency have less influence but still play an important role in taxpayer satisfaction with the information system (Le Quang & Nguyen Thanh, 2025). A study by Phuong Nguyen (2023) also confirmed that the quality of the system and positive experiences with it have a significant positive impact on taxpayers' intention to fulfill their tax obligations on time. The system reduces errors in completing forms, shortens submission times, and increases the sense of responsibility and control over tax obligations (Phuong Nguyen, 2023).

5. FINAL CONCLUSIONS

The tax administration in Slovenia provides its services via the eDavki portal, which offers online submission of forms and the provision of certain services by the tax administration. This type of operation reduces costs for both taxpayers and the tax administration. Our research examined how taxpayers perceive the use of digital services offered by the tax administration in Slovenia.

The results of our research have shown that tax administrations need to pay more attention to both information and system quality. Poor-quality, unclear, and untimely information can quickly lead to confusion and dissatisfaction with the services provided by tax administrations. Similarly, a poor-quality, opaque, complex system can reduce taxpayers' willingness to fulfill their tax obligations on time, which can lead to late payments,

tax evasion, and fraud. It is therefore recommended that the tax administration continue to develop and establish additional mechanisms for the rapid and high-quality collection of information and provision of services, and that, in the event of changes to the system, it informs users and educate them in areas where they need it.

Despite the fact that taxpayers are generally satisfied with the services, information, and the tax administration's system, there are more likely to fulfill their tax obligations on time. Timely payment of taxes is mandatory, and late payments result in additional costs (fines, penalties, etc.). The future research could therefore elaborate this connection. Based on the results, it is also recommended that tax administrations continue to monitor and adapt their services to technological changes

and advances and ensure that artificial intelligence tools are used responsibly and ethically. With careful implementation and ongoing oversight, artificial intelligence can significantly improve the ability of tax systems to fulfill their critical role in society, finance public services, and promote economic stability. Although the

taxpayer's perception research was limited to four categories, future research could be expanded by examining the impact and relationships of the use of AI in public services and public trust.

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BRIDGING THE FINANCIAL GAP: THE ROLE OF MICROCREDIT IN EMPOWERING ECONOMICALLY EXCLUDED POPULATIONS IN THE WESTERN BALKANS – AN EMPIRICAL CASE FROM REPUBLIKA SRPSKA

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Abstract

Microcredit organizations play a crucial role in fostering microentrepreneurship, especially in regions and among groups that have traditionally been excluded from the formal financial system. The research conducted in Republika Srpska focuses on individuals who have completed their working life, sometimes already at the age of 50, and who lack access to credit cards or larger loans from banks. The results show that more than 20% of respondents would definitely take a credit card if given the opportunity, with an additional more than 10% expressing potential interest. This indicates a substantial untapped demand for financial products aimed at economically excluded groups. Such access could motivate individuals to engage in small-scale entrepreneurial activities and thereby promote local economic development. The paper highlights the need to design flexible microcredit products tailored to older users, with a particular emphasis on supporting entrepreneurial initiatives rather than merely covering basic living expenses.

Keywords: microcredit, financial inclusion, microentrepreneurship, credit cards, economic inclusion

1. INTRODUCTION

The phenomenon of financial exclusion of the elderly population has become one of the key issues of contemporary societies, especially in transitional and post-socialist economies. In many countries of Southeast Europe, including Bosnia and Herzegovina, population ageing is progressing rapidly, while systems of social and financial support are not adapting quickly enough to emerging needs. The Republic of Srpska, as one of the entities of BiH, faces a dual challenge: on the one hand, the growing number of elderly citizens requires greater social and financial security, while on the other hand, the existing systems are not sufficiently adjusted to their needs.

According to data from the Statistical Office of the Republic of Srpska, the share of the population over 65 is continuously increasing and already exceeds 20%. At the same time, average pensions, although showing slight growth in recent years, remain insufficient for an adequate standard of living. Most retirees have incomes that cover basic living needs, while opportunities for investment, savings, or entrepreneurial activities remain limited. As a result, the elderly population becomes economically vulnerable and often excluded from formal financial flows.

The process of population ageing is not specific only to the Republic of Srpska. In countries of the region, such as Croatia, Serbia, and Montenegro, the share of elderly persons also exceeds 20%, while in the European Union this percentage surpasses 22%. A particular challenge lies in the fact that life expectancy continues to rise, so an increasing number of citizens spend 20 or more years in retirement. This demographic trend places additional pressure on pension and healthcare systems, but it also raises the issue of the economic and social participation of the elderly. In other words, the elderly population

should not be seen only as a burden on the budget, but also as a potential resource.

Financial exclusion implies the inability or difficulty in accessing basic financial services such as bank accounts, loans, cards, or savings instruments. While younger generations are increasingly oriented toward digital banking solutions, the elderly often rely on traditional methods of payment, avoid online services, and show lower levels of trust in financial institutions. In this way, instead of taking advantage of the opportunities offered by the financial market, older citizens remain confined to cash transactions, which further marginalizes them and reduces their financial security.

The digitalization of the financial sector, which has intensified in recent years, has brought significant advantages but also created new challenges. For the elderly population, digital transformation means confronting technologies that are not always familiar to them. The lack of digital skills further deepens the generational divide. For example, while younger generations use mobile payment applications and online banking as a standard, older citizens often lack even smartphones or internet access. This digital exclusion becomes as serious an obstacle as classical financial exclusion.

Another problem is the low level of entrepreneurial awareness after retirement. Although many retirees possess significant work experience, practical knowledge, and resources such as agricultural land, workshops, or craft skills, their willingness to start entrepreneurial initiatives remains minimal. Key barriers include psychological factors (fear of risk, uncertainty about the future), institutional barriers (difficulties in accessing credit, bureaucratic requirements), and social factors (lack of support from

the community and family). All this results in the elderly population remaining passive, even though they could represent a valuable segment of small entrepreneurship.

When looking at the broader European context, research shows that countries with developed financial education and inclusion programs achieve significantly better results in terms of the economic participation of the elderly. For example, Scandinavian countries have developed lifelong learning models that include retirees, while Germany and Austria have specialized microfinance programs intended for older people who want to start small business ventures or join cooperatives. By contrast, in Balkan countries, including BiH, such programs are only at an early stage. This means that the elderly population in the region remains in a less favorable position compared to their European peers.

In the Republic of Srpska, the specificity of the problem is further emphasized by the historical and social context. The transition from a socialist system to a market economy has left deep marks: a large part of the population still distrusts financial institutions, and the concept of entrepreneurship was long perceived as insecure and risky. This mentality has also carried over to the older population, who spent most of their working lives in different economic circumstances. Here the digital divide is also evident: while younger generations adopt new technologies, older citizens remain largely outside the digital economy, further reducing their chances of inclusion in modern financial and entrepreneurial flows.

Education is therefore recognized as a key tool in bridging the financial gap. Numerous studies confirm that financial literacy significantly influences an individual's ability to use available financial products and to engage in entrepreneurial activities. The elderly

population, however, rarely participates in educational programs, either due to a lack of opportunities or because of the perception that learning is no longer necessary or possible in later life. However, experiences from developed countries show that well-designed educational programs can significantly improve the level of financial and digital literacy of the elderly. This opens space for microcredit institutions and non-governmental organizations that can create targeted educational programs.

The aim of this paper is to empirically examine the level of financial inclusion of the elderly population in the Republic of Srpska, analyze their readiness to start entrepreneurial initiatives, and identify key obstacles and opportunities for improvement. Special emphasis is placed on the educational implications and the role of microcredit institutions, which can act as intermediaries between the financial system and socially vulnerable groups. In this context, microcredit institutions represent not only financial intermediaries but also educational actors who can reduce the financial and digital divide.

The expected contribution of the research is the formulation of recommendations for public policies and practical measures that could improve the position of the elderly population. The proposals include the development of specialized educational programs for retirees, the adaptation of financial products to their needs, the encouragement of digital literacy, and the strengthening of cooperation between financial institutions, the non-governmental sector, and local communities. In this way, the paper seeks to answer the question of how to create an integrated model that combines education, financial support, and entrepreneurial initiatives with the aim of improving the quality of life of the elderly population in the Republic of Srpska.

2. THEORETICAL FRAMEWORK

2.1. Financial Inclusion and Microcrediting

Financial inclusion implies the availability and use of basic financial services for all layers of society, including vulnerable groups such as the elderly, women, the unemployed, and the rural population. The World Bank defines financial inclusion as "access to useful and affordable financial products and services that meet the needs of individuals and businesses – transactions, payments, savings, credit, and insurance – delivered in a responsible and sustainable manner." In developed economies, financial inclusion is a prerequisite for social stability and economic growth, while in transition economies it is still a challenge.

Microcrediting is a specific form of financing that was developed to address the needs of socially excluded groups. Initially aimed at poor segments of the population without collateral or formal credit history, it today increasingly covers vulnerable market segments that have potential but lack support. In the context of the elderly population, microcredit institutions (MCIs) can

play a dual role: on the one hand, providing financial resources for small entrepreneurial initiatives, and on the other, offering educational and advisory support necessary for successful project implementation.

The literature highlights that MCIs are more flexible than traditional banks, which allows them to better adapt to the needs of older clients. While banks often require complex procedures, guarantees, and proof of income, microcredit institutions rely on personal contact, potential assessment, and social responsibility. In this way, conditions are created for older citizens, especially in rural areas, to gain access to financing.

It is particularly important to stress that financial inclusion is not only a matter of economic development but also of social justice. When older people remain outside the financial system, this has consequences for their social inclusion, quality of life, and opportunities for community participation. This deepens inequalities between generations, as well as within the elderly

population itself – between those who have access to modern financial services and those who do not.

In the European context, microcrediting is increasingly used as an instrument in the fight against poverty among older persons and as a means of encouraging their active participation in the labor market or in self-employment. Examples from Italy, Spain, and France show that microfinance programs combined with educational components have significantly increased the participation of the elderly in small entrepreneurial projects. This suggests that the “credit plus education” model can be highly effective in environments where older citizens face multiple barriers.

2.2. Psychological and Social Barriers to Starting a Business in Older Age

Entrepreneurial behavior in older age is confronted with a number of barriers that are not only financial but also psychological and social. According to research by the European Commission, elderly citizens on average show lower willingness to take risks, weaker belief in their ability to learn new skills, and frequent doubts about support from their environment.

The psychological dimension is particularly important. The theory of planned behavior (Ajzen, 1991) emphasizes that the intention to engage in entrepreneurial activity depends on perceived behavioral control, subjective norms, and attitudes. Among the elderly, there is often a decline in the perception of personal control (“I am no longer capable of new beginnings”), while family norms may act discouragingly (“at this age it is not the time for risk”). Such barriers limit the possibility of translating the experience and resources of the elderly into concrete entrepreneurial initiatives.

Social barriers relate to the isolation of older persons, the lack of institutional support, and weaker connectedness with modern trends, especially the digitalization of business. In rural areas, additional challenges are geographic distance and the lack of opportunities to participate in educational programs. This leaves elderly citizens outside the main currents of social and economic life.

Social attitudes toward the elderly further complicate the situation. In many communities, the perception still prevails that older persons should be passive recipients of social benefits rather than active participants in economic life. Such perceptions shape both policy and

practice, resulting in little encouragement or support for older people to start their own activities.

2.3. The Role of Education in Encouraging Entrepreneurial Behavior

Education is recognized in contemporary literature as a key factor in the development of entrepreneurial activity in all age groups, including older people. Lifelong learning programs increasingly emphasize the importance of involving elderly citizens in both formal and informal educational processes.

OECD research shows that participation in education increases the level of financial literacy, reduces fear of the unknown, and strengthens the sense of control. In practice, this means that education can significantly boost the self-confidence of older people and motivate them to enter entrepreneurial endeavors. Moreover, education enables older citizens to follow new trends, including digital technologies, which are becoming increasingly important tools in business.

In the context of microcrediting, education is particularly important because it allows users to understand borrowing conditions, manage their own finances, and plan sustainable business projects. The combination of financial support and education therefore represents an integrated model that can produce the best results. The literature emphasizes the concept of “credit plus services,” meaning credit accompanied by educational and advisory services, which has proven more effective than credit provision alone.

Examples of good practice from Hungary, Slovenia, and Poland confirm that when the elderly are provided not only financial support but also professional counseling, the chances of success of their small business ventures increase significantly. This confirms the importance of an integrated approach that combines education, financing, and mentoring support.

In conclusion, the theoretical framework clearly shows that financial inclusion, microcrediting, and education represent key levers for increasing the economic participation of the elderly population. Psychological and social barriers can be overcome through systematic support programs, while the financial gap can be reduced by developing microcredit institutions and tailored educational programs. Such an approach would allow older people to transform their experience and resources into sustainable entrepreneurial initiatives, thereby improving their economic and social inclusion.

3. METHODOLOGY

3.1. Aim and Research Questions

The aim of the research was to analyze the level of financial inclusion of the elderly population in the Republic of Srpska, their readiness for entrepreneurial initiatives, and to identify the main barriers and opportunities for improvement. The research was designed to provide an empirical basis for shaping policies and programs that can contribute to greater

social and economic inclusion of older citizens. The initial research questions were:

1. What is the level of access to basic financial services (bank account, cards, loans) among the elderly population?
2. To what extent are older citizens willing to take on debt for entrepreneurial purposes?

3. What are the most prominent psychological and social barriers to starting entrepreneurial activity in later life?
4. How interested are older citizens in participating in educational programs in the field of financial literacy and entrepreneurship?
5. Are there differences in financial inclusion between urban and rural areas, and between different age and educational groups?

3.2. Sample

The research was conducted on a sample of 575 respondents over the age of 55, residents of the Republic of Srpska. The sample was designed to capture the diversity of demographic and socio-economic characteristics. Stratification was carried out according to gender, age, place of residence (urban/rural), and educational status. In the total sample, 52% of respondents were women and 48% were men. About 60% of respondents lived in urban areas, while 40% came from rural areas.

The age structure of the sample was as follows: 55–64 years accounted for 38% of respondents, 65–74 years 44%, while those over 75 years made up 18%. The educational structure showed that 27% of respondents had completed elementary school or less, 48% secondary school, and 25% had higher or university qualifications. This distribution enabled comparisons among groups and analysis of how education and place of residence influence financial behavior.

3.3. Research Instrument

A standardized questionnaire was used for data collection, consisting of three sections:

1. Demographic data (age, gender, education, place of residence, source of income).
2. Financial behavior and inclusion (account ownership, card usage, loan indebtedness, use of microcredit).
3. Attitudes and intentions (willingness to take loans for entrepreneurship, interest in education, perception of barriers and opportunities).

The questionnaire included a combination of closed-ended questions (5-point Likert scale, multiple choice) and several open-ended questions for collecting additional qualitative data. Examples of questions included: “Do you believe that taking a loan at your age is too big a risk?” or “Would you participate in free educational workshops on personal finance management?”

To ensure clarity, a pilot test was conducted on a smaller sample of 20 respondents. Based on feedback, minor language adjustments were made to simplify terminology.

3.4. Data Collection

Data were collected during March and April 2025 across the territory of the Republic of Srpska. A combined approach was used to reach respondents of different profiles:

- Field surveys (face-to-face interviews in households and public spaces).

- Telephone interviews (for older persons who were not accessible in the field or had mobility difficulties).
- Online questionnaires (a smaller number of respondents, mostly from urban areas with better digital skills).

Field interviewers underwent training to adapt their communication to elderly participants. Special attention was given to ethical aspects of the research: participation was voluntary, all respondents gave informed consent, and the collected data were used exclusively for research purposes.

3.5. Statistical Methods of Analysis

The data were processed using SPSS and Excel. The analysis included several levels:

- Descriptive statistics (frequencies, percentages, means, standard deviations).
- Chi-square tests to determine relationships between demographic characteristics and financial behavior.
- T-tests and ANOVA analyses for comparing attitudes between different groups (e.g., gender, urban/rural, education level).
- Factor analysis to identify key latent dimensions such as risk perception, interest in education, and entrepreneurial readiness.
- Correlation analysis to determine the relationship between financial literacy and readiness for entrepreneurial initiatives.

The choice of these methods was based on their ability to reveal how demographic variables influence the financial behavior and attitudes of the elderly population. Using multiple methods allowed for triangulation of data, thereby increasing the reliability of findings.

3.6. Limitations of the Research

Despite careful preparation and implementation, the research has several limitations:

- The sample was of a convenience type, which reduces the possibility of fully generalizing results to the entire population of the Republic of Srpska.
- The data relied on self-assessment by respondents, which may lead to subjective bias and socially desirable responses.
- The oldest population (75+ years) was underrepresented, partly due to health and logistical barriers.
- The research could not track longitudinal changes, as it was based on a cross-sectional design.

Nevertheless, the results provide valuable insight into the state of financial inclusion and entrepreneurial potential of the elderly in the Republic of Srpska. The methodology proved appropriate for an initial assessment, and future research should combine quantitative and qualitative methods, including in-depth interviews and focus groups.

3.7. Advantages of the Research Approach

Despite the limitations, the research has a number of advantages: it included a wide range of respondents, used multiple methods of data collection, and enabled comparisons between different groups. The combination of quantitative and qualitative approaches

in future studies could further strengthen the findings, but even this version of the research clearly indicates patterns of behavior and attitudes of the elderly population with regard to financial inclusion and entrepreneurship.

4. RESEARCH RESULTS

The research results show that a significant portion of the elderly population in the Republic of Srpska still does not have full access to basic financial services. Out of a total of 575 respondents, 72% have a current bank account, while 28% rely exclusively on cash. When data are analyzed by place of residence, a clear difference emerges: in urban areas as many as 85% of respondents have an account, while in rural areas that share drops to 55%. This difference indicates a substantial gap between urban and rural populations, highlighting unequal access to financial services and infrastructure. It also suggests that geographic factors play a significant role in determining the level of financial inclusion, with rural residents facing more pronounced barriers related to availability, accessibility, and trust in financial institutions.

Card usage is also relatively low. Only 46% of respondents use debit cards, while credit cards are held by just 18%. The use of ATMs and POS devices is significantly more frequent in urban areas (63%) compared to rural areas (28%). These figures point to limited financial inclusion, particularly when compared with the European average, where more than 90% of the adult population use at least one card. In addition, women use cards less often than men (41% vs. 52%), which confirms existing gender disparities in access to and use of financial services. These differences may be explained by a combination of socio-economic factors, including lower income levels, reduced financial independence, and more limited exposure to financial education among older women. Consequently, gender-sensitive approaches should be considered when designing policies aimed at improving financial inclusion.

As for access to loans, the study shows that only 22% of older citizens had experience with credit indebtedness in the past 10 years. Most of these were housing or consumer loans, while the use of microloans was limited to only 7% of respondents, mostly for home renovation or financing agricultural activities. It is particularly significant that microloans are more frequently used in rural areas (11%) than in urban ones (5%), indicating that MCIs play a key role precisely in rural settings.

Limited willingness to take on debt is linked to perceptions of risk and a lack of trust in financial institutions. Almost half of respondents (49%) believe that a loan could endanger their financial security, while 32% stated that they do not believe a bank or microcredit institution would even approve them a loan due to their age and limited income. These results show

that the problem of financial exclusion is reflected not only in the objective availability of services but also in subjective attitudes and perceptions of risk, trust, and financial self-confidence. In other words, even when financial products are available, psychological barriers may significantly limit their use, further reinforcing the cycle of exclusion among the elderly population.

When asked whether they would take a loan to start an entrepreneurial venture, only 15% of respondents answered affirmatively. However, when data are analyzed by educational structure, a clear difference appears: among respondents with higher education, 27% expressed willingness to borrow, compared to only 11% among those with secondary or lower education. Likewise, the younger part of the older population (55–64 years) shows a higher level of readiness (21%) compared to the group older than 70 (7%). These results indicate that both education and age play a significant role in shaping entrepreneurial intentions, suggesting that better-educated and relatively younger segments of the elderly population are more open to taking financial risks and engaging in business activities. This finding highlights the importance of targeted support measures that take into account differences within the elderly population, particularly in terms of education and age structure.

Self-employment and entrepreneurial initiatives are recognized by only a smaller segment of the elderly population. Only 19% of respondents believe they could start a small business in their community. The most common ideas relate to agriculture (growing vegetables, fruits, beekeeping), craft services (carpentry, tailoring), and tourism activities in rural areas. However, as many as 68% of respondents said they are not considering self-employment because “at that age it is not the time for new beginnings.” This perception reflects deeply rooted social and psychological barriers, including fear of failure, lack of confidence, and the belief that entrepreneurship is primarily reserved for younger generations. Such attitudes significantly limit the potential for economic activation of the elderly, even in cases where they possess valuable experience, skills, and resources that could be utilized in small-scale business activities.

A positive result of the research is the significant interest of older citizens in participating in educational programs. When asked whether they would attend workshops or courses on financial literacy and entrepreneurship, 41% of respondents answered positively, 37% were undecided, and 22% showed no interest. The highest interest was expressed by

respondents aged 55–65, while among those over 70 interest was significantly lower. Respondents from urban areas also expressed greater interest (48%) compared to those from rural areas (33%), which may be attributed to better access to educational opportunities and higher exposure to information and support programs. These findings indicate that, despite existing barriers, there is considerable potential for improving financial inclusion through targeted educational initiatives, particularly among younger segments of the elderly population and those living in urban environments.

4.1. Gender Differences in Financial Inclusion

The analysis reveals pronounced gender differences in financial inclusion. Men are more likely to use banking services, cards, and loans, while women display a greater degree of conservatism in financial behavior. For example, 55% of men use at least one bank card, compared to 38% of women. In terms of loans, the difference is even more evident: 27% of men had used a loan in the past 10 years, compared to 17% of women. When it comes to entrepreneurial intentions, men are twice as likely to express willingness to start a business (21% vs. 10%). However, women more often express interest in participating in educational programs (44% vs. 38%), indicating the need for financial education programs specifically designed to further empower women.

4.2. Age Groups

Age differences also play an important role. The youngest segment of the elderly population (55–64 years) shows the highest level of inclusion: 81% have a bank account, 63% use a card, and 21% would consider a loan to start a business venture. In the 65–74 group these percentages fall (68% account, 42% card, 12% readiness for a loan), while in the group over 75 they are even lower (53% account, 27% card, 5% readiness for a loan).

These results confirm that with increasing age, the tendency to engage in financial and entrepreneurial activities decreases. Reasons include health limitations, greater caution toward risk, and reduced motivation for long-term plans.

4.3. Urban and Rural

The comparison between urban and rural areas reveals clear patterns. Urban respondents have better access to banks, use cards more frequently, and participate in educational programs more often. On the other hand, rural respondents use microloans more often because banks are less accessible to them and because such products suit their small agricultural and craft activities. However, the digital divide remains significant. While 62% of urban respondents use some form of digital payment (internet or mobile banking), in rural areas the percentage is only 19%. This indicates the need for digital education programs targeting older people in rural communities.

4.4. Regional Comparisons and European Context

To put the results into a broader context, it is useful to compare them with data from neighboring countries. In Croatia, according to Eurostat (2023), as many as 94% of those over 55 are included in the banking system, and 72% use at least one card. In Serbia, the percentage is lower – 78% of older citizens have an account, while about 51% use cards. The results for the Republic of Srpska, where almost a third of older people do not have an account, indicate a much weaker level of inclusion even in the regional context. This gap highlights structural differences in the development of financial systems, as well as disparities in financial literacy, accessibility of services, and institutional trust. It also suggests that additional efforts are needed to align financial inclusion levels with those observed in neighboring countries and the broader European environment.

When it comes to digital inclusion, OECD data show that on average 48% of older people in the EU use the internet for financial transactions. In the Republic of Srpska, based on this research, the percentage does not exceed 20%, clearly showing the depth of the digital divide. This limits not only access to finance but also opportunities for entrepreneurship and broader social engagement.

4.5. Synthesis and Implications

The results clearly show that the financial inclusion of the elderly in the Republic of Srpska lags behind both European and regional averages. Particularly concerning is the low level of card and loan usage and the extremely small number of elderly who engage in entrepreneurial initiatives. At the same time, the strong interest in education represents an important opportunity.

To improve the situation, it is necessary to develop targeted programs that combine financial support and education. Recommendations include:

- creating special credit products for the elderly, with more flexible conditions and smaller amounts,
- developing workshops for women and the oldest age groups,
- increasing the availability of digital tools and training in rural areas,
- strengthening the role of microcredit institutions as a bridge between banks and the elderly population,
- using examples of good practice from Croatia and Slovenia, where financial literacy programs for the elderly have shown significant effects.

In conclusion, the research results confirm that the elderly population has potential for greater economic participation, but it is necessary to remove barriers related to the financial gap, digital illiteracy, and lack of trust in institutions. The Republic of Srpska can significantly improve the position of its older citizens if financial instruments, education, and local community support are combined.

5. DISCUSSION AND EDUCATIONAL IMPLICATIONS

The research results clearly show that the elderly population in the Republic of Srpska remains partially excluded from the financial system and that entrepreneurial potential is insufficiently utilized. These findings correspond with theoretical assumptions in the literature, which suggest that older people often have limited access to financial services, express greater fear of risk, and participate less frequently in educational programs. The aim of this discussion is to interpret the results in the light of the theoretical framework, highlight the specific characteristics of the Republic of Srpska, and offer recommendations for improvement.

5.1. Linking Results with Theoretical Concepts

Financial inclusion represents a fundamental prerequisite for the active participation of older citizens in society. The results showed that almost one-third of the elderly in the Republic of Srpska do not have a current account, while cards and loans are used to a much lesser extent than in European countries. This confirms the claim that financial exclusion is a multidimensional problem, where economic, psychological, and social factors intersect. Psychological barriers, such as fear of risk and low self-confidence, further reduce the willingness of older people to engage in entrepreneurial activities.

On the other hand, the significant interest in education (41% of respondents) confirms the thesis that education can be a key instrument in encouraging entrepreneurial behavior. This supports the “credit plus services” concept, which suggests that financial resources should be combined with educational and advisory components in order to achieve sustainable results.

5.2. Comparison with International Experiences

A comparison with European countries shows that older citizens in the Republic of Srpska are in a significantly less favorable position. While access to banking services in the EU is almost universal, here 28% of the elderly have no account at all. Similarly, while in the EU more than 60% of the elderly participate in lifelong learning programs, in this study only 41% expressed interest. These differences highlight the need for policy adaptation to enable better integration of older people. Examples of good practice from Scandinavian countries show that it is possible to develop support systems that actively include older people in economic life. Lifelong learning models, local cooperatives, and specialized microfinance programs for the elderly have successfully integrated this population into economic flows. Although specific models cannot be fully transferred due to different social and economic contexts, key guidelines can serve as inspiration.

In addition, experiences from Central and Eastern European countries, such as Poland and Slovenia, show that the combination of microcredit programs and education has produced very good results in rural areas. For example, in Slovenia, microcredit institutions, in cooperation with local development centers, developed workshops for older farmers, which enabled them to

gain better access to markets and financial services. Such models could also be implemented in the Republic of Srpska.

5.3. Specific Challenges of the Republic of Srpska

The Republic of Srpska faces challenges characteristic of transitional economies: distrust in financial institutions, a lack of tailored financial products, and underdeveloped digital infrastructure, particularly in rural areas. The historical context of the socialist system additionally influences the perception of entrepreneurship, which for many older citizens is still associated with insecurity and risk.

Another specific challenge is the gender dimension. The results show that women use financial services and loans less often, but more frequently express interest in education. This means that women’s empowerment programs could play a key role in strengthening the financial inclusion of the elderly population. Furthermore, differences between urban and rural areas require targeted policies: while in urban settings the emphasis should be on digital education and the modernization of services, in rural areas it is essential to develop microcredits and local support programs.

5.4. Recommendations for Public Policies and Microcredit Institutions

Based on the results and international experiences, several recommendations can be formulated:

1. Development of tailored financial products for the elderly – including microloans with lower interest rates, more flexible repayment terms, and smaller amounts.
2. Education and lifelong learning – organization of free workshops and financial literacy courses, especially in rural areas.
3. Digital inclusion – providing internet access and basic digital education for older people, thereby reducing the gap in using modern financial services.
4. Gender-sensitive policies – designing programs specifically targeting women, with an emphasis on their inclusion in financial flows and entrepreneurship.
5. Institutional cooperation – strengthening coordination between banks, microcredit institutions, NGOs, and local communities to create integrated support programs.
6. Regional cooperation – exchanging experiences and practices with neighboring countries, such as Croatia and Slovenia, which have more developed financial education models for the elderly.

5.5. Educational Implications

The findings of the research have significant educational implications. First of all, it is necessary to develop specialized educational programs for the elderly population, adapted to their needs and capabilities. Such programs should be practical, simple, and focused on solving concrete problems – for example, how to use banking services, how to manage

a household budget, or how to develop a small business venture.

Education can also help reduce psychological barriers. Through interactive workshops and mentoring support, older citizens can gain greater self-confidence and readiness to participate in financial and entrepreneurial activities. A particularly important dimension of education is digital literacy, since the digital divide is one of the main causes of financial exclusion of the elderly.

It is also important to stress the long-term effects of education. If older people acquire skills in financial management and digital competencies, they can transfer these skills within their families and communities. In

6. CONCLUSION

The research conducted among the elderly population of the Republic of Srpska showed that financial inclusion in this demographic group remains at a relatively low level. Although most respondents have a current account, a significant portion still relies exclusively on cash, while the use of cards and loans is considerably below the European average. Particularly concerning is the fact that almost one-third of older citizens do not have an account at all, which represents a clear barrier to their integration into the modern financial system and limits their access to a wide range of financial services. This situation not only affects their financial security but also reduces their ability to participate in economic activities, including potential entrepreneurial initiatives. The results also showed that the willingness of older people to borrow for entrepreneurial initiatives is limited. Only a small number of respondents recognize self-employment as a realistic option in later life, with barriers including fear of risk, health constraints, and lack of trust in financial institutions. At the same time, the strong interest in education indicates that older citizens recognize the importance of new knowledge and skills, particularly regarding financial literacy and digital competencies. This suggests that, despite existing barriers, there is a foundation upon which targeted educational and support programs can be built, potentially increasing both financial inclusion and entrepreneurial activity among the elderly population. These findings point to several key conclusions. First, financial exclusion of the elderly in the Republic of Srpska is a multidimensional problem involving economic, psychological, and social factors. Second, there are significant differences in inclusion levels between urban and rural areas, between educational groups, and between men and women. Third, despite existing barriers, there is clear potential for improvement through targeted educational and financial programs.

Based on the research results, several concrete recommendations can be formulated to improve the position of the elderly population:

this way, education of the elderly has a multiplier effect – it benefits not only the individual but also the wider community. This reduces the risk of financial vulnerability in the long term and promotes sustainable social development.

In conclusion, the discussion shows that there is clear room for improvement in policies and practices in the Republic of Srpska. If financial instruments, education, and local support are combined, it is possible to significantly increase the level of financial inclusion and entrepreneurial activity of the elderly population. This would not only reduce social vulnerability but also contribute to the sustainable development of communities.

1. Increase the availability of financial products tailored to the elderly, including microloans with flexible conditions.
2. Invest in the development of digital infrastructure and education, particularly in rural areas.
3. Ensure greater participation of women through gender-sensitive financial literacy programs.
4. Develop local initiatives linking financial institutions, NGOs, and communities to create networks of support for the elderly.
5. Incorporate experiences and good practices from the region and the EU into public policy design.

The educational implications of this research are particularly important. The results show that older people are willing to learn and participate in programs that help them better understand financial products and develop budget management skills. This opens space for the development of targeted educational content, workshops, and courses, which can have long-term positive effects not only on individuals but also on their families and local communities.

It is important to emphasize that this paper contributes not only to the academic literature on financial inclusion but also has practical implications. Based on the results, concrete support programs can be designed and implemented by microcredit institutions, banks, and public authorities. In this way, a bridge is created between theory and practice, where research becomes a starting point for real social change. The importance of linking financial institutions with local communities is particularly emphasized, as such cooperation enables more effective identification of the needs of the elderly population and the development of tailored financial and educational solutions. Strengthening these connections can significantly contribute to reducing financial exclusion and fostering sustainable economic participation among older citizens.

The contribution of the research also lies in providing a basis for comparative analyses with other countries in the region. Future studies could examine similar patterns in Serbia, Montenegro, or Croatia, creating a broader picture of the position of the elderly population in Southeast Europe. In addition, longitudinal research

could track changes over time and show the effects of potential reforms or new support programs.

In conclusion, the elderly population of the Republic of Srpska faces both challenges and opportunities. Bridging the financial gap is possible only through an integrated approach that combines education, the development of tailored financial instruments, and the strengthening of local support. Such an approach would enable

older citizens to become more active participants in social and economic life, reducing their vulnerability and increasing their contribution to the community. Ultimately, the findings of this research highlight the need for coordinated efforts among financial institutions, policymakers, and educational organizations in order to create sustainable solutions that will improve both financial inclusion and overall quality of life for the elderly population.

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FINANCIAL INDICATORS ANALYSIS AS A FUNCTION OF THE EFFICIENCY OF USING BANK LOANS

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Abstract

The goal of this paper is to present the results of analyzes from various research studies on the effects of the use of bank loans in the financing of business entities, credit risk assessments and analysis of financial variables of legal entities as bank clients. The key role (Wali, 2018) of the value of financial ratios is emphasized, both in predicting the business quality and in assessing the credit risk. The research (Alqam, 2021) concludes that financial indicators contribute 53% to the investor's decision. Financial analysis using current financial statements can be used to better predict the future state of financial positions (Baharee, 2021). The methods used in the empirical part of the research include the use of statistical techniques, including regression and correlation analysis, in order to examine the interaction between independent variables (financial indicators of the company) and dependent variables (financial stability and efficiency of the company's operations). The comparative presentation of the data obtained through the statistical analysis of the financial indicators of the sampled business entities should provide an overview of performance in areas such as profit margins, Return on Assets (ROA) and Return on Capital Employed (ROCE). Adequate analysis presupposes credible financial reports created in accordance with the international accounting standards which reflect the real performance of the company. The aforementioned analyzes are also of great use to regulatory authorities, shareholders and investors, creating an important basis for making the most complex decisions.

Keywords: financial indicators, liquidity, profitability, credit risk, creditworthiness

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1. INTRODUCTION

Financial institutions are crucial in any economy. They provide financial resources and information for economic growth. Weakness in credit risk management is a big part of the reason for banks' difficulties, especially when there is a worse classification of approved loans. Often the problem starts at the stage of applying for a loan and then increases in the stages of loan approval, monitoring and control (Richard, 2008). Before investing, the bank must assess the risk and decide whether it is appropriate. Risk management helps in risk detection, analysis and resolution. (S. Chen, 2023).

"A business process is an agile, complex organizational unit with a logical and time-bound sequence of actions" (Stravinskiene & Serafinas, 2020). It is important to manage and update the processes that would perform their function, i.e. improve the company's performance. Moreover, processes are complex because they are not just a set of actions, but also include roles, resources, and rules. According to Reijers (2021), a process has steps, people who perform these steps, information that is exchanged and processed during these steps, and technologies that are used. Another process concept is a horizontal sequence of sequential actions, operations, or activities during which inputs (raw materials) produce outputs (results) that satisfy client needs. According to Gribovskis (2021), the organization process consists of five parts: Source of input (can be a previous process), input (materials, energy, information, raw materials, resources, requirements), activity, output/result, and receiver of results.

All concepts show that a process is defined as a complex series of actions and that there are people who perform these actions. Also, a process has input, information and output. Processes in the organization are constantly taking place and are essential for the execution of organizational functions (Gribovskis, 2021). Considering that the processes are essential for the functioning of the organization, it can be said that the processes have a positive influence on the success of the company. In every organization there are many different processes that depend on the organization's activities, size, structure or type of management (Gribovskis, 2021). Different processes have different effects on the success of the organization. However, professional process management can help achieve better results. In short, every organization has many different processes that depend on organizational activity, culture, and other metrics, but they are all critical to the enterprise in order to reduce disruption, confusion, and improve efficiency.

Good and thoughtful approval of loans to companies is becoming an increasingly important part of the business process in all banks. The Basel Accord set guidelines for banks to apply risk management practices and ensure a strict credit approval process (Basel Committee on Banking Supervision, 2018). Global crises such as Covid-19, the war in Ukraine and massive inflation lead to an increase in all kinds of risks. Therefore, banks must control and mitigate all risks with reliable and efficient risk management processes that lead to positive results in the performance of banks. The loan approval

process is just as important as the risk management process. "Risk can be a business loss by not approving a suitable candidate or a financial loss by approving a candidate who is a poor risk" (Smith, 2017). Given that

these two processes are vital for the banking sector, it is necessary to understand how the interplay of key banking processes, i.e. the risk management process and the loan approval process, affects the performance of banks.

2. CONCEPTUALIZATION OF THE LOAN APPROVAL PROCESS

The profitability and stability of the bank mainly depend on the success of the work of the credit sector, which carries out verification of the client's financial background. In general, credit decisions are key determinants of a bank's success. The credit approval subsystem should help reduce losses and provide loans only to eligible and solvent clients (M.K.Jayanthi Kannan, 2023). The loan approval process is one of the most complex processes in banks due to the wide range of factors that are taken into account. Banks collect data on the purpose of the loan, type of account, balance, guarantor, monthly income, collateral, credit history and other information in order to compare them with the loan conditions set by the bank (Takyi, 2020). In order to get a loan, clients must meet the conditions of the bank's credit policy, the amount of the loan, the purpose of the loan and the ability to repay. Furthermore, according to (Kannan, 2023), the following are taken into account during the loan approval process:

- analysis of financial statements,
- business results,
- liquidity,
- previous business results
- current and future business plans.

Many attributes are taken into account, but the most important attributes for deciding on loan approval are the client's income history, years of business, credit score (based on previous credit history) and data on previous outstanding obligations.

Banks must have a credit scoring model to avoid subjectivity in decision-making that can cause losses (Bekhet & Eletter, 2014). This model helps in assigning clients to different groups and deciding whether the client is likely to repay the loan or default.

The EBA (European Banking Authority) specifies the following necessary information and data for loan approval:

1. Information on the purpose of the loan
2. Where relevant, proof of the purpose of the loan
3. Financial statements and accompanying notes at the individual entity level and consolidated level (balance

sheet, income statement, cash flow) covering a reasonable period and audited or professionally verified, where applicable

4. Reports/excerpts on receivables from debtors
5. The debtor's business plan and in connection with the purpose of the loan
6. Financial forecasts (balance sheet, income statement, cash flow)
7. Proof of tax status and tax obligations
8. Data from credit reference registers or credit information bureaus, which include at least data on financial obligations and outstanding claims
9. Information on external credit ratings, where applicable
10. Information on existing contractual provisions and whether the debtor respects them, where applicable
11. Information on major litigation in which the debtor is involved at the time of submitting the request
12. Security information, if any
13. Proof of ownership of security, where applicable
14. Evidence of the security value
15. Proof of collateral insurance
16. Information on the enforceability of collateral (in the case of specialized lending, a description of the structure and security package of the transaction)
17. Information on guarantees, other credit risk reduction factors and guarantees, if any
18. Information on the debtor's ownership structure for the purpose of preventing money laundering and terrorist financing.

Of the 18 necessary information and data for loan approval specified by the EBA (European Banking Authority), the analysis of financial statements is listed under serial number 3, while the next 4 items refer to data from financial statements. This highlights the importance of financial statements in credit analysis, within which a whole series of data related to the company's operations is obtained. Another significant group of data refers to data related to collateral, which also includes a large number of items related to necessary information during loan approval.

3. FINANCIAL ANALYSIS AS A BASIC TOOL FOR ASSESSING THE ECONOMIC SITUATION OF A COMPANY

Financial analysis is the basic tool for assessing the economic situation of the company. She can not only retrospectively assess past performance, but above all formulate conclusions important for the future management of the company and its strategic decision-making. The importance of financial analysis lies primarily in its ability to provide an objective view of the company's financial health and to timely detect potential problems that threaten its stability (Růčková, 2021).

According to Knápková (2017), financial analysis enables managers, investors and creditors to better understand the company's financial performance, its capital structure, liquidity and ability to generate profits. Financial analysis thus becomes not only a means of internal management, but also an important tool for communication with interested parties outside the company. The importance of financial analysis is growing, especially in a turbulent business environment, where

changes in the economic climate, competitive pressures or changes in legislation can have a significant impact on the financial situation of companies.

Financial analysis serves as an important tool for various stakeholders who use its results to make informed decisions. It provides key information about the financial health, performance and stability of the company, which enables an efficient assessment of the current state of the company and its future prospects. Thanks to this data, users can analyze the company's strengths and weaknesses, identify potential risks and opportunities, and plan steps to improve or maintain its financial position.

The main users of financial analysis besides banks are:

- Investors
- Managers
- Employees
- Business partners (suppliers, customers)
- Competitors
- The state and its authorities

When deciding on future investments, investors primarily emphasize risk assessment and the expected return on invested capital. As part of the control, they focus on the stability, liquidity of the company, the amount of available profit, the market value of the company and its ability to maintain its long-term existence and development. For this reason, they require regular reports on the financial situation of the company (Konečný, 2006).

Managers for effective strategic and operational financial management must have an overview of business profitability, resource utilization efficiency and company liquidity. Financial analysis, as a key part of performance evaluation, provides them with a basis for improving management and optimizing processes. The results achieved by the company also serve as an important motivation for their decision-making (Konečný, 2006).

The company's employees naturally strive for its prosperity and ensuring economic and financial stability. Like managers, they are often motivated by the company's economic results. Their interest is focused on job security and future opportunities for wage growth and social benefits (Grünwald, 2007).

Business partners and suppliers primarily focus on the company's financial stability, its ability to meet payment obligations and maintain liquidity. Customers choose their suppliers based on their reliability and ability to fulfill agreed obligations (Konečný, 2006).

Banks and other creditors require as much information as possible about the financial situation of a potential borrower in order to make a responsible decision about the possibility of granting a loan, its amount and conditions. Banks often include provisions in credit contracts that link the stability of credit conditions with the achievement of certain values of selected financial indicators. For example, they may retain the right to adjust the terms of the loan if the company exceeds a certain level of debt (Grünwald, 2007).

Competitors use financial analysis mainly for those companies that do well in the given market. This is to gain inspiration and the possibility to apply the given practices to their company (Knápková, Pavelková, 2017).

The state and its institutions apply financial analysis for the purpose of statistical monitoring, control of tax obligations, supervision of state-owned enterprises, distribution of financial aid to companies and obtaining an overview of the financial health of enterprises that have state contracts (Konečný, 2006).

The history of financial analysis is closely related to the development of modern business and the capital market. The first systematic approaches to assessing the financial situation of companies can be traced back to the transition from the 19th to the 20th century in the USA, especially in connection with the development of banking and the need to assess the creditworthiness of borrowers. During the Great Depression of the 1930s, it became clear that financial reports alone are not informative enough to detect financial problems of companies in a timely manner.

In the last decades, financial analysis is increasingly connected with modern information technologies. Automated systems of financial reporting, data analytics and business intelligence enable the analysis of huge amounts of data in real time (Damodaran, 2012). The development of financial analysis today also reflects a shift from the simple measurement of accounting variables to a comprehensive assessment of economic added value (EVA) or the sustainability of a company's financial performance in the long term. The importance of financial analysis lies in its contribution to strategic management, performance assessment and early risk identification.

Historical development shows that financial analysis is constantly evolving in response to the changing needs of the business environment and the development of evaluation methods. Modern financial analysis today combines traditional indicators with advanced analytical tools and technologies.

High-quality and relevant data are a basic prerequisite for a successful financial analysis. It can be said that the correct choice of information sources, their completeness, accuracy and appropriate interpretation significantly influence the informativeness of the analysis and thus the correctness of the decisions made on its basis (Růčková, 2021). On the other hand, inaccurate or incomplete data can lead to wrong conclusions and consequently to risky strategic steps.

The basic and most common source of information are financial reports, which offer a standardized and legally based picture of the company's financial condition and performance. In combination with other sources, such as annual reports, control results, statistical data and external databases, they form the basis for a comprehensive analysis of the company's financial performance (Skálová, 2023).

In any case, it is necessary to state that sufficient resources and information are only part of a quality financial analysis, but also that a successful financial analysis does not depend only on the availability of data, but above all on the ability to adequately interpret this information and place it in the wider context of the business environment.

The EBA (European Banking Authority) has created a detailed set of criteria for granting loans to small, medium and large companies:

1. Specifications of the geographic market and economic sector
2. Client acceptance criteria, i.e. specific probabilities of default, external rating systems, types of clients, record of results, etc.
3. Minimum requirements for income, cash flow and financial projections
4. Minimum collateral requirements
5. Minimum collateral requirements and credit rating improvement
6. Minimum acceptable contractual provisions
7. Requests for withdrawal of borrower's funds
8. Maximum loan amounts
9. Appropriate limits for loans with partial or no right of assignment
10. Maximum loan maturity dates
11. Repayment plans and eligibility standards and limits for non-amortizing loans and use of interest reserves and cash payout structure.
12. Risk-based restrictions (by concentration, type of product, etc.)
13. Acceptable limits of loan-to-value ratio (for secured loans)
14. Acceptable debt coverage ratio limits
15. Acceptable interest coverage ratio limits

16. Acceptable limits on the ratio of total debt to earnings before interest, taxes, depreciation and amortization

17. Acceptable limitations of indebtedness

18. Acceptable debt-to-equity ratio limits

19. Acceptable limits on the ratio of loans and expenses

20. Acceptable limits on cash flow and debt servicing;

21. Acceptable limits on the return on equity ratio

22. Acceptable limits of capitalization rates (net operating income / market value)

23. Standards for solving and mitigating risks related to environmental risk

24. Policy for compliance with macroprudential requirements, where is relevant.

From the set of criteria indicated by the EBA (European Banking Authority), from order number 13 to 22, a whole series of ratios whose relations must be fulfilled and whose data for calculation is obtained from financial statements is indicated.

Of particular importance are the criteria numbered 3 and 11, which contain elements of future projections in business and financial planning. Financial planning is a key tool in the strategic management of the company, the goal of which is to ensure the efficient distribution of resources, sustainability and the achievement of set goals. It includes analysis of the current financial situation, forecasting of future income, expenses, investment and cash flow planning.

A well-prepared financial plan helps the company react to changes in the environment, minimize risks and optimize returns. Its success depends on realistic assumptions and continuous updating in accordance with the current market situation (Landa, 2007).

If financial planning wants to work, it is necessary to respect the basic principles and principles in its process (Landa, 2007).

Table 1: Basic principles of financial planning

Principle	Description
Cash flow preference principle	This principle focuses on ensuring that total monetary income prevails over total monetary expenditure. This principle is applied in practice in liquidity management and is an essential factor in making investment decisions.
The principle of respecting the time factor	The main essence of this principle is the preference of earlier income over later income. If their nominal value of income is the same. In practice, this principle is mainly applied to the assessment of investments using the net present value.
The principle of respect and risk minimization	The principle of respect and minimization of risk focuses on the fact that in financial management the same amount of money obtained with a lower risk should be preferable to the same income with a higher risk. However, in practice, it is not always the case that the least risky option is the most advantageous.
Principle of capital structure optimization	This principle encourages the company's financial management to properly monitor the optimal composition of corporate capital, which should be reflected in the company's strategic goals. The main essence of optimizing the capital structure is finding financial stability and reducing the cost of capital in the company.

Source: Landa, M. (2007). Financial planning and liquidity. Brno: Computer Press.

In addition to these four principles, it is recommended to take into account some specific principles in financial planning (Landa, 2007):

Table 2: Specific principles of financial planning

Principle	Description
The principle of long-term financial planning	The main essence of this principle is that the company's long-term strategic goals should be superior to short-term financial goals.
The principle of hierarchical organization of corporate financial goals	This principle builds on the previous principle and states that one selected goal must be defined among the goals, which has the position of the main goal for the given planned period.
The principle of realistic achievement of corporate financial goals	The application of this principle is based on basic knowledge of financial planning obtained from analyzes of the internal and external environment. The main significance of this principle is that the realistic achievement of the main goals has a great influence on the motivation of employees.
The principle of programmatic profit orientation of the company	Despite the fact that maximizing the market value of the company is the main priority, the importance of the company's profit orientation cannot be ignored. Profit represents the second highest goal in the hierarchy of financial priorities and serves as a key indicator for the external assessment of the economic performance of the company and affects the market value of the company.
The principle of periodic updating of the company's financial plans	This principle is based on the reality of a changing environment and the fact that financial plans should be constantly updated. For strategic financial plans, it is generally recommended to update them annually.
The principle of essential compliance of the structure and form of the main planning documents with the structure and form of the company's financial statements	This principle takes into account that the structure, form and methods of compiling the financial plan directly follow the structure, form and methods of internal economic reporting.
The principle of simplicity and transparency of planning budgets	This principle is preferred for planning procedures and calculations that are not too complicated and enable quick orientation. The main essence of the problem is that not only experts work on financial plans, but also managers, who may not have a high degree of financial or economic knowledge.
The principle of relative autonomy of the financial plan	The principle of relative autonomy of the financial plan tries to oppose attempts to dilute or abandon given intentions on the basis of acceptable strategic goals and financial policies.

Source: Landa, M. (2007). Financial planning and liquidity. Brno: Computer Press.

Financial planning methods represent different approaches to creating financial plans that help companies to efficiently allocate resources and achieve their goals. These methods are based on the analysis of historical data, estimates of future development and relationships between individual financial items. The key to success is choosing the appropriate method according to the specifics of the company and the market situation. A properly chosen approach enables the company to respond to changing conditions, minimize risks and improve decisions on future investments and financing (Koráb, 2007).

- Linear regression

The linear regression method is based on a static assessment of the relationship between the values of selected items from the income statement, balance sheet or sales volume. This relationship is then used to forecast and plan these items for the future.

- Percentage of sales method

The percentage of sales method is one of the most widely used methods of financial planning in practice. This method works on the principle of the same relationship of some balance sheet and income statement items to sales. The most important step in this method

is the accurate estimation of future sales, because other items are based on them. Sales are usually carried out based on sales plans.

- Turnover period indicator method

The turnover period indicator method is based on financial-analytical relationships between sales and individual items of current assets and short-term liabilities, using activity indicators.

Financial analysis is an important part of corporate management, which is closely related to financial accounting and financial management of the company. Financial analysis connects these two areas, which highlights its key role in the conditions of the market economy. The relationship between accounting and financial management can be described as follows (Grünwald, 2007): accounting serves as the "language of finance" because it provides data and information necessary for making financial decisions. This information is conveyed through the main financial statements, which include the balance sheet, income statement, and cash flow statement.

Financial statements are the result of the financial accounting process, which includes the collection, recording, sorting and documenting of company management

data (Grünwald, 2007). The main goal of financial analysis is to describe the company's financial situation as comprehensively as possible, including all its aspects. In the case of a more detailed analysis, one can focus on the assessment of specific components, such as the level

of indebtedness, the risk of insolvency, etc. Financial analysis thus provides an overview of the past, present and expected future financial management of the company (Grünwald, 2007).

4. THE QUALITY OF FINANCIAL INDICATORS AND THE EFFICIENCY OF THE USE OF BANKS' LOAN FUNDS

According to (Wali, 2018), the key role of the value of financial ratios, which include liquidity, capital adequacy, profitability and asset quality, is emphasized, both in predicting the business of clients and in assessing the credit risk of banks. The research (Ahmad Alqam, 2021) concludes that the investor's decision is largely influenced by the analysis of financial indicators, and that financial indicators contribute 53% when making a decision. Financial analysis using current financial statements can be used to better predict the future state of financial positions (Baharee, 2021). The aim of this paper is to present the results of analyzes and conclusions from various research studies on the effects of the use of bank loans in the financing of business entities, credit risk assessments and analysis of financial variables of legal entities as banking clients.

The methodologies used in the empirical part of the research include the use of statistical techniques, including regression and correlation analysis, in order to examine the interaction between independent variables (financial indicators of the company) and dependent variables (financial stability and efficiency of the company's

operations). The comparative presentation of the data obtained through the statistical analysis of the financial indicators of the sampled business entities should provide an overview of performance in areas such as profit margins, profitability of assets and profitability of capital. Overall, the goal of this research is to emphasize the importance of analyzing the company's financial statements in assessing business performance and defining the creditworthiness of banks.

Adequate analysis presupposes credible financial statements prepared with the application of international accounting standards with positions that reflect the real state of the business entity's operations to the greatest extent possible.

A statistical sample of 235 large companies out of a total of 601 participates in the empirical part of the research. The classification of large companies was made according to the Law on Accounting and Auditing of the Republic of Srpska ("Official Gazette of RS", no. 94/2015 and 78/2020).

A ratio analysis of the company's financial indicators was created, where the following results were obtained:

Table 3: Results of the analysis of financial indicators

The name of the indicator	Number of companies	
	Acceptable	Not satisfactory
Liquidity ratios		
Current ratio	105	130
Quick (Acid-Test) Ratio	95	140
Cash Ratio	108	127
Coef. financial stability	197	38
Leverage Ratios		
Debt ratio	137	98
Debt to asset ratio	126	109
Debt to equity ratio	133	102
Interest coverage ratio	235	0
Level of coverage I	154	81
Level of coverage II	193	42
Activity ratios		
Total Asset Turnover Ratio	128	107
Working Capital Turnover Ratio	206	29
Fixed Asset Turnover Ratio	197	38
Receivables turnover ratio	52	183
Duration of receivables collection in days	52	183
Economic indicators		
Economy of the overall business	225	10

Economy of business (sales)	219	16
Economy of financing	69	166
Economy of extraordinary business	115	120
Profitability Ratios		
Operating margin ratio	74	161
Gross margin ratio	34	201
Return on assets ratio (ROA)	172	63
Return on equity ratio (ROE)	129	106

Source: Author's data processing

It is evident from the previous table that:

- most companies do not have satisfactory liquidity, that is, the coefficients of current liquidity, accelerated liquidity and current liquidity are unsatisfactory for most companies,
- a significant number of companies (41.70%) have increased indebtedness and an insufficient coefficient of own financing (46.39%),
- a significant majority of companies have unsatisfactory collection of receivables and excessive duration of collection of receivables in days (77.87%),

- a significant number of companies do not have satisfactory profit margins and Return on equity ratio (ROE) (45.11%).

The efficiency of the use of banks' loan funds was determined using a statistical correlation between the extent of the company's borrowing from the banks and the quality of the financial indicators of the mentioned companies:

Table 4: Results of correlation analysis of financial indicators

Independent variable	Dependent variable	Correlation coefficient
Participation of total loans in total liabilities	Net profit margin	-0.062
Participation of total loans in total liabilities	Return on Total Assets (ROA)	-0.224
Participation of total loans in total liabilities	Return on total equity (ROE)	-0.009
Participation of short-term loans in short-term liabilities	Current liquidity ratio	-0.195
Participation of short-term loans in short-term liabilities	Coefficient of accelerated liquidity	-0.193
Participation of short-term loans in short-term liabilities	Current liquidity ratio	-0.188
Participation of long-term loans in long-term liabilities	Coefficient of financial stability	0.057
Participation of total loans in total liabilities	Turnover ratio of total assets	-0.191
Participation of total loans in total liabilities	Short-term asset turnover ratio	0.083
Participation of total loans in total liabilities	Long-term asset turnover ratio	0.061
Participation of total loans in total liabilities	Receivables turnover ratio	0.116
Participation of total loans in total liabilities	Duration of receivables collection in days	-0.121
Participation of total loans in total liabilities	Economy of the overall business	-0.096

Source: Author's data processing

When analyzing the financial indicators from the previous table, we separately observed three independent variables, that is, in addition to the share of total loans in total liabilities, we separated the share of short-term loans in short-term liabilities and the share of long-term loans in long-term liabilities. We then analyzed the values of each of the independent variables together with the corresponding financial indicators. In this part, the important role of the analysis of financial statements is highlighted, the fundamental task of which is to ensure the information base necessary for making decisions that ensure more successful and safer operations. As in the case of independent variables, we also separated the dependent variables depending on their sensitivity to

certain types of sources of funds, that is, to the maturity of the secured sources of financing. Thus, we analyzed the use of short-term loans with indicators of liquidity, the use of long-term loans with indicators of financial stability, while the total debt of the company was analyzed with indicators of economy and profitability. In each of the three cases mentioned, very low values of correlation coefficients were obtained, which amount to approximately 0. Based on this, it was determined that the results of the correlation analysis of financial indicators did not indicate a mutual connection and conditionality of the use of bank loans, on the one hand, and the quality of business operations of companies from the representative sample, on the other hand.

In addition to the above, a correlation model was formed in which the coefficient of participation of total loans in the total liabilities of the company was used as an independent variable, while the number of financial indicators of the company that are within acceptable reference values was used as a dependent variable. Similar to the

previous model, in this way we also tried to establish a connection between the extent of the use of bank loans and the financial performance of the company. The results of the correlation analysis are presented in the following table.

Table 5: Results of the correlation analysis of companies from the sample (235 companies)

Independent variable	Dependent variable	Correlation coefficient
Participation of total loans in total liabilities	Number of all financial indicators that meet the benchmark values	-0.251

Source: Author's data processing

The results obtained in this case indicate a weak negative conditionality between the volume of use of bank loans and the number of financial indicators that have values within satisfactory reference frames. The negative value of the coefficient, which is -0.251, points to the conclusion that companies that are more indebted to banks have, in all aspects of the analysis of financial indicators, less quality and successful operations than companies that have less credit debt.

Analyzing the financial indicators of companies from a representative sample, we did not find that the company's credit liabilities have a positive effect on their growth, development and profitability, but only on meeting the requirements for current liquidity, working capital and maintenance of fixed assets. Directing the credit indebtedness of companies in the direction of a greater share of investment loans approved on the basis of quality project documentation would create the conditions for a higher degree of justification of the use of bank loans, i.e. more indebted companies would have greater assumptions that they have better financial indicators than companies that do not use bank loans.

5. CONCLUDING REMARKS

Credit appears today as one of the most important instruments for the development of the overall economic activities of each country. It is precisely the banking sector that plays an important role in the process of providing sources of financing for the purpose of economic growth and social development. The analysis of financial statements of companies from a representative sample indicates that a large part of companies do not have satisfactory financial indicators. Liquidity indicators are not satisfactory for most large companies, including coefficients of current liquidity, accelerated liquidity and current liquidity. A significant number of companies have increased indebtedness and an insufficient coefficient of own financing. In addition, a significant majority of companies have unsatisfactory collection of receivables and excessive duration of collection of receivables in days, as well as insufficient profitability. The results of the correlation analysis of financial indicators did not indicate a mutual connection and conditionality of the use of bank loans, on the one hand, and the quality of business operations of companies from the

The conducted research indicates a significant volume of loans placed with the aim of ensuring current liquidity and maintenance of fixed assets and equipment. Such placements do not enable the growth and development of the company and do not lead to an improvement in the business performance of the company. If we take into account the connection between the financial and real sectors within the national economy, we can conclude that the development and volume of investments in the real sector is an important factor for the functioning of banks and the basis for the placement of their credit potential. With a quality selection of development projects and favorable sources of financing, banks can direct economic flows in areas of the economy in which it is the most competitive. In this way, prerequisites would be created for the efficient use of credit funds, which, in addition to increasing the competitiveness of the economy, would also increase the income and profitability of the companies to which the said loans were placed.

representative sample, on the other hand. In other words, the borrowing of companies and the use of short-term and long-term loans does not contribute to the improvement of the financial indicators of companies from the representative sample. This indicates that most companies use bank loans only when they fall into financial difficulties, that is, when they do not have a sufficient level of liquidity and solvency to settle current business obligations. A significant number of companies have increased indebtedness and an insufficient coefficient of own financing, which, along with unsatisfactory profitability, indicates inefficient use of bank loans.

The conducted research indicates a significant volume of loans placed with the aim of ensuring current liquidity and maintenance of fixed assets and equipment. If we look at the company's operations from a long-term perspective, the results obtained indicate a lack of dedicated loans approved by banks whose purpose is to finance projects that enable more successful operations of the company. Borrowing is an important element in the

operations of large companies and their financing, especially if one takes into account demanding development projects where the emphasis is on ensuring market justification and sustainability. On the other hand, it is necessary for banks to make a greater effort to manage

credit risk through a more detailed analysis of project documentation and the company's overall operations, as well as macroeconomic research of the economic branch in which the company operates.

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SUSTHONOMICS AND TOURISM: A NEW PARADIGM FOR SUSTAINABLE AND INCLUSIVE DESTINATION DEVELOPMENT IN THE WESTERN BALKANS

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Abstract

This paper introduces the concept of susthonomics as a new theoretical and developmental paradigm that integrates economic, social, and environmental dimensions of sustainability. Tourism, as a sector deeply intertwined with space, community, and natural resources, offers fertile ground for the application of susthonomic principles. The paper analyzes global examples of good practice (Slovenia, Bhutan, Costa Rica) and compares them with developmental potentials in the Republic of Srpska and the Western Balkans region. A model of susthonomic tourism is proposed, based on four pillars: (1) local value retention, (2) social inclusion, (3) environmental responsibility, and (4) a wellbeing-oriented rather than growth-driven economy. Special attention is given to the application of this model in rural and peripheral destinations. The conclusion offers the first working definition of susthonomics in tourism and outlines key policy recommendations for integrating this concept into destination development strategies.

Keywords: susthonomics, sustainable tourism, social economy, local development, wellbeing

JEL: Z32, O21, Q56, R11, L83

1. INTRODUCTION

Tourism has always functioned as a bridge between the economy, culture, and nature. However, precisely because of this multidimensional character, the sector also carries contradictions: while it generates record global revenues, it simultaneously deepens social inequalities and adds pressure to fragile ecosystems. (Gössling & Peeters 2015; Higgins-Desbiolles 2020). In the Western Balkans, these paradoxes are particularly pronounced. The region possesses exceptional landscape and cultural capital, but the prevailing tourism model continues to rely on quantitative growth, high profit leakage, and fragmented governance (Tourism Development Report 2023). Although strategic documents frequently invoke “sustainability,” critical literature warns that most initiatives remain trapped within the paradigm of permanent GDP growth, with local communities often relegated to the periphery of the value chain (Hickel 2020; Mitchell & Ashley 2010).

Within this context, the concept of susthonomics emerges as a synthesis that localizes economic value, embeds social justice, and respects planetary boundaries (Costanza et al. 2014; Daly 1996). Unlike radical “degrowth” approaches, susthonomics does not reject development but reconstitutes it: prosperity is measured by the wellbeing of residents and the integrity of ecosystems, rather than by the mere accumulation of capital (Jackson 2017). This raises a crucial research gap: how can such a paradigm be translated into operational poli-

cies and measurable indicators in a region where institutions are young, markets are dualistic, and the destination metabolism (energy–food–waste) remains poorly mapped?

This paper seeks to address that gap through a comparative analysis of global practices (Slovenia, Costa Rica, Bhutan) and micro-regional case studies across all Balkan states—from Tikveš in North Macedonia, through Valbona in Albania and Durmitor in Montenegro, to Uvac in Serbia, and Una and Hutovo Blato in Bosnia and Herzegovina. Within this framework, the central question arises: to what extent and in what ways can susthonomic principles—local value retention, social inclusion, ecological resilience, and a wellbeing-oriented economy—be systematically embedded into the governance of tourism destinations in the Western Balkans?

We anticipate that the results will offer a dual contribution. Scientifically, they extend the discourse on susthonomics beyond the Global North by testing theoretical postulates in a post-socialist, institutionally heterogeneous environment. Practically, the proposed set of instruments—eco-taxes, payment schemes for ecosystem services, “zero-km gastronomy” labels, and community ownership models—may serve policymakers as an operational roadmap for transitioning from extractive tourism to a destination economy measured by quality of life and the resilience of local ecosystems.

2. CONCEPTUAL FOUNDATIONS OF SUSTHONOMICS – TRANSFORMATION OF ECONOMIC DEVELOPMENT

The concept of susthonomics emerges as a critical response to the dominant discourse on sustainable development which, despite emphasizing the balance between economic, social, and environmental goals, in

practice often remains trapped in the paradigm of unlimited growth (Hickel, 2020; Gössling & Scott, 2018). Within the broader field of post-growth economics, scholars such as Spash (2020) and Kallis (2018) argue that essential transformation cannot be reduced to the

“greening” of GDP growth but requires a re-design of the very objectives of development. On this basis, susthonomics introduces a synthetic concept that insists on the simultaneous optimization of prosperity for both people and the planet, where prosperity is not understood as quantitative accumulation but as localized and equitably distributed value (Costanza et al., 2014; Jackson, 2017).

In this paper, susthonomics is defined as an integrated developmental model that unites localized economic value, social justice, and ecological resilience into a coherent system. Its aim is to ensure that economic activity (a) remains within the permissible ecological space, (b) contributes to the wellbeing of all members of the community, and (c) generates long-term sustainable prosperity.

If economic progress is viewed exclusively through the growth of aggregate macro-variables such as GDP, a “prosperity paradox” emerges: societies become statistically wealthier, yet wellbeing and social equality stagnate or decline (Jackson, 2017; Raworth, 2017). The degrowth literature—from Georgescu-Roegen to contemporary authors such as Hickel (2020) and Kallis (2018)—emphasizes that material and energy flows must be qualitatively reshaped rather than simply “greened.” Susthonomics accepts this thesis but, rather than advocating radical freezes in production, directs attention to the distribution and composition of economic activity. The goal is to enable prosperity growth measured by indicators of health, cultural vibrancy, and social cohesion, while stabilizing or reducing the physical scale of resource consumption. This “quality-led growth” implies a transition from production-volume-oriented sectors to services based on knowledge, culture, and experience—precisely the sphere in which tourism, redesigned along susthonomic lines, may function as a carrier of immaterial value and localized development.

Defined in this way, susthonomics constitutes an upgrade of the sustainable development concept, enriched with elements of growth-limitation theory. The theoretically authentic elements of the susthonomic model lie in its binding local component, which concretizes the very definition of development as an attribute of the whole. In other words, development whose fruits do not reach every individual cannot be considered genuine economic development. This approach aligns with the idea of the wellbeing economy, which measures progress using subjective and objective wellbeing indicators (Sachs, 2015; Stiglitz, Fitoussi & Durand, 2022), while simultaneously embedding ecological boundaries through the planetary limits framework (Rockström et al., 2009).

Since the Limits to Growth report (Meadows et al., 1972), ecological economics has emphasized that the human economy is a subset of the biosphere. The concept of “planetary boundaries,” formulated by Rockström and colleagues (2009), quantitatively defines biophysical thresholds whose transgression threatens the

stability of the Earth system. Susthonomics integrates these boundaries at its normative core: economic activity must remain within the permitted “ecological space” while ensuring the “social foundation” of a dignified life (Daly, 1996; Raworth, 2017). In tourism, this translates into the obligation that the total material and energy footprint of a destination (emissions, freshwater withdrawal, land degradation) be established as a limiting factor for planning capacity, investment, and marketing. Instruments such as carbon taxes, payments for ecosystem services, and carrying capacity management (Gössling, 2021; Buckley, 2012) thus become crucial levers through which planetary boundaries are “translated” to the operational level of the local destination and incorporated into the system of susthonomic tourism indicators.

Susthonomics avoids the reductionism of the triple-bottom-line model by redefining the relationship between the economic and the ecological. Instead of treating nature as a factor within the production function, it positions the economy within the ecological system (Daly, 1996). While classical interpretations of sustainable development acknowledge this dependence, they still operationally favor growth-oriented solutions, often through “green” technological optimizations (Peck, 2021). By contrast, susthonomics adopts the post-growth thesis that improving ecological efficiency per unit of output is not sufficient; it is necessary to reduce the overall material and energy footprint of the economy (Coscieme et al., 2019; Parrique et al., 2019). Unlike some strict degrowth approaches, susthonomics does not reject economic development per se but calls for its relocation and redistribution within local communities, thereby combining with the legacy of social economy and common resource governance (Utting, 2015; Ostrom, 2010).

Tourism is particularly well-suited for the application of susthonomic principles for three reasons. First, tourism is spatially determined, as value is created in a specific destination and depends on local cultural and natural capital (Dwyer, 2018). Globalization reduces the possibility of “locking in” the economic effects of tourism within local space (Higgins-Desbiolles, 2020). Retaining the value of tourist expenditure in the circular flow of the local economy thus constitutes the first pillar of susthonomics. This thesis is supported by studies of community-based tourism in Southeast Asia and Latin America, which show that cooperative models increase the domestic multiplier by up to 2.5 times compared to conventional ones (Scheyvens & Biddulph, 2018; Mitchell & Ashley, 2010). Second, tourism is one of the few service activities that inevitably engages marginalized groups (artisans, women, youth), thereby naturally highlighting the dimension of social justice (UNWTO, 2022; WTTC, 2023).

The issue of tourism’s ecological resilience is tied to a dual vulnerability: it is both a significant emitter of CO₂ (particularly in aviation) and simultaneously a victim of climate change (Scott et al., 2020). The susthonomic

model therefore calls for systemic decarbonization of the value chain, including energy-efficient accommodation, locally sourced food, and low-emission forms of mobility (Gössling, 2021). The inclusion of ecosystem services in tourism cost accounting, such as carbon charges or eco-taxes, is already employed in some countries as a mechanism for the internal valorization of nature (Buckley, 2012; Font & McCabe, 2017).

On these foundations, a theoretical bridge is built between susthonomics and existing paradigms of sustainable and regenerative tourism. While sustainable tourism emphasizes the minimization of negative impacts, regenerative tourism emphasizes the active renewal of ecosystems (Hughes & Rogerson, 2020). Susthonomic tourism integrates economic locality and social inclusion into a single coherent framework. Its innovativeness lies in a pragmatic shift away from abstract global goals toward concrete, measurable indicators at the destination level.

3. TOURISM AS A SUSTHONOMIC SYSTEM – FROM PROFIT TO WELLBEING

The mass tourism industry, rooted in the paradigm of permanent growth and cost externalization, has long been subject to critique in the contemporary literature on the sustainability of the sector (Gössling & Peeters, 2015; Higgins-Desbiolles, 2020). While it generates significant added value at the macro level, the model of mass tourism deprives local communities of a fair share of revenues. For example, it is estimated that in typical “all-inclusive” arrangements less than one-third of tourist expenditure remains in the destination, while the remainder is absorbed by transnational intermediary chains (Mitchell & Ashley, 2010). It is within this space of economic and social imbalance that the concept of susthonomic tourism positions itself, seeking to redirect the focus toward enhancing destination wellbeing.

The transformation of a destination toward a susthonomic model rests primarily on the localization of economic value through the creation of short supply chains and cooperative business models. Research demonstrates that the multiplier effect of local expenditure can increase up to 2.5 times when primary providers are local households and micro-enterprises (Hall, 2019). Such organization allows for a fairer distribution of income and strengthens the financial resilience of destinations against external shocks.

The localization of value in tourism materializes most tangibly through food. Gastronomy represents a “condensed identity of place” (Bessière, 1998) and a powerful marker of authenticity recognized by tourists, with the link between the local origin of ingredients, experiential value, and willingness to pay a premium well documented (Everett & Aitchison, 2008; Sims, 2009). The susthonomic approach requires that the culinary offering of a destination not be treated as a peripheral element, but rather as an economic collector connecting farms, crafts, food processing, women’s and family cooperatives, gastro-events, and hospitality. When the hospitality sector structurally shifts to “zero-km” or

Synthesizing these arguments, susthonomics can be described as a place-based economy that simultaneously targets community wellbeing, ecosystem preservation, and the structural resilience of the local economy. Its application in the tourism sector of the Western Balkans—a region where tourism often functions as a rapid source of foreign exchange with limited social benefit—represents a potentially transformative strategy. Rather than competing through cheap labor and low environmental standards, the adoption of susthonomic principles opens avenues for destination branding through quality of life and preserved nature, priorities for post-pandemic market niches oriented toward wellbeing and slow tourism (Bianchi, 2022; Everingham & Chasagne, 2020). Thus, susthonomics offers not only a critical diagnosis but also a pragmatic roadmap, positioning tourism as a testing ground for the broader transformation of the regional economy toward a fairer and more ecologically stable model.

“low food miles” procurement standards, the result is not only greater retention of monetary value within the destination but also multiplier effects across the rural economy (Hall & Gössling, 2016; Cucinelli, Peri, & Zanni, 2021). Furthermore, systems of geographical indications of origin (PDO/PGI) and gastronomic routes increase the visibility of local products, thereby enhancing intangible values—reputation, pride, intergenerational transfer of knowledge—that are critical for long-term social cohesion (Lane & Kastenholz, 2015).

Sustainable gastronomy thus becomes the first operational axis of susthonomic tourism: it internalizes local resources into the tourism product, distributes revenues more horizontally, reduces the carbon footprint of transportation, and enhances the recognizability of the destination in a market increasingly sensitive to authenticity and health (Kivela & Crotts, 2006; UNWTO, 2022).

A susthonomic destination must also manage its own “metabolism”—the inflows and outflows of matter and energy through the tourism system (Farrell & Twining-Ward, 2004; Becken & Patterson, 2006). Whereas conventional sustainable tourism measures emissions or water consumption at facilities, the susthonomic approach integrates the entire value chain: from agricultural practices supplying gastronomy, through the energy mix of accommodation, to the management of organic waste as a resource for composting or biogas. In closed mountain systems, such as ski resorts with limited water resources, linking wastewater treatment to irrigation of local farms can simultaneously reduce environmental pressures and stimulate local food production for the tourism supply (Scott et al., 2020; Gössling, 2021). Similarly, organic waste from hotels and restaurants can be redirected into local farms—closing the nutrient cycle and reducing dependence on imported inputs. This “circular loop” expands the economic base of the destination beyond classical tourism services and

builds systemic resilience to supply crises (cf. Girard & Nocca, 2017).

The key epistemological shift introduced by susthonomics in tourism governance is the replacement of one-dimensional indicators (arrivals, overnight stays, GDP) with wellbeing and boundary-based indicators. An “infrastructural bridge” is needed between global agendas (SDGs, Paris Agreement) and local destination practice (Hall, 2019). In practice, this means supplementing classical economic indicators with the LM3 local multiplier of tourist expenditure; an index of social distribution (share of women/youth in tourism revenues); the ecological footprint per arrival; and a subjective index of resident satisfaction with tourism (Costanza et al., 2014; Stiglitz, Fitoussi & Durand, 2022). When published transparently, these indicators become regulatory mechanisms: destinations that degrade ecosystems or

exclude local groups lose their susthonomic label and access to public incentives.

A systemic observation of tourism through the lens of susthonomics reveals it as a sector with high networking capacity—linking land and landscapes, labor and services, culture and narratives, gastronomy, infrastructure (energy, water), and finance (taxes, fees). When these flows are aligned with local development priorities, tourism evolves into a testing ground for a broader economic transition toward wellbeing-oriented and ecologically bounded models (Bianchi, 2022; Everingham & Chassagne, 2020). It is precisely in this role that susthonomic tourism positions itself: not as a niche eco-segment, but as a pivotal sector capable of swinging the pendulum from profit toward wellbeing across the entire local economy.

4. SUSTHONOMIC PRINCIPLES IN PRACTICE

Recent experiences from some of the world’s most visited countries demonstrate that susthonomic principles—local value retention, social inclusion, ecological resilience, and wellbeing orientation—are increasingly permeating mainstream tourism policies, albeit with variations in scope and institutional environments. France, for example, has developed the Occitanie Slow Tourism program in the Occitanie region, which subsidizes exclusively small domestic households, cooperative accommodation facilities, and thematic cultural routes with limited daily visitor quotas. Research by the regional development agency shows that in the past three years the local expenditure multiplier has doubled, while pressures on the most sensitive natural sites have declined by one-third (Occitanie Tourisme, 2023).

A similar logic has been adopted in the Basque Country of Spain through the Basque Zero-Km Gastronomy label. Restaurants sourcing at least seventy percent of their ingredients within a radius of one hundred kilometers recorded a 21% increase in turnover, along with a 30% reduction in supply-chain emissions (Basque Culinary Center, 2023). Thus, short supply chains, mandatory contracts with women’s and family cooperatives, and reduced carbon footprints have become constitutive elements of the region’s brand identity.

In Italy, susthonomic experiments are twofold. In the north, the Trentino Ecomuseum Network integrates mountain households, agricultural cooperatives, and micro-accommodation facilities into a collective “village of wellbeing”; in the south, the borghi autentici network revitalizes historic rural cores through a combination of sustainable tourism, creative industries, and community ownership of cultural infrastructure. Both models have contributed to slowing demographic decline and increasing youth participation in local entrepreneurship (BAI, 2022; Trentino Sviluppo, 2022).

In Germany’s Baden-Württemberg region, the Fair Trade Tourism label was launched, obligating hotels to use renewable energy, incorporate local supply chains,

and reduce the share of seasonal labor. Preliminary results show that participating establishments have reduced energy intensity by 40% while maintaining competitiveness in international markets (Regierung BW, 2023). On the Isles of Scilly, part of the United Kingdom, the Community Land Trust introduced a “sustainable tourism tax,” with revenues directly reinvested into affordable housing and small-scale renewable energy projects, thereby mitigating the pressure of secondary housing and encouraging the return of younger residents (Scilly CLT, 2022).

The susthonomic concept has also gained traction in non-European countries with high tourism intensity. In Hawai’i, the Community-Based Subsistence Tourism initiative restricted access to the most sensitive beaches and trails, introduced a reservation system, and channeled revenues into indigenous cooperatives managing coastal ecosystem protection. Similarly, in Mexico, the Maya Ka’an destination enabled Mayan communities to retain full control over accommodation and products, with revenues returned via a common fund to education and forest conservation (Pagiola, 2020).

Thailand’s Doi Tung Development Project integrates mountain tourism with organic coffee production and weaving crafts, reinvesting profits into funds for women and youth, while strict carbon management tracks the entire value chain (Mae Fah Luang Foundation, 2021). Particularly illustrative is the case of Costa Rica, where a long-term Payments for Ecosystem Services (PES) system enabled the rehabilitation of most national forests, while tourism remained the leading source of foreign exchange (Pagiola, 2020). At the opposite scale, Bhutan, through its restrictive “high value – low volume” policy and linking of tourism contributions to the Gross National Happiness index, has subordinated the sector entirely to social and cultural wellbeing.

Ultimately, these examples—from Occitanie to the Himalayas—demonstrate that susthonomic principles are not reserved for marginal destinations but are suc-

successfully implemented even in highly competitive markets, provided that public policies orient tourism toward a place-based economy and sustainable ecology. Their common denominator is the abandonment of one-dimensional growth metrics in favor of wellbeing and

ecosystem preservation indicators, thus laying the foundation for a new developmental matrix in which tourism becomes an instrument of socio-ecological transformation rather than a mere generator of revenue.

5. OPPORTUNITIES FOR APPLYING THE SUSTHONOMIC CONCEPT IN THE TOURISM OF THE WESTERN BALKANS

Within the Western Balkans, the susthonomic concept of tourism has not yet been institutionally codified. However, the complex combination of natural resources, cultural diversity, and underutilized local market niches indicates substantial development potential. When examining the countries of the region from south-east to northwest, one can identify different starting positions but also a common baseline: the need to shift tourism away from a paradigm of cost externalization toward a model prioritizing localized value, social inclusion, and ecological resilience.

In North Macedonia, the Tikveš wine region and the mountain municipalities of Kruševo and Mavrovo already feature cooperatives of winegrowers and small-scale accommodation providers. Yet, integration of these actors into a coherent tourism product remains partial (Ministry of Economy of North Macedonia, 2023). The creation of a regional label “Tikveš – zero-km wine tourism” could, according to ministry simulations, raise the local expenditure multiplier from the current 1.6 to 2.3, while reducing the carbon footprint of food transport by 18%.

Albania, following extensive growth along its coastline, now faces ecosystem degradation and growing social inequalities. Mountain areas such as Valbona and Theth have established the beginnings of community-based tourism organizations managing accommodation and trails, but they lack a financial mechanism for maintaining alpine pastures (Albanian Sustainable Tourism Initiative, 2022). Introducing payments for ecosystem services, supported by IPA III grants, would allow revenues from hiking fees to directly finance restorative measures, thereby fulfilling the susthonomic postulate of internalizing external costs.

In Montenegro, whose tourism profits are concentrated on the coast, northern municipalities already implement rural tourism programs through IPARD funding (Government of Montenegro, 2023). Still, analyses show that 55% of the revenues from Durmitor National Park flow to international tour operators. Establishing a “Local Value Durmitor” certificate, obliging hospitality providers to source at least 50% of supplies from local producers, would retain significantly more value within the community while strengthening the social capital of rural households.

In Serbia, the Rural Tourism Development Fund in 2023 directed incentives toward women’s cooperatives and circular supply chains in Western Serbia (Tourism Development Report, 2023). In the Uvac area, a pilot project for a carbon-neutral destination has been announced: by introducing a €1 eco-tax per visitor, part of

the funds would be invested in solarization of eleven registered eco-camps, reducing emissions by 340 tCO₂ within just five years.

In Bosnia and Herzegovina, particularly in Republika Srpska, diverse natural and cultural resources contrast with limited coordination of development policies. The Drina basin near Foča generates around €2.5 million in annual rafting revenues, but more than half of that value leaks away through external arrangements (Municipality of Foča, 2023). Establishing an Eco-Services Fund, financed by a €0.5 environmental tax, would secure over €120,000 for erosion control and cooperative ownership of campsites. In Sutjeska National Park, restructuring gastronomic supply chains could retain an additional €380,000 in the municipality, while lowering the carbon footprint by 1.7 tCO₂ per ton of goods (JP “NP Sutjeska,” 2023). Jahorina, as the most commercialized mountain destination, would benefit from the introduction of an “Olympic Table” label, whereby at least 60% of products sourced from Romanija would increase farm incomes and reduce transport costs. At the same time, a €1 surcharge per ski pass could serve as a flexible decarbonization tool—from investments in Nearly-Zero Energy hotel retrofits to the establishment of an electric shuttle line Pale–Trebević.

The Semberija region holds potential as an agrotourism hub: integrating twenty family farms into the “Banja Dvorovi” culinary route could generate an additional 15,000 high-quality overnight stays and create seventy permanent jobs. According to an IUP study (2023), 65% of the initial investments in renewable energy and value-added chains would be covered by IPA III “Nature-based Tourism SMEs” grants.

In the Federation of BiH, the beginnings of practices aligned with susthonomic principles are already visible, though lacking systematic networking and clear regulatory support. In the Neretva Valley, the project “Hutovo Blato – Nature Pays Back” (UNDP BiH, 2023) introduced a voluntary €2 “bird-watching fee,” with 70% of revenues directed to wetland restoration and the remainder to local beekeepers supplying traditional honey as part of the tourism package. In Una National Park, a co-management scheme for rafting corridors was established, whereby local cooperatives retain 60% of gross revenues and 40% is reinvested into water ecosystem monitoring and training of young guides (WWF Adria, 2022).

Meanwhile, in the Central Bosnia Canton, the Via Dinarica Green Corridors foundation developed a pilot “zero-km gastronomy” certification for mountain

lodges on Vlačić. Initial results show an increase in domestic procurement from 22% to 55% within a single season (GIZ, 2023). Finally, in the Old Town of Mostar, the “Crafts 4 Heritage” initiative connects artisanal workshops (jewelers, coppersmiths, leatherworkers) with tourist guides through a digital voucher system. Each purchased voucher includes a €1 contribution toward the conservation of the Old Bridge and co-financing training for women’s cooperatives producing souvenirs from recycled textiles (Mostar Tourism Cluster, 2024). These scattered yet promising projects indicate that the Federation possesses a critical mass of local actors, particularly in gastronomy, crafts, and nature-based activities, who—if integrated into a unified susthonomic framework—could significantly increase the

6. CONCLUSION

The analytical framework of this paper began with the question of to what extent susthonomic principles—local value retention, social inclusion, ecological resilience, and wellbeing orientation—can be embedded into tourism practice in the Western Balkans. Comparative analysis of global projects demonstrated that destinations which systematically support short supply chains, community ownership, and mechanisms of financial valorization of ecosystem services succeed simultaneously in increasing local revenues, reducing social inequalities, and lowering ecological footprints. In the Balkan context, case studies—from the wine region of Tikveš and the mountain area of Valbona, to the Drina river corridor and rural Semberija—confirmed the existence of a critical mass of actors and resources for such a transformation, while also exposing institutional weaknesses: fragmented jurisdictions, incomplete statistics, and dependence on external tour operators.

Accordingly, the following levers of action are of priority:

1. Legal recognition of cooperatives and community-based ownership as key drivers of tourism development;

local expenditure multiplier while simultaneously funding ecosystem conservation and strengthening social inclusion.

At the regional level, the key obstacle remains scarce intersectoral coordination. Yet, the perspective of the EU’s Carbon Border Adjustment Mechanism fund from 2027 and new IPA III instruments foresee significant financing lines for “nature-positive” and “community-owned” tourism models. If local communities in Republika Srpska adopt cooperative ownership, payments for ecosystem services, and “zero-km” gastronomy, the region’s tourism could evolve from an extractive logic to a susthonomic model that measures success by achieved wellbeing and ecosystem preservation.

2. Introduction of mandatory eco-taxes and payment schemes for ecosystem services as stable sources of funding for nature conservation;
3. Integration of local farms, artisans, and women’s entrepreneurial initiatives into the gastronomic and cultural products of destinations.

These measures are not merely an ethical imperative; they also constitute a competitive advantage in the post-pandemic era of demand oriented toward authenticity, wellbeing, and low-carbon footprints.

Future research should deepen the quantification of the social dividends of inclusive models, test the long-term financial viability of ecosystem service funds, and assess how different forms of local branding (e.g., “zero-km gastronomy”) influence visitor and resident perceptions. Yet even now it is evident: by embracing a susthonomic approach, tourism in the Western Balkans can move from an extractive phase to a place-based economy that measures success through human wellbeing and ecosystem preservation, positioning the region as a leader of “quality-led growth” within the European tourism space.

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SUSTAINABILITY OF HEALTHCARE FINANCING IN GREECE

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Abstract

The sustainability of healthcare financing in Greece remains a pressing policy issue due to persistent macroeconomic fragilities, demographic ageing, high medical inflation, and one of the highest out-of-pocket (OOP) burdens in the European Union. This study evaluates medium- and long-term sustainability using updated macroeconomic and demographic projections for 2024–2035 and an actuarial modelling framework. Health expenditures are projected on the basis of age-specific spending profiles, population dynamics, and medical inflation, while contribution revenues depend on employment, wages, and stable contribution rates. The analysis employs actuarial balance and solvency ratio indicators to examine baseline and alternative scenarios. Results show that expenditure growth outpaces revenue capacity throughout 2024–2035, widening funding gaps despite moderate labour-market improvements. Long-run indicators confirm that, under realistic assumptions, the solvency ratio remains below the level consistent with full financial balance, signalling structural pressure on the pay-as-you-go health insurance model. Policy implications include adopting an actuarial reserve mechanism, restructuring state funding into direct health-insurance subsidies, introducing complementary insurance to reduce OOP burden, and implementing automatic adjustment rules linked to actuarial indicators.

Keywords: Actuarial Balance; Sustainability; Health Insurance; Solvency Ratio

1. INTRODUCTION

The Greek healthcare system is financed through a mix of state budget transfers and social health insurance contributions. The economic crisis of the 2010s brought severe expenditure cuts, statutory ceilings and strict consolidation rules. While these measures ensured short-term fiscal discipline, they also increased household exposure to healthcare costs, with Greece consistently exhibiting one of the highest OOP shares in the EU.

Macroeconomic conditions remain fragile. GDP recovery is moderate, productivity growth is low, and labour-force participation—especially among older

workers and women—lags behind EU benchmarks. These weaknesses directly constrain contribution revenues, the backbone of the social insurance system. At the same time, demographic ageing and medical inflation exert upward pressure on health expenditures, raising concerns about the long-run sustainability of healthcare financing.

This paper combines updated macroeconomic and demographic projections for 2024–2035 with an actuarial sustainability framework to evaluate the financial outlook of the Greek health insurance system and to discuss policy options that could enhance its resilience.

2. BACKGROUND AND THEORETICAL FRAMEWORK

Healthcare systems financed on a pay-as-you-go (PAYG) basis require continuous alignment between revenues and expenditure obligations. In such systems, sustainability depends on demographic structure, labour-force participation, wage dynamics and the rate of medical inflation. Actuarial analysis provides tools to assess whether current financing arrangements are consistent with long-term balance.

Two indicators are central to this assessment. First, the actuarial balance compares the present value of projected revenues (contributions and state transfers) with the present value of projected expenditures over a long

evaluation period. A negative actuarial balance indicates structural unsustainability. Second, the solvency ratio relates projected revenues to projected liabilities. Values above one indicate financial adequacy, whereas values below one signify persistent deficits and the need for parametric or structural reform.

Greece also faces challenges related to its public–private mix. The country records one of the highest OOP shares in Europe, reflecting limited financial protection. International experience, for instance from France and Germany, shows that well-designed complementary insurance schemes can absorb a substantial share of private costs while preserving universal access.

3. METHODOLOGY

The methodological framework builds on previous actuarial studies of the Greek health insurance system (Mavridoglou, Polyzos 2022, Mavridoglou Gourzoulidis 2025), and extends them by integrating updated macroeconomic and demographic projections. Total health expenditure is projected by combining age-specific expenditure profiles with population forecasts and medical

inflation assumptions. Contribution revenues are modelled as a function of employment, wages and stable contribution rates.

To evaluate the financial health of the Greek healthcare system, the study employs two key actuarial indicators. The first is the actuarial balance (AB_t), which

measures the system's ability to cover its expenditures with its revenues on an annual basis. It is defined as:

$$AB_t = \frac{Revenues_t}{Expenditures_t}$$

A value of $AB_t < 1$ indicates an annual deficit that must be covered by other sources, such as increased employees and employers' contributions or extraordinary state subsidies.

The second indicator is the Solvency Ratio (SR), is the basic indicator used to assess the long-term sustainability of the health insurance system over the entire evaluation period. It is defined as the ratio of the present value of projected revenues to the present value of projected expenditure obligations:

$$R = \frac{PV(TotalRevenues)}{PV(TotalExpenditures)} = \frac{\sum_{t=t_0}^{\omega} \frac{Revenues_t}{(1+r)^{t-t_0}}}{\sum_{t=t_0}^{\omega} \frac{Expenditures_t}{(1+r)^{t-t_0}}}$$

where:

t_0 is the base year of the projection (2024),

ω is the final year of the projection horizon (2035),

r is the discount rate used to calculate present values,

$Revenues_t$ includes all contribution inflows and state transfers at time t ,

$Expenditures_t$ represents the total projected health spending at time t .

This ratio signifies the overall financial adequacy of the current pay-as-you-go (PAYG) model; a SR significantly below unity indicates structural insolvency and the need for immediate policy intervention.

Furthermore, the Funding Gap (%) represents the residual share of total health expenditure that is not covered by public funding or the current level of private insurance penetration. This indicator highlights the structural deficiency in financial protection and is calculated as:

$$\text{Funding Gap}_t = \frac{\text{Total Exp}_t - (\text{Public Funding}_t + \text{Contributions}_t)}{\text{Total Exp}_t}$$

Interpretation of this gap is crucial, as it quantifies the pressure exerted on households to cover healthcare costs through out-of-pocket (OOP) payments, thereby

signalling the potential market space for structured complementary insurance pillars.

4. DATA AND ASSUMPTIONS

The projection model is populated with data from national accounts, population forecasts, and official health expenditure statistics. The primary data sources and the rationale behind the key parameters are as follows:

- **Demographic Data:** Population projections ($Pop_{\{a,t\}}$) are based on Eurostat's EUROPOP 2024 database, which accounts for fertility, mortality, and migration trends. As shown in Table 1, the total population is expected to decline significantly through 2035.
- **Macroeconomic Indicators:** GDP per capita and growth projections are derived from Eurostat forecasts and the structural requirements set out in the Memoranda of Economic Cooperation signed by Greece. GDP per capita is projected to rise from €24,752 in 2024 to €29,589 in 2035.
- **Health Expenditure Profiles ($C_{\{a,t\}}$):** Due to the absence of detailed national data regarding age-specific healthcare costs in Greece, the spending profiles were calibrated using the EU-average profiles from the 2024 Ageing Report. This proxy approach

captures the non-linear increase in costs associated with older age groups.

- **Medical Inflation (i_m):** The model distinguishes between general and medical inflation. While the general inflation rate is assumed to be 2.0%, medical inflation is set at 2.2%. This differential reflects the impact of technological progress and the increasing intensity of specialised care (Cutler & Sheiner 2020, Dormont et al., 2018).
- **Revenue Variables:** Contribution revenues are modeled based on employment and wage projections. The statutory contribution rates are kept constant at current levels to test the sustainability of the existing pay-as-you-go (PAYG) framework.

The data in Table 1 illustrates a critical tension: while GDP per capita is projected to grow by approximately 19.5%, the total population is shrinking. This demographic contraction, combined with the rising share of public health expenditure in GDP (from 5.10% to 5.60%), underscores the increasing fiscal pressure on the working-age population to sustain the healthcare system.

Table 1: Population and macroeconomic projections, 2024–2035

Year	Population	GDP per capita (€)	Public health exp. (% of GDP)
2024	10.396.324	24.752,10	5,10%
2025	10.345.636	25.271,89	5,20%
2026	10.292.097	25.827,87	5,25%
2027	10.235.326	26.266,94	5,30%
2028	10.175.942	26.660,94	5,30%
2029	10.117.518	27.060,85	5,40%
2030	10.060.012	27.466,76	5,40%
2031	10.003.413	27.878,76	5,45%
2032	9.947.967	28.296,94	5,45%
2033	9.893.936	28.721,39	5,50%
2034	9.840.676	29.152,21	5,55%
2035	9.788.482	29.589,49	5,60%

5. RESULTS

5.1. Projections of health expenditure and revenues (2024–2035)

Table 2 presents the projections for total, public, and private health expenditure for the period 2024–2035. Total health expenditure is projected to rise steadily, driven by the interaction of demographic ageing and a medical inflation rate of 2.2%. Specifically:

- Total Expenditure: Increases from €19.9 billion in 2024 to €24.1 billion in 2035.

- Public Funding: Follows a flatter trajectory, rising from €13.1 billion to €16.2 billion.
- Private Expenditure: Shows a continuous upward trend, exceeding €7.9 billion by the end of the projection horizon.

Composition: The share of public funding remains constrained, effectively shifting a significant portion of the financial burden to private sources.

Table 2: Projected health expenditure by source, 2024–2035 (euros)

Year	Total expenditure	Public funding	Private expenditure
2024	19.901.128.513	13.123.873.542	6.777.254.972
2025	20.351.924.569	13.595.596.154	6.756.328.415
2026	20.832.951.497	13.955.704.349	6.877.247.148
2027	21.219.325.457	14.249.086.694	6.970.238.763
2028	21.569.200.890	14.378.909.408	7.190.291.482
2029	21.924.178.673	14.784.586.177	7.139.592.496
2030	22.285.211.007	14.921.060.145	7.364.150.862
2031	22.651.758.116	15.199.109.522	7.452.648.595
2032	23.024.102.175	15.341.587.787	7.682.514.387
2033	23.401.971.875	15.629.218.313	7.772.753.562
2034	23.782.958.993	15.921.698.998	7.861.259.995
2035	24.167.680.079	16.219.627.466	7.948.052.613

5.2. Private Expenditure and the Funding Gap

The decomposition of private spending (Table 3) reveals a heavy reliance on out-of-pocket (OOP) payments:

- OOP Payments: Projected to rise from €6.4 billion (2024) to over €7.5 billion (2035).

- Private Insurance: Continues to cover only a minimal share of private spending (approx. 5%), significantly lower than in countries like France.
- Funding Gap: The residual share of expenditures not covered by public resources or existing insurance remains at approximately 8-9%.

- Actuarial Balance: Remains consistently below unity (0.91–0.92), signaling persistent structural pressure on the financing mix.

Table 3: Projected OOP (% and euros) and Actuarial Balance (%) , 2024–2035

Year	Private exp.	Share of total (%)	Private insurance	Out-of-pocket	Funding gap (%)	Actuarial balance (AB)
2024	6.777.254.972	34,10%	338.862.749	6.438.392.223	9,10%	0,91
2025	6.756.328.415	33,20%	337.816.421	6.418.511.994	8,20%	0,92
2026	6.877.247.148	33,00%	343.862.357	6.533.384.790	8,00%	0,92
2027	6.970.238.763	32,80%	348.511.938	6.621.726.825	7,80%	0,92
2028	7.190.291.482	33,30%	359.514.574	6.830.776.908	8,30%	0,92
2029	7.139.592.496	32,60%	356.979.625	6.782.612.871	7,60%	0,92
2030	7.364.150.862	33,00%	368.207.543	6.995.943.319	8,00%	0,92
2031	7.452.648.595	32,90%	372.632.430	7.080.016.165	7,90%	0,92
2032	7.682.514.387	33,40%	384.125.719	7.298.388.668	8,40%	0,92
2033	7.772.753.562	33,20%	388.637.678	7.384.115.884	8,20%	0,92
2034	7.861.259.995	33,10%	393.063.000	7.468.196.995	8,10%	0,92
2035	7.948.052.613	32,90%	397.402.631	7.550.649.982	7,90%	0,92

5.3. Long-Term Sustainability And Scenario Analysis (2020–2050)

To account for macroeconomic and demographic uncertainty beyond the initial projection horizon, the study evaluates the system's sustainability under three distinct scenarios up to 2050. The results demonstrate that the long-term solvency of the Greek healthcare system is highly sensitive to labor market dynamics and GDP growth:

- Baseline Scenario: Under neutral growth assumptions, healthcare expenditures are projected to reach 9.1% of GDP by 2050. The system faces a persistent structural deficit of approximately 1% of GDP, with an average Solvency Ratio of 0.94 over the 2020–2050 period.

- Pessimistic Scenario: Assuming a weaker economic recovery and lower labour participation, expenditures escalate to 9.6% of GDP. The deficit widens to 1.8% of GDP, while the average Solvency Ratio drops to 0.86, indicating severe financial instability.
- Optimistic Scenario: By assuming higher employment rates, especially among women and youth, expenditure is contained at 8.6% of GDP. In this case, the system approaches sustainability with an average Solvency Ratio of 0.997.

The following Table 4 summarizes these long-term findings:

Table 4: Long-term Projections and Scenario Comparison (2050)

Indicator	Pessimistic Scenario	Baseline Scenario	Optimistic Scenario
Total Health Expenditure (% of GDP)	9.6%	9.1%	8.6%
Public Funding (% of Total)	67%	67%	-
Private/OOP Payments (% of Total)	33%	33%	-
System Deficit (% of GDP)	1.8%	1.0%	0.2%
Average Solvency Ratio (2020-2050)	0.86	0.94	0.99

5.4 Evaluation of Funding Reserve Policies

The study compared two alternative strategies for addressing the projected structural deficits and maintaining the solvency of the system:

- Policy 1 (Ad-hoc Funding): This involves the immediate coverage of annual deficits through extra public/private funding or the reduction of health

services. This reactive approach lacks predictability and fails to address the underlying structural pressures.

- Policy 2 (Actuarial Reserve): This strategy utilizes a mathematical reserve accumulated by the social health insurance organization (EOPYY) to smooth out financial shocks.

- **Key Efficiency Finding:** Actuarial modeling reveals that Policy 2 is significantly more efficient; in the neutral scenario, it requires only 11.67% of the liquidity that Policy 1 would demand to cover the same deficits. Even under the pessimistic scenario,

the reserve-based policy requires only 72.75% of the funds compared to ad-hoc coverage.

By implementing an actuarial reserve mechanism (Policy 2), the Solvency Ratio in the neutral scenario can be stabilized, moving from 1.26 in 2020 to a sustainable 1.02 in 2050.

6. DISCUSSION

The results confirm persistent structural vulnerabilities in Greece's healthcare financing. Expenditure pressures driven by ageing and medical inflation outpace the system's revenue-generating capacity. Public funding remains constrained, while private expenditure—and especially OOP payments—plays an increasingly important role in maintaining overall spending levels. The actuarial balance indicator suggests that, without significant policy adjustment, the system will continue to rely heavily on private payments, raising concerns about equity and access.

The persistent funding gaps and the high reliance on OOP payments in Greece highlight a structural divergence from other European healthcare models. In countries such as France, the introduction of a structured complementary insurance pillar has successfully absorbed a significant portion of private costs, thereby preserving universal access (Chevreul et al., 2015). Similarly, the Belgian model demonstrates how multi-layer financing can stabilize healthcare resources despite demographic pressures (Gerkens & Merkur, 2020). According to OECD (2023) data, these countries maintain some of the lowest OOP burdens globally, contrasting sharply with the Greek trajectory, where the

actuarial balance ($AB \approx 0.92$) signals a failure of the current single-pillar PAYG model to contain private spending.

6.1. Limitations

Despite the use of robust actuarial tools, this study is subject to certain limitations:

- **Proxy Data Utilization:** Due to the lack of detailed national age-specific cost data, the study utilizes EU-average profiles from the 2024 Ageing Report. While this is a standard academic practice, it may not fully capture unique local clinical patterns or specific inefficiencies of the Greek system.
- **Macroeconomic Uncertainty:** The projections rely on growth assumptions from Eurostat and the Memoranda of Economic Cooperation. Unforeseen economic shocks or shifts in fiscal policy could alter the revenue trajectory.
- **Medical Inflation Volatility:** The assumed differential between general (2.0%) and medical inflation (2.2%) is a conservative estimate; rapid technological breakthroughs could exert higher-than-expected pressure on expenditures.

7. POLICY IMPLICATIONS

The actuarial projections for 2024–2050 indicate that the Greek healthcare system faces a structural financing gap that cannot be addressed solely through ad hoc fiscal measures. The persistent Solvency Ratio below unity (approx. 0.92) and the escalating household burden necessitate a shift towards a more resilient and predictable financing model. Based on the findings, the following policy interventions are proposed:

- **Establishment of an Actuarial Reserve Mechanism (Policy 2):** The most critical finding of this study is that utilizing a mathematical reserve (accumulated by EOPYY) is significantly more efficient than immediate deficit coverage. In the baseline scenario, Policy 2 requires only 11.67% of the liquidity that would otherwise be needed. This mechanism would act as a financial buffer, smoothing out shocks from demographic ageing and medical inflation.
- **Restructuring State Funding:** It is proposed to convert a portion of direct state funding into a targeted health insurance subsidy for employees. This would stabilize the revenue base and ensure that public resources are directly linked to the insurance status of the population, enhancing the system's transparency.

- **Introduction of a Structured Complementary Insurance Pillar:** To bridge the observed 8-9% funding gap and reduce the high out-of-pocket (OOP) payments (projected at over €7.5 billion), Greece should look towards European paradigms such as France and Belgium. A second pillar of complementary insurance could absorb a significant portion of private costs, providing better financial protection for households without undermining the public character of the system.
- **Rule-Based Automatic Adjustments:** The implementation of automatic adjustment rules, triggered when the Solvency Ratio or Actuarial Balance falls below defined thresholds, would ensure long-term stability. This approach avoids the need for reactive political decisions and provides a predictable environment for both the state and contributors.

In conclusion, the transition from a reactive "pay-as-you-go" approach to a proactive model incorporating an actuarial reserve and complementary insurance is essential to ensure that the Greek healthcare system remains sustainable and equitable in the face of irreversible demographic trends.

8. CONCLUSION

Greece's healthcare financing system faces long-term sustainability challenges. Projections for 2024–2035 show continuing pressure from expenditure growth, while the current public-private mix implies a heavy reliance on OOP payments. Actuarial indicators point to

the need for a comprehensive reform that combines the creation of an actuarial reserve, restructuring of state contributions and the introduction of complementary insurance. Such a package would strengthen the resilience of the system and support equitable access to care.

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ECONOMIC AND BEHAVIORAL FACTORS INFLUENCING ELECTRICITY, TELECOMMUNICATIONS AND DISCRETIONARY SERVICES PRICE SENSITIVITY AMONG HOUSEHOLDS IN BOSNIA AND HERZEGOVINA

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Abstract

This study examines household consumer reactions to proposed electricity tariff increases in Bosnia and Herzegovina. The Van Westendorp Price Sensitivity Meter was applied in a representative survey of electricity users to identify acceptable price ranges. The survey gathered price thresholds for potential rate changes, as well as data on service satisfaction, perceptions of fairness and demographic factors. Results reveal that tolerance for higher electricity prices is extremely narrow. Electricity is an essential household good with inherently inelastic demand and consumers resist price hikes rooted in fairness concerns and distrust of utility providers. Consistent with international evidence, many respondents viewed tariff increases as symptoms of corruption or mismanagement. Stated willingness to pay was not found to increase with satisfaction; willingness to pay frequently failed to reflect satisfaction. Gender differences were observed, with female respondents less willing than men to accept surcharges for improved reliability.

By contrast, consumers show far greater price flexibility for non-essential services (e.g., telecommunications or entertainment subscriptions), underscoring electricity's unique status in household budgeting. These findings carry direct policy implications. Electricity pricing reforms should address perceived unfairness and lack of trust. In line with established recommendations for tariff reform, the evidence suggests more open communication strategies and capacity-building within utilities to address consumer concerns and sustain public support.

Keywords: household electricity prices, price sensitivity, willingness to pay, consumer behavior

1. INTRODUCTION

In Bosnia and Herzegovina's (BiH) complex socio-economic landscape, a paradox of consumer behavior has emerged. Over the past two decades, telecommunications and other discretionary services have transformed through technological progress and rising household spending. Consumers have accepted price increases motivated by benefits such as faster internet, more channels, and improved connectivity. However, this acceptance has often been reluctant, driven by necessity and limited alternatives rather than genuine perceptions of fairness. As later results show, most consumers reject further telecom price increases, revealing a gap between actual payment behavior and stated willingness to pay. In practice, consumers continue paying high telecom bills because services are essential and alternatives are limited, but at the attitudinal level they reject these prices as unfair. This distinction between revealed preferences (actual payments) and stated preferences (expressed attitudes) reconciles the apparent contradiction. On the other hand, the energy sector, which provides the most essential services, remains caught in a state of economic and political gridlock. Despite its importance for quality of life and economic activity, any proposal for even minor adjustments to electricity prices is met with public and political resistance. Statements from energy company officials framing price corrections as a "necessity" to maintain financial stability are often countered by political leaders assuring the public that price hikes

are not being considered, reflecting strong sensitivity (Lakic, 2024).

Maintaining artificially low electricity prices provides short-term protection but creates unsustainable economic reality across the sector. The strain is evident in utility performance. Elektroprivreda HZHB saw profits collapse from 52 million KM in 2023 to 0.7 million KM in 2024 (Kolobara, 2025). Elektroprivreda Republike Srpske reported a drop from nearly 145 million KM to about 3.2 million KM (Energologija, 2025). JP Elektroprivreda BiH, the country's largest utility, recorded a loss of 57.96 million KM in 2024 (EPBIH, 2025).

Persistent financial shortfalls cripple the sector's ability to fund critical investments. The underinvestment in modernizing aging infrastructure and developing renewable energy sources (RES) is not a hypothetical future risk but a present reality. For instance, in 2023, capital investments by Elektroprivreda BiH were realized at a rate significantly below what was planned, a failure attributed to systemic issues. This investment deficit threatens BiH's energy security and its capacity to meet decarbonization goals mandated by international agreements (EPBIH, 2025).

While the effects of price stagnation are clear, the behavioral drivers remain underexplored. This paper addresses the gap by applying a behavioral economics framework to examine why consumers accept higher

costs for entertainment and communication but resist paying for stability in their most critical utility.

The central hypothesis of this research is that households in BiH show lower price elasticity and a lower willingness to pay (WTP) for price increases for energy compared to telecommunications and other discretionary services. We posit that this disparity is driven not merely by income constraints but primarily by differences in (i) perceived value for money, where the benefits of telecom upgrades are tangible and immediate, while energy system stability is an invisible, abstract benefit; (ii) perceived fairness, influenced by a deep-seated lack of trust in the management of public enterprises versus privately-owned companies; and (iii) price anchoring, where decades of subsidized energy have created a psychological expectation of low prices.

To test this hypothesis, this paper addresses the following key research questions:

2. LITERATURE REVIEW

2.1. Behavioral economics perspective on consumer price sensitivity

To examine consumer behavior in BiH, this study applies a behavioral economics framework that shows how psychological factors shape economic decisions, enabling analysis of differing public reactions to price changes in essential and discretionary services. The analysis centers on WTP, the maximum price a consumer will pay for a service (Stobierski, 2020). WTP is context-sensitive and directly linked to price sensitivity, which measures how demand reacts to cost changes (Kagan, 2025). While electricity is typically considered priceinelastic, this study investigates why it provokes a sensitive reaction to price adjustments compared to discretionary services (Csereklyei, 2020).

One key explanation is Price Anchoring, a cognitive bias where individuals rely heavily on the first piece of information (the "anchor") when making decisions. As Tversky and Kahneman (1974) identified, subsequent judgments are insufficiently adjusted from this anchor. We hypothesize that decades of subsidized electricity in BiH have created a powerful low-price anchor, causing any price increase to be perceived as a drastic deviation. In contrast, the dynamic telecom market never established such a rigid anchor, allowing for greater price flexibility.

The consumer's evaluation of a price is fundamentally tied to their Perceived Value, which Zeithaml (1988) defined as the "consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given". This concept frames value as a subjective trade-off between the benefits gained and sacrifices made, both monetary and nonmonetary (Luo, Li, & Sun, 2022), (Mencarelli & Arnaud, 2012). This framework is central to our hypothesis. For telecommunications, the benefits of a price increase are often tangible and immediate, e.g. faster internet speeds, more channels, and better mobile coverage. For energy, the

- How have the real prices of energy and telecommunication services evolved over the past two decades in relation to general inflation?
- What is the measurable difference in consumers' WTP for a price increase in energy versus telecommunications and discretionary services?
- Which socio-demographic and psychological factors are the strongest predictors of this differential price sensitivity?

The paper is structured as follows. Section 2 reviews literature on behavioral economics and consumer behavior in BiH. Section 3 outlines the mixed-methods approach, combining secondary data analysis with a consumer survey. Section 4 presents results, Section 5 discusses their implications, and Section 6 concludes with key recommendations and future research.

primary benefit of a price increase is abstract and preventative, i.e. the avoidance of future system failures and the assurance of long-term stability. Consumers derive higher perceived value from visible, immediate upgrades than from the maintenance of a status quo, which helps explain their differential WTP.

Reactions are mediated by Perceived Fairness, a subjective judgment of whether a price is reasonable and justifiable. Research shows fairness perceptions are influenced by the seller's inferred motives and institutional trust. A price increase is deemed unfair if the seller is seen as covering internal inefficiencies rather than funding legitimate improvements (Gielisse & Dutilh, 2008), (Bettray, Suessmai, & Dorn, 2017). This relates to our hypothesis that price hikes from state-owned utilities, often perceived as inefficient, are judged more harshly than those from private firms seen as investing in innovation.

2.2. Inflation and household consumption patterns

The effects of inflation on macroeconomic indicators and economic growth are often examined in economic literature. Like in most countries, the prices of goods and services in BiH are increasing (WorldData, 2025). Spasojevic and Djukic (2024) analyzed the impact of inflation on economic growth in BiH. Their results show that inflation in BiH has a nuanced relationship with economic growth because even though high inflation can coincide with GDP growth, the overall impact is complex and influenced by many economic factors.

The changes in macroeconomic indicators translate into changes in consumer behavior as consumers adjust their financial decisions to rising prices. Inflation affects people's perceptions, including attitudes towards money and personal savings and spending. Rising inflation is reducing the purchasing power of households. Manyhert (2022) shows that households in low-income and below-median income EU countries are impacted more

strongly, because of higher relative spending on essential items and less elastic consumer demand. In BIH, people's attitudes towards money in times of inflation was the main focus of a study conducted by Kratovac et al. (2023). The study was based on a survey among households and findings showed that perceived inflation has a statistically significant impact on people's attitudes towards money, as well as on how much money they save and spend.

As a result of global and domestic factors, inflation has influenced household expenditure patterns and altered consumer behavior. According to available statistical data, prices in different sectors have followed different growth dynamics. According to data from Survey on Household Expenses in BiH for the period 2021-2022, average monthly expenses for energy sources amounted to 141.27 KM (71.86 EUR) and accounted for about 8.0% of total monthly expenses. In comparison with data from the 2011 survey, when these expenses amounted to 138.93 KM (70.67 EUR), average monthly expenses for energy sources increased by 2.34 KM (1.19 EUR). In contrast to that, average monthly expenses for communications for the period 2021-2022 amounted to 115.53 KM (58.77 EUR) and accounted for about 6.6% of total monthly expenses. Average monthly expenses for communications increased notably, by 59.75 KM (30.39 EUR), compared to the year 2011, when they amounted to around 55.78 KM (28.38 EUR) and accounted for 3.6% of total monthly expenses. Unlike the expenses for energy sources and communications, average monthly expenses for recreation and culture decreased from 45.4 KM (23.09 EUR) in 2011 to 30.46 KM (15.50 EUR) in the 2021-2022 period when they accounted for 1.7% of total monthly expenses.

Socio-economic implications of inflation are especially important in the context of energy prices, because energy is the material basis for economic growth. Electricity sector plays an important role in achieving climate goals and enabling the energy sector transition, while consumers are considered an important part of this transition because their consumption patterns directly influence the overall effectiveness of the transition.

To achieve progress in the energy transition, investments in new and more efficient technologies alongside the implementation of energy efficiency (EE) measures to reduce consumption are required. These investments often lead to increase in electricity prices for consumers (Lightning, n.d.). However, rising electricity prices can also encourage investments in EE measures. Research by Wang et al. (2019) found out that energy prices negatively affected per capita energy consumption in high and lower-middle income countries while they had a positive impact in upper-middle income countries. On the other hand, results obtained by Wang et al. (2021) showed that electricity prices do not have significant impact on residential electricity consumption, while habits are an important factor that affects consumption behavior. Based on the economic statistics and data from questionnaires researchers found out that residents

without saving habits consume 15.54 kWh more electricity every month on average.

The study by Fredriks et al. (2015) states that many consumers fail to take steps towards EE even though they have knowledge and desire to do so, and that household energy consumption is not primarily driven by financial incentives and the rational pursuit of material interests. This is explained by discrepancy between knowledge, values, attitudes and intentions, and people's observable behavior. Their research was based on behavioral economics and psychology and explains the cognitive biases and motivational factors that help connecting energy-related behavior with the personal values and material interests of consumers.

Generally, electricity awareness levels differs between households. Study conducted by Trotta (2021) that aimed to measure the level of awareness about electricity prices among Finnish households showed low levels of awareness among consumers. The higher levels of awareness were linked to less electricity consumption, but there was a significant number of consumers who were unaware of their own knowledge deficits and were unwilling to receive information about energy consumption and savings. The research in Serbia that aimed to analyze the impact of energy saving instructions on change in consumer behavior showed that they do not have significant impact when electricity price is very low. Inefficient use of energy was explained by low efficiency of devices, and the low will to change habit, but also the impossibility of changing habit without changing devices (Podbregar et al., 2021).

BIH faces similar problems with using energy efficiently. According to the report by Gallop et al. (2021), BIH can do better to use energy more efficiently. Because of very low electricity prices, the incentives for energy savings are limited. Low electricity prices and high related subsidies disproportionately benefit higher-income households and hinder efficiency and an effective transition in BIH. Furthermore, keeping energy prices low resulted in an estimated EUR 3.4 billion of induced support for consumers between 2018 and 2023. The highest consumer support was generated in Federation of BIH (approximately EUR 2.0 billion), followed by around EUR 1.2 billion in Republika Srpska and EUR 92 million in the Brčko District (OECD, 2025).

According to the OECD report, bringing regulated electricity prices closer to market levels would significantly reduce the need for support in the electricity sector. This change would also free up resources to meet investment needs for the energy transition (OECD, 2025). Research by Hubana and Ljevo (2020) shows that investments needed for reliable distribution systems could be made feasible if consumers were willing to pay for increased reliability of electricity supply. Their study analyzed the WTP of residential and business consumers in BIH, revealing that households on average would pay 3.02 KM to avoid a one-hour interruption, while business consumers indicated a WTP of 105.4 KM.

However, it is expected that adjustments of energy prices and subsidies reforms will also have some social implications because of higher energy costs in households (OECD, 2025). Aside from affecting household budgets, rising energy prices contribute to the emergence or deepening of energy poverty. This phenomenon has been widely studied in European and global contexts. Findings by Manyhert (2022) show that rising energy prices contribute the most to increasing living costs in households across the EU. This is further supported by research conducted by Piao and Managi (2023) which shows that there is a positive association between household energy expenditures and life satisfaction and that energy consumption increases with household wealth improvement. In BIH, research by Vuckovic et al. (2025) analyzed how various socio-economic factors influence energy poverty in households. The research results indicate that energy poverty is more common in homes that relies on coal, larger homes and

homes in rural areas, while it is less common in households with higher income and better housing conditions. Even though electricity prices in BiH are well below Western European levels, many households already spend more than 10% of their income on electricity and heating, so any increase in prices is viewed as a threat to the monthly budgets. According to OECD (2025) a gradual increase of about 8% per year is needed to fund reliability and the energy transition.

The literature review confirms that understanding electricity pricing dynamics in BIH is valuable for analyzing household price sensitivity across sectors. Links between low prices, consumption, and energy poverty reveal how pricing both shapes and reflects consumer behavior. Examining these factors clarifies how households perceive and adapt to price changes and their socio-economic effects. Yet, existing research shows that economic and behavioral influences on electricity prices in BIH require deeper analysis, a gap this paper seeks to address.

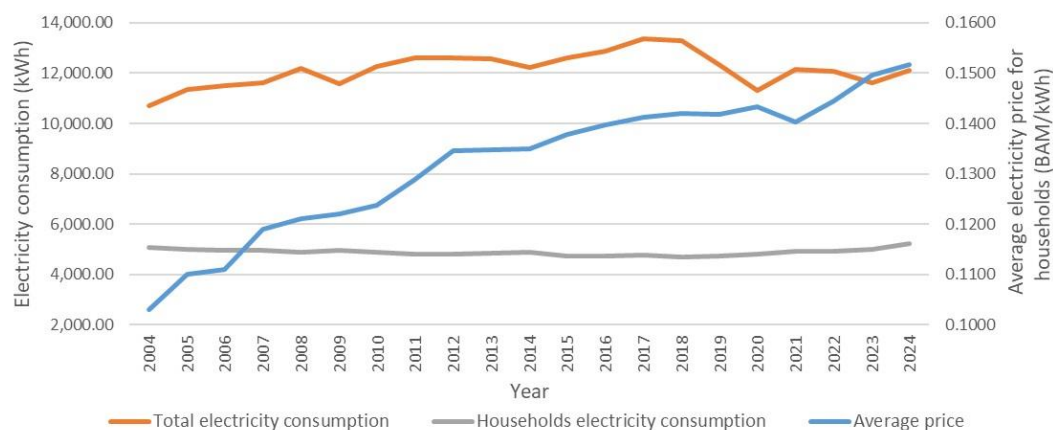
3. METHODOLOGY

This research adopted a mixed-methods approach, combining analysis of historical price data (secondary sources) with a quantitative consumer survey (primary sources) to address the research objectives. The secondary data analysis covered a period of 20 years and examined data on prices for household electricity and several discretionary services. Data for the research were obtained from different sources.

3.1 Data Sources

Data on the electricity prices for households and household electricity consumption as a share of total electricity consumption shown in Figure 1 were collected from Annual Reports of the State Regulatory Commission for Electricity. For the years with missing data, linear regression was used to estimate the values.

Figure 1: Increase in average electricity prices for households and household electricity consumption as a share of total electricity consumption

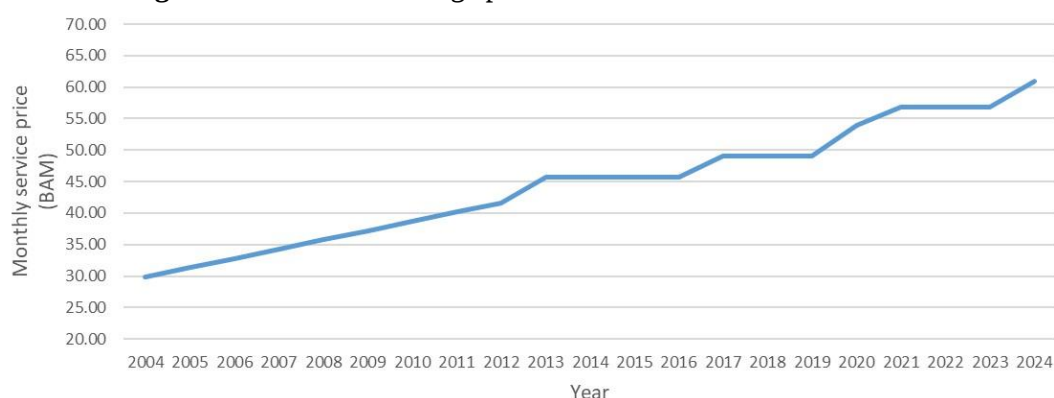


Source: Annual Reports of the State Regulatory Commission for Electricity

Figure 1 shows that electricity prices for households increased by 0.0488 KM/kWh in the observed period of 20 years, with an average annual increase of around 0.0024 KM/kWh. In the same period total electricity consumption in households showed only a slight growth of 8.87 GWh annually. Households' electricity consumption account for about 40.34% of total electricity consumption in BIH.

Telecommunications price trends were approximated using typical bundled service prices (TV + internet +

landline phone) over time, given that reliable long-term public data were limited. Data presented in Figure 2 was collected from price lists of one of the most widespread telecommunication companies in BIH for their combined service package that include TV, internet and landline phone. Since these data was available from the year 2012 onwards, values for the previous years were estimated using linear regression

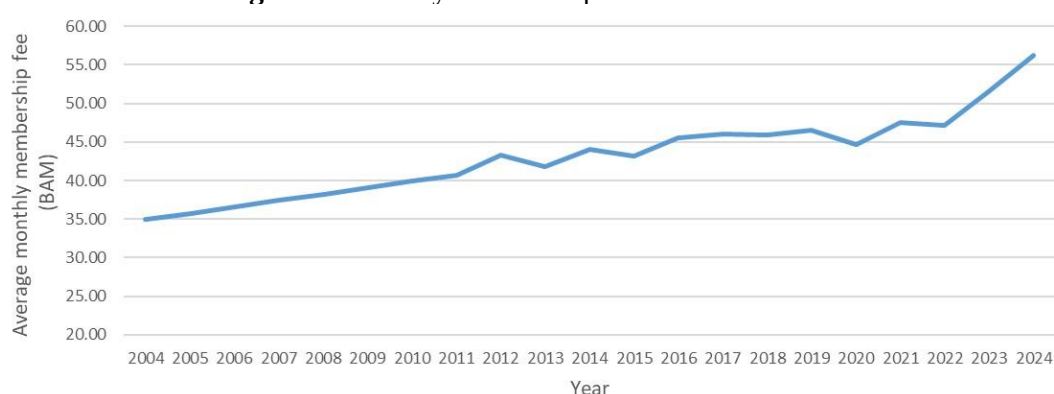
Figure 2: Increase in average prices for telecommunication services

Source: Price lists of the telecommunications company

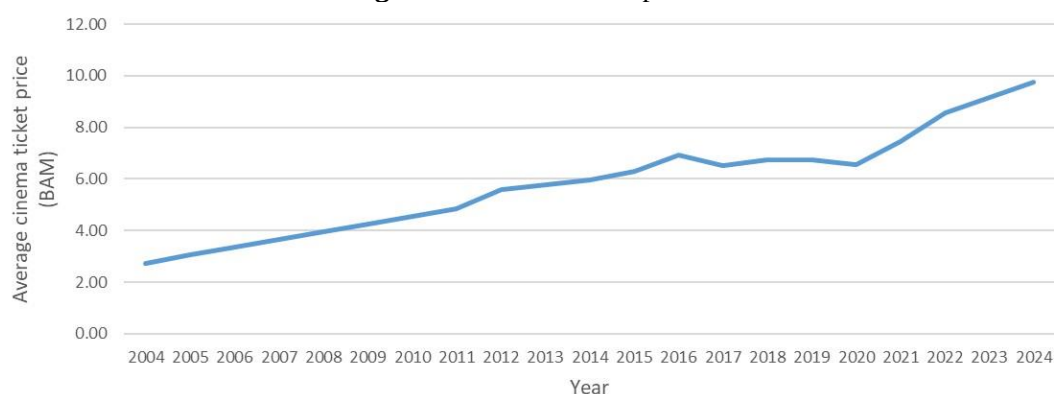
Figure 2 shows that telecommunication prices for households increased by 31.08 KM in the observed period of 20 years. Average annual increase in telecommunication prices was around 1.55 KM.

Data on average monthly membership fee for fitness clubs and data on average cinema ticket prices were collected from cost-of-living database Numbeo. These data

are shown in Figure 3 and Figure 4. Since Numbeo database only included data from the year 2011 onwards, values for the previous years were estimated using linear regression in both cases.

Figure 3: Monthly membership fee for fitness clubs

Source: Numbeo

Figure 4: Cinema ticket prices

Source: Numbeo

From Figure 3 it can be seen that membership fees for fitness clubs increased by 21.30 KM in the observed period of 20 years, with an average annual increase of around 1.06 KM. Cinema ticket prices increased by a

total of 7.00 KM over the same period, with an average annual increase of 0.35 KM.

Obtained secondary data provide context for how essential and discretionary service prices have evolved. These

data serve as a foundation for the survey-based WTP analysis.

3.2 Research approach

After examining secondary data, a survey questionnaire was designed to directly measure consumers' price sensitivity and attitudes. The survey instrument (administered online to respondents across BiH in mid-2025) gathered demographic information (gender, age, education, income, etc.) and then posed a series of structured questions in four parts. In Part II, respondents evaluated prices for standardized service scenarios using the Van Westendorp Price Sensitivity Meter (PSM) technique. For each service, electricity (per kWh), a monthly telecom package (TV/internet/telephone), a fitness membership and a cinema ticket, they indicated four key price points, i.e. a price so low that quality would be in doubt ("too cheap"), a price considered a bargain ("cheap"), a price that is expensive but still might be paid ("expensive") and a price so high they would refuse to pay ("too expensive"). This method, introduced by van Westendorp in 1976, yields an acceptable price range and an optimal price point where consumers are most indifferent. Part III included binary WTP scenarios. Respondents answered "Yes", "No" or "Maybe" to whether they would pay specified price premiums for improved service features, such as +5 KM/month for guaranteed no power outages or +15 KM for doubled internet speed. These scenarios gauge incremental WTP for quality improvements in each sector (electricity reliability, green energy, telecom speed/content, gym amenities and cinema enhancements).

Finally, Part IV gathered attitudinal data using Likert-scale statements (1 = "strongly disagree" to 5 = "strongly agree"). Respondents rated their agreement with statements reflecting perceived fairness, value, and quality, e.g. "Public utilities operate efficiently", "Higher telecom prices are justified by better service", "Any increase in electricity price is unjustified" and "It's easier to pay more for entertainment than for utilities".

Survey data were analyzed quantitatively. The PSM responses were aggregated to derive for each service, i.e. the Point of Marginal Cheapness (PMC), Indifference Price Point (IPP), Optimal Price Point (OPP) and Point of Marginal Expensiveness (PME), as well as the overall range of acceptable prices (PME minus PMC) for that service. These metrics indicate the price range within which most consumers are comfortable and the price that maximizes acceptance. To test demographic influences on price sensitivity (research question 3), oneway ANOVA tests were conducted for each service's PSM thresholds across groups (gender, age, education, income). Similarly, Chi-square tests of independence were used to examine whether WTP for each Part III scenario was significantly associated with gender, age, education or income segments. All statistical tests used a 5% significance level. Finally, cross-tabulations of key Likert items were examined to identify

"value gaps" and potential logical contradictions in consumer attitudes, e.g. comparing those satisfied with a service's quality but perceiving its price as unfair, as a measure of latent dissatisfaction. The mixed methods design ensures that the analysis stays aligned with the initial hypotheses and objectives. The historical trend review addresses RQ1 (price evolution context), the PSM and WTP measures address RQ2 (quantifying differences in WTP between energy and other services) and the demographic and Likert analyses address RQ3 (socio-economic and psychological drivers of price sensitivity).

4 Results

We fielded the survey during 8–31 July and obtained 269 valid responses from BiH, covering 64 different cities. The sample included 106 men and 163 women, with broad variation in education, age and income. The study faces common limitations. In addition, the sample may overrepresent urban, younger and more educated respondents who are more likely to engage with online surveys. This potential skew should be considered when generalizing results to the entire BiH population, particularly rural or older households. The sample is not strictly random, so representativeness is not guaranteed. Participation was voluntary, which introduces self-selection. Responses are self-reported and subject to social desirability and recall bias. The design is cross-sectional, so it identifies associations rather than causality. Some demographic subgroups are small, which widens uncertainty around their estimates.

4.1 Price Sensitivity Analysis

We utilized the Van Westendorp Price Sensitivity Meter to quantify consumers' WTP thresholds across sectors using survey data. Table 1 presents key PSM metrics for electricity, telecom, fitness, and cinema, reflecting respondent distributions of "too cheap," "cheap," "expensive," and "too expensive" price points. The results outline acceptable price ranges for BiH consumers for each service and identify the OPP from the consumer perspective.

The responses reveal a very limited acceptable price range for household electricity. The PMC is approximately 0.157 KM/kWh, the price at which increases would raise concerns. If electricity were significantly cheaper than 0.16 KM, respondents might doubt its quality or neglect conservation efforts, as few currently perceive the price as excessive. The PME, where prices are considered excessive, is approximately 0.195 KM/kWh. The acceptable range is approximately 0.16 to 0.20 KM/kWh, a difference of 0.04 KM (25% of the current price). The IPP, where equal numbers perceive the price as cheap versus expensive, is 0.169 KM/kWh, while the OPP, minimizing the share finding it too expensive and too cheap, is 0.178 KM/kWh. The values are closely grouped around the prevailing price (0.16 KM). BiH consumers view the current electricity price as close to an acceptable maximum; any significant rise above 0.18–0.20 KM/kWh may lead to considerable backlash or hardship due to long-standing low tariffs.

The acceptable price range for a standard telecom package is significantly higher than that of electricity, yet it still indicates a sensitivity threshold. Respondents view approximately 43 KM/month as a "too cheap" price for the defined package (PMC = 42.9 KM), indicating that a lower price may suggest poor quality. The PME reaches 58.7 KM, indicating that most consumers find bundles over 60 KM/month to be excessively priced. The optimal acceptable price center is approximately 47–50 KM (OPP = 47.3 KM; IPP = 50.4 KM). The current market price (65 KM for the package) exceeds the consumer-defined acceptable range. This suggests a potential "value gap" in telecom, where many households pay 65 KM due to necessity or limited alternatives, yet consider amounts exceeding 55–60 KM as uncomfortable. Telecom services are in high demand, leading consumers to accept higher bills; however, many consider the service expensive at 65 KM. Resistance to additional price increases is probable unless justified by evident quality enhancements. The acceptable range width is approximately 16 KM (43–59 KM), representing 37% of the PMC, which is broader than the narrow band of electricity, indicating greater flexibility in telecom pricing. The optimal perceived price (47 KM) being significantly lower than the typical price indicates a hidden dissatisfaction with telecom pricing.

The PSM analysis for a standard fitness membership shows a PMC of 40.36 KM and a PME of 50.98 KM. Respondents find fees of approximately 40 to 51 KM per month for a decent gym reasonable. The optimal perceived price point is approximately 45–46 KM (OPP = 45.9 KM; IPP = 51.0 KM), near the midpoint of this range. Many urban gyms in BiH charge 60 KM per month, as indicated in the survey scenario. The PSM results indicate that 60 KM exceeds the acceptable limit for most respondents, surpassing the PME threshold by nearly 9 KM. This indicates a value perception issue, as

most view a 60 KM fee as "too expensive" for the standard offering, despite similar prices in the market. This may indicate that only a segment of higher-income or value-seeking consumers are willing to pay that rate, while others either forgo gym memberships or perceive they are overpaying. The acceptable range width (PMC to PME) for fitness (10.6 KM) is approximately 26% of the lower bound, reflecting moderate flexibility, which exceeds that of electricity but remains constrained.

The acceptable price range for a cinema ticket, currently averaging 10 KM, is approximately 6.2 KM to 10.0 KM. The PMC is 6.2 KM or lower, leading consumers to question the cinema's quality or perceive it as excessively inexpensive. The PME is 10.05 KM, aligning with the current typical price. Therefore, 10 KM represents the upper limit of what is deemed acceptable for a standard movie experience. The optimal price point is approximately 8.6–8.7 KM (OPP = 8.6; IPP = 8.7 KM), indicating that consumers prefer ticket prices under 10 KM. Cinema is a minor discretionary expense, with a clear limit; ticket prices exceeding double digits significantly reduce interest. Cinemas benefit from the current 10 KM price, which is near the threshold of acceptability, with a significant portion of respondents considering it fair (as discussed in the attitudes analysis). Any further increase (e.g., to 12–15 KM) may lead many moviegoers to reduce attendance. Electricity is anchored to the status quo with minimal tolerance for higher tariffs. Telecom and fitness show higher absolute WTP, yet current market prices already push the top of what many consider acceptable. Cinema is closest to balance, the going rate aligns with the upper bound, and small surcharges risk demand loss. These patterns reflect hard price anchors for essential services and higher, but conditional, WTP for value-added services.

Table 1: Summary of PSM Results for electricity, telecom, fitness and cinema

Variable	Electricity price (KM/kWh)	TV/Internet/Tel. monthly subscription (KM/month)	Fitness monthly fee (KM/month)	Cinema (KM/ticket)
Point of Marginal Cheapness (PMC)	0.1568	42.90	40.36	6.21
Indifference Price Point (IPP)	0.1691	50.37	50.13	8.68
Optimal Price Point (OPP)	0.1780	47.31	45.88	8.57
Point of Marginal Expensiveness (PME)	0.1952	58.68	50.98	10.05

Source: Author's calculation.

4.3. Price sensitivity across demographics (ANOVA)

To test demographic differences in price thresholds, one-way ANOVA was applied.

Men and women did not differ on electricity, telecom, or fitness thresholds for “too cheap” or “expensive” ($p > 0.05$), suggesting both genders use these categories similarly. A notable difference emerged for cinema tickets: women had higher thresholds for “too cheap” and “cheap” pricing ($p = 0.016, 0.042$), implying they are less price-sensitive for small entertainment and associate low prices with lower quality. Gender had little effect on WTP higher prices overall.

Education showed few effects. Electricity, telecom, and fitness thresholds did not differ significantly across groups ($p > 0.05$), suggesting attitudes are societal rather than educational. Only the “too expensive” cinema threshold varied ($p = 0.044$), with educated respondents more tolerant of premium ticket prices, though differences were small. All groups placed the maximum acceptable ticket at 10–12 KM.

Household income strongly influenced discretionary but not electricity prices. Electricity thresholds were unaffected ($p = 0.64$ – 0.75 ; “too expensive” $p = 0.12$), indicating general resistance to higher bills. In contrast, higher-income respondents had higher telecom “expensive” and “too expensive” thresholds ($p = 0.048, 0.045$), often accepting prices above 70 KM, while lower-income groups objected above 50 KM. Income effects were strongest for fitness memberships ($p < 0.01$ across categories), reflecting budget and lifestyle differences: low-income respondents joined only if fees were under 30 KM, while wealthier consumers afforded premium clubs. Cinema remained an outlier, with no significant income differences ($p > 0.3$), suggesting affordability for most households at standard prices.

Age had limited effects. Electricity and telecom thresholds were stable ($p > 0.2$). Fitness “too expensive” thresholds showed significance ($p = 0.039$), as older respondents considered fees above 50 KM excessive, while younger people tolerated higher costs. Cinema thresholds were mostly unaffected, though a borderline difference appeared at the “too cheap” point ($p = 0.051$), older people being more skeptical of very low prices. Older viewers were also less inclined to pay extra for VIP seating.

ANOVA shows income as the main factor shaping WTP for discretionary services, while socio-demographics have little effect on electricity, where resistance to price increases is consistent. Gender, age, and education produced only minor effects, reinforcing that the electricity-services gap reflects cultural and behavioral rather than demographic drivers.

4.4. Willingness to Pay for service improvements (Chi-square analysis)

Household WTP for service upgrades varied strongly by sector. Table 2 presents response distributions (“Yes”, “Maybe”, “No”) for each hypothetical surcharge, with Chi-square results for gender, education, income, and age. Key findings are summarized below.

For a guaranteed uninterrupted electricity supply at +5 KM/month, 51% said “Yes,” 24% “Maybe,” and 25% “No,” showing a small majority willing to pay for reliability. For electricity exclusively from renewables at +10 KM/month, 42% said “Yes,” 26% “Maybe,” and 31% “No,” indicating greater hesitation and no clear majority. Education significantly affected willingness for reliability ($p < 0.01$), but no demographic differences were found for the renewable offer (all $p > 0.05$). Telecom upgrades had the lowest support. Only 11% would pay +15 KM/month for doubled internet speed, and just 6% for all premium TV channels, with strong majorities rejecting both. Chi-square tests showed no demographic effects ($p > 0.05$), suggesting low perceived value for faster internet or more channels at current prices.

Fitness enhancements drew somewhat more support. About 18% would pay +15 KM/month for unlimited group classes (18% “Maybe,” 63% “No”), while 22% accepted +20 KM for wellness/spa facilities (16% “Maybe,” 62% “No”). Significant differences were observed: women and younger respondents showed higher WTP for group classes ($p < 0.05, p < 0.01$), while women and the better educated were more open to spa facilities ($p < 0.05$). Income showed no effect, indicating lifestyle rather than affordability drives interest.

Cinema surcharges produced mixed results. For 3D films, 42% agreed to pay +2 KM per ticket, 19% were unsure, and 39% declined, suggesting nearly even division over valuing the experience. For VIP seating at +3 KM, only 26% agreed, 16% were unsure, and 57% opposed, showing strong resistance to luxury upgrades. WTP for 3D films showed no demographic segmentation (all $p > 0.05$). For VIP seating, age mattered ($p < 0.05$): older viewers were more willing to pay, while younger respondents were less inclined. Gender, education, and income had no effect.

Overall, Chi-square results reveal limited WTP for service upgrades, with modest acceptance for electricity reliability and certain fitness or entertainment perks. Demographic effects were sparse, with education influencing electricity reliability, gender and age affecting fitness preferences, and age shaping attitudes toward VIP cinema seating.

Table 2: Willingness-to-Pay rates for service improvements with demographic breakdowns and Chi-Square Test

WTP - question	By gender	WTP-Chi-Square Test		By age	Distribution of answers		
		By education	By income		Yes	Maybe	No

Q1: +5KM electricity reliability	0.55171	0.00856	0.07749	0.13717	51.1%	23.7%	24.8%
Q2: +15 KM 100% renewable energy	0.14545	0.78767	0.16167	0.22731	42.2%	25.9%	31.5%
Q3: +15 KM for double internet speed	0.36060	0.64809	0.06393	0.07046	11.5%	19.3%	68.9%
Q4: +15KM for premium TV channels	0.90894	0.59505	0.88969	0.89879	6.3%	7.4%	85.9%
Q5: +15KM for group trainings	0.04371	0.62213	0.21546	0.00258	18.1%	18.1%	63.3%
Q6: +20KM for wellness and spa	0.03438	0.03016	0.13528	0.10144	21.9%	15.6%	62.2%
Q7: +2KM for 3D movie	0.93204	0.06111	0.29016	0.38486	42.2%	18.9%	38.5%
Q8: +3KM for premium/VIP seats	0.06678	0.22267	0.14552	0.02874	26.3%	16.3%	57.0%

Source: Author's calculation.

4.5. Consumer Attitudes and Value Perceptions (Likert Analysis)

Likert-scale questions in Part IV reveal fairness, value, and quality perceptions underlying WTP patterns. Figure 5 illustrates how consumer beliefs align and diverge across sectors.

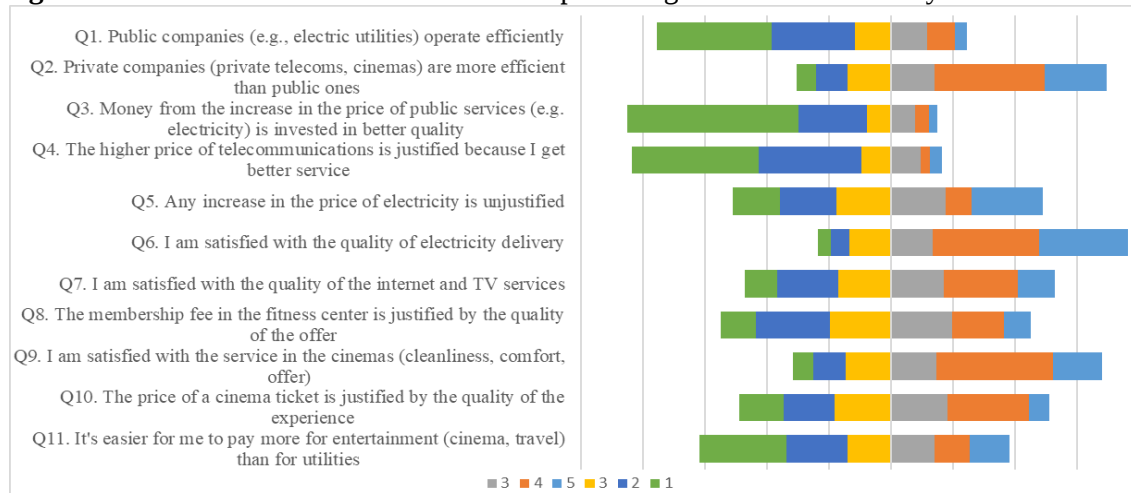
Perceptions of public and private services differ. Only 13% agreed that state-run utilities operate efficiently, while 64% disagreed (Q1). By contrast, 55% thought private companies were more efficient, with 16% disagreeing (Q2). Although the private sector is seen as better run, telecom prices are still judged unfair, showing that efficiency and fairness are distinct dimensions.

Respondents doubted that higher prices improve quality or service. About 7% thought higher public service fees, like electricity prices, improved quality, while 77% didn't, indicating a lack of trust in price increases for public service enhancement. Only 7% of respondents thought better service warranted a higher telecommunications price (Q4). 74% disagreed.

These majorities suggest that essential utilities and telecom services do not improve service quality for higher costs. The claim that "any increase in the price of electricity is unjustified" received mixed responses. One-third (31%) said no price increase is justified, while

35% said some may be acceptable. Still, 34% were neutral. Many oppose electricity price increases on principle, but many are uncertain or conditionally supportive. Service satisfaction varied by sector. For electricity, 63% were satisfied and 10% dissatisfied (Q6), suggesting reliability despite doubts about utility management. Internet and TV satisfaction was lower (36% satisfied, 30% dissatisfied, remainder neutral; Q7). By contrast, discretionary services scored higher: 54% were satisfied with cinema cleanliness and comfort, while 17% were dissatisfied (Q9). These results show consumers distinguish between sectors—satisfied with public utilities, mixed on telecom, and more positive toward leisure services.

Value perceptions in discretionary services were cautious. Only 25% thought fitness fees were justified, while 35% disagreed and 39% were neutral (Q8). One-third of cinemagoers judged ticket prices fair, 31% disagreed, and 36% were neutral (Q10). High neutrality and negativity suggest widespread doubt about entertainment value. On Q11, 48% disagreed that it was easier to pay more for entertainment than utilities, 24% agreed, and the rest were neutral—showing resistance to discretionary price hikes.

Figure 5: Consumer Attitudes and Value Perception – agreement levels for key Likert statements

Source: Author's calculation.

4.5.1. Satisfaction and Willingness Contradictions

Satisfaction with electricity service quality and refusal to pay more are in conflict. The quality of supply was satisfactory to 63% of respondents, reflecting reliability and contentment. Urban blackouts are rare and voltage is stable, so quality is not a major concern. Yet many argued that price hikes are unwarranted. Even satisfied customers do not support paying for maintenance or upgrades. This paradox illustrates status quo bias and the anchoring effect, where people are content with the present situation and see no reason for higher costs, assuming reliability should be standard. Consumers often fail to link higher payments with prevention of future risks, since benefits of grid investment are visible only when failures occur. To illustrate, we compared views that higher prices would be invested in quality with resistance to price increases. Twenty seven percent rejected both ideas, showing a negative outlook. Another 26% were conflicted, recognizing a need for higher prices but not fully accepting them. Only 3% believed funds would improve quality and supported increases. Overall, most distrust utilities or reject surcharges. Because public trust in the energy sector is low, even satisfied customers resist paying more. They believe current service is sufficient and that inefficiency or corruption could waste funds.

In telecommunications, we compared satisfaction with internet and TV service to views on price fairness. A large gap was evident, with 18% satisfied with quality but finding the price unjustified. This was three times the 5% who felt both service and price were fair. Only 1% rated service poor but price fair, a contradictory position. About 27% were dissatisfied with both quality and price. Only 5% are supportive of telecom pricing, while 45% are dissatisfied. This mismatch shows telecom companies can raise prices because services are essential, yet fail to convince consumers they are worth

the cost. Customers often pay reluctantly, believing they like the service but not its price.

Cinema results were more favorable. Twenty eight percent were satisfied with both service and ticket prices, showing cinema is widely enjoyed. Seven percent were satisfied but thought it expensive, while only 1% were dissatisfied yet considered the price fair. Thirteen percent believed tickets were unjustified. Overall, satisfied and price-fair supporters outnumbered critics by two to one. Most view cinema as fair value, with only a minority dissenting, suggesting effective pricing and a small value gap.

The belief that paying more for entertainment than for utilities is easier was widely accepted. Most agreed that discretionary spending feels lighter than higher utility bills. This means people allocate extra money to leisure and show high loss aversion to utility cost increases. Adding five KM to an electricity bill is seen as a loss, while spending the same on a leisure activity is perceived as a gain. Resistance to higher utility prices arises because they are necessary costs, not desirable services.

Consumers thus perceive a value and trust gap in public utilities, especially electricity. Despite satisfactory service, they prefer low prices and doubt higher payments would be used efficiently. By contrast, people are more willing to pay for private and discretionary services when tangible benefits exist. Cinema is seen as fair value, while telecom and fitness are criticized for high costs. Attitudes mirror behavioral findings, as low willingness to pay for electricity stems from fairness concerns and distrust, while reluctant acceptance of other services reflects perceived value and personal benefit. Contradictions such as being satisfied but unwilling to pay for electricity, or liking telecom services while opposing their cost, highlight the role of anchoring, fairness perceptions, and mental accounting in consumer decisions.

5. DISCUSSION

Survey results reveal a mix of attitudes toward electricity pricing in BiH. Respondents reported high satisfaction with service delivery and deep skepticism about rate increases. Van Westendorp PSM shows that the acceptable electricity price range is extremely narrow. The estimated optimal price (0.178 KM/kWh) lies close to both the “too cheap” and “too expensive” thresholds, yielding a tolerance band of only 0.038 KM/kWh or 23.75% of the stated price (0.16 KM/kWh). This means even small tariff increases risk being perceived as unfair. By contrast, acceptable price ranges for other services are far wider, e.g. about 15.8 KM (36.8%) for TV/Internet, 10.6 KM (26.3%) for gym fees, and 3.8 KM (61.8%) for cinema tickets. These findings confirm that electricity, as an essential utility, is treated differently from discretionary goods and expected to remain stable.

Likert-scale responses reinforce this sensitivity. Fewer than 13% agreed that state-owned utilities operate efficiently (Q1), while over 55% judged the private sector more efficient (Q2). Roughly three-quarters rejected the claim that past price increases in public services improved quality (Q3) or that higher telecom fees are justified (Q4). Around one-third considered any electricity price increase unjustified (Q5). Yet two-thirds expressed satisfaction with current electricity delivery (Q6) and more than half with cinema services (Q9). This suggests opposition to tariff hikes is not rooted in dissatisfaction with outages or reliability but in distrust of utilities and fear of unfair pricing. People appear content with service levels yet feel that payments have not produced visible improvements. Satisfaction thus coexists with low trust in public revenue management. It is important to note that this relationship differs across sectors. In electricity, satisfaction does not translate into higher WTP, while in cinema, satisfaction aligns more closely with acceptance of current prices. This highlights the unique behavioral dynamics of essential utilities compared to leisure services.

WTP analysis highlights trust, fairness, and demographics. Chi-square tests show education significantly influences willingness to pay for reliability surcharges. Higher-income respondents were more tolerant of rising telecom and fitness fees but not electricity tariffs, suggesting electricity price sensitivity cuts across income groups. Education and age had isolated effects: education shaped acceptance of a 20 KM reliability fee, and older respondents were slightly less willing to pay

higher fitness fees. Overall, distrust is widespread, but communication strategies may require tailoring. For example, one gender group was more open to reliability surcharges, suggesting outreach could target the less willing group.

A “value gap” was also evident between utilities and leisure. Attitudes toward fitness fees (Q8) compared with ease of paying for entertainment over utilities (Q11) showed distinct consumer segments. About 10–20% consistently justified higher recreation spending, while others held mixed or inconsistent views. Some supported high gym fees yet disagreed that entertainment costs are easier, and vice versa. This inconsistency shows that acceptance in one domain does not predict acceptance in another. Communication strategies cannot assume cross-sector analogies will persuade consumers.

These findings also connect directly to energy poverty concerns raised in the literature review. Since many households already spend a significant share of income on electricity and heating, even modest tariff increases may deepen vulnerability. This reinforces that policy design must balance financial sustainability with targeted protection for at-risk groups.

Regarding initial hypotheses, the data provide a mixed verdict. The hypothesis that electricity price tolerance is narrow is confirmed by PSM analysis. The expectation of public skepticism and fairness concerns is supported by widespread distrust of efficiency and reinvestment. The idea that satisfaction would translate into higher WTP is not supported, as even satisfied users resist increases. Demographic hypotheses find partial support: education influenced WTP for electricity reliability, while income mattered mainly for non-electricity services. Finally, the hypothesis that utility and entertainment costs are treated differently is confirmed by the value gap. Overall, findings show that trust and perceived fairness, rather than service quality or income, are the decisive drivers of public acceptance of electricity pricing in BiH.

From a behavioral economics perspective, results illustrate strong price anchoring in electricity (decades of low tariffs), clearer perceived value in telecom upgrades despite dissatisfaction with costs, and fairness-driven skepticism of fitness and cinema fees. Each sector's acceptable price range thus reflects not only economic constraints but also cognitive biases and trust perceptions.

perceived fairness and scepticism toward providers shape attitudes, so any price change should be staged and carefully explained, with only small adjustments falling within acceptance. Gender differences appear in WTP for reliability surcharges, which suggests that measures and messages should be tailored by segment.

6. CONCLUSION

This study has direct implications for tariff and communication policy. Evidence from the Van Westendorp analysis places the optimal household electricity price near 0.178 KM/kWh, with only about 0.038 KM/kWh above the lower acceptable bound, which signals very limited room for increases. Survey results show that

The expectation that higher service satisfaction leads to higher WTP is not supported, since many respondents report satisfactory delivery yet remain unwilling to accept higher bills. Results from other sectors point to a different pattern, with telecommunications and entertainment showing broader acceptable price ranges, while electricity is treated as a core necessity. Low regulated prices and tight household budgets frame this response, and even gradual market-cost adjustments presented as funding reliability and the energy transition are perceived as risky.

These findings are significant as they underscore a fundamental conflict between essential energy policy and public sentiment. The power sector of BiH necessitates cost-reflective pricing to guarantee financial sustainability and to finance green investments. Nevertheless, the findings indicate that consumers may respond strongly to even slight increases. A significant number of households are currently vulnerable to energy poverty, thus price fluctuations entail substantial social costs. This implies that simplistic tariff reforms may incite protests, non-compliance or political resistance. The comparison with discretionary service providers is enlightening, as utility services lack competitive market indicators and encounter scepticism, resulting in citizens being less tolerant of price fluctuations. In short, public opinion, like fears about utility inefficiency or fairness, makes the "loss aversion" that comes with electricity worse. On the other hand, competitive sectors build more trust by showing value. This explains why raising electricity prices is seen as especially unfair and causes a lot of opposition, even though the tariffs are very low.

The research indicates that technical reforms should be accompanied by social and communication strategies. If customers don't trust the provider or expect problems, just saying "cost recovery" won't be enough. Future research should evaluate interventions designed to modify perceptions, such as framing price increases as investments in grid improvements or renewable energy sources, which may mitigate adverse responses. These results indicate that regulators should implement incremental, data-informed reforms. To grow public acceptance, there needs to be a full plan that includes thorough surveys of public concern, participation from all

stakeholders (including NGOs, the media and regulators) and effective educational campaigns. In practice, decision-makers should make changes one step at a time, checking how households respond.

In response to these findings, power utilities and regulators ought to implement the following specific measures to reform pricing and enhance public trust:

- Incrementally adjust retail rates to achieve complete cost recovery, while safeguarding vulnerable consumers. Implement or enhance lifeline rates, social tariffs, or direct cash transfers for low-income households to ensure that reforms do not disproportionately impact the impoverished. Utilities and regulators need to clearly explain why prices are increasing (e.g. to cover infrastructure costs, financing RES or upgrading the grid). List the benefits and any help programs that go along with them. Regular interactions with the media (TV, radio, social media) and town hall meetings can help people understand tariffs better.
- Promote and streamline the application process for assistance programs (e.g. housing subsidies, utility rebates).
- Regularly disseminate performance and financial metrics to illustrate efficiency. Establish or empower an autonomous energy ombudsman/regulator to address grievances and evaluate tariffs.
- Talk to consumer groups, NGOs, and community leaders about how to set prices. Use surveys or focus groups to get feedback on early reforms. Hold public workshops where officials explain the timeline for the reforms and answer questions. This participatory approach, which is in line with OECD guidance on stakeholder engagement, will build trust and make sure that policy frameworks deal with real consumer problems.

All these steps are based on the research findings, indicating that gradual reforms with clear communication and integrated support are more likely to succeed than sudden increases. By integrating credible pricing reforms with a comprehensive strategy of engagement and transparency, utilities and regulators can alleviate opposition and advance towards a sustainable, publicly endorsed electricity sector.

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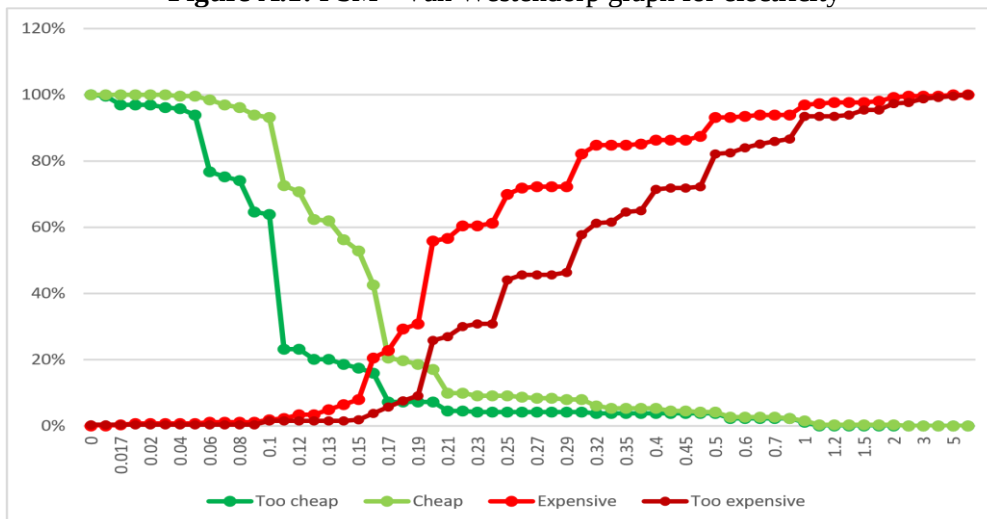
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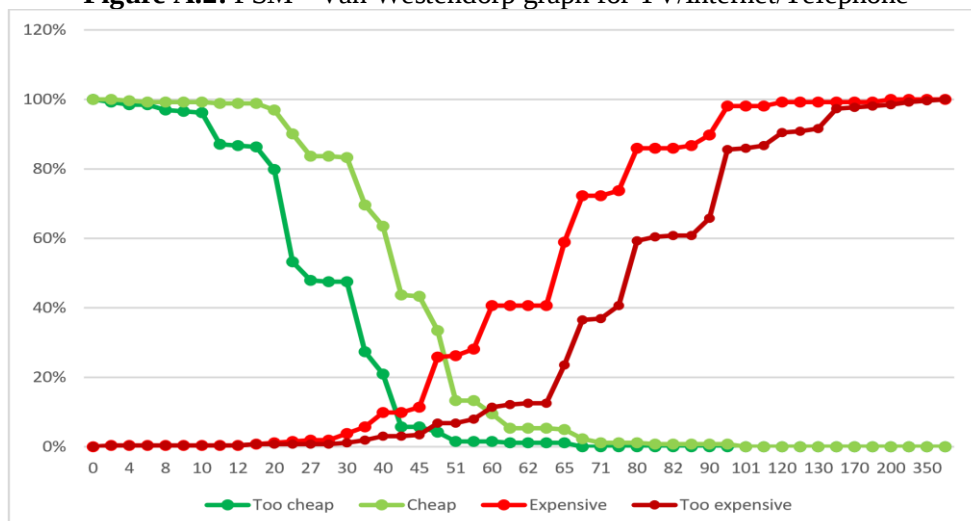
APPENDIX A. PSM - Van Westendorp graph

Figure A.1: PSM - Van Westendorp graph for electricity



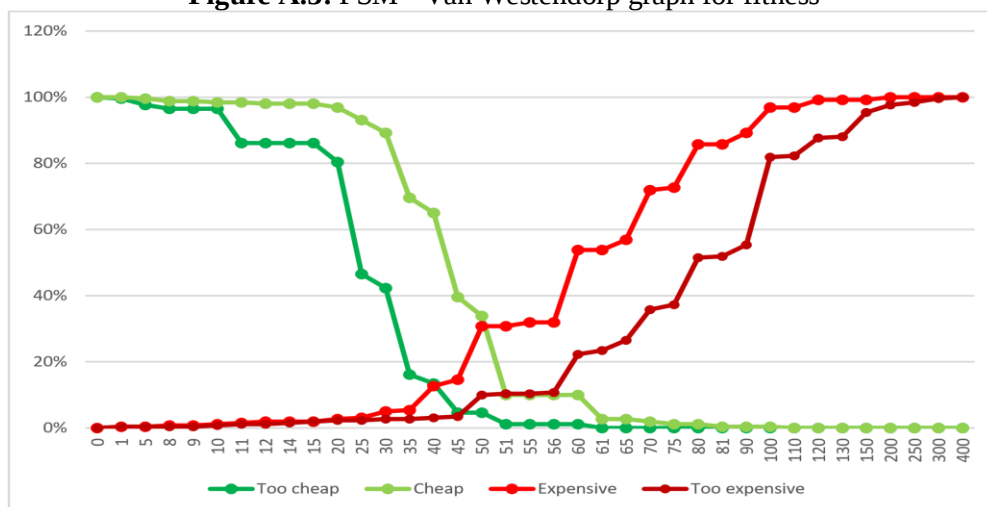
Source: Author's calculation.

Figure A.2: PSM - Van Westendorp graph for TV/Internet/Telephone

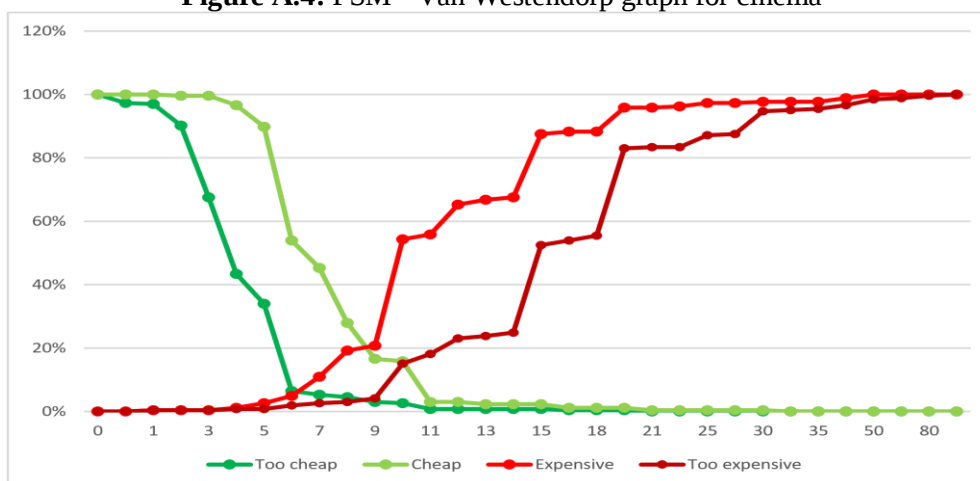


Source: Author's calculation.

Figure A.3: PSM - Van Westendorp graph for fitness



Source: Author's calculation.

Figure A.4: PSM - Van Westendorp graph for cinema

Source: Author's calculation.

APPENDIX B. PSM ANOVA Test**Table B.1: PSM ANOVA TEST**

By gender	Too cheap	Cheap	Expensive	Too expensive
Electricity price	0,19175	0,56372	0,96445	0,55326
TV/Internet/Telephone monthly subscription	0,06401	0,57999	0,21950	0,29440
Fitness monthly fee	0,29604	0,92841	0,12064	0,07987
Cinema ticket	0,01577	0,04233	0,73547	0,75987

By education	Too cheap	Cheap	Expensive	Too expensive
Electricity price	0,89804	0,78448	0,48935	0,55520
TV/Internet/Telephone monthly subscription	0,30480	0,22766	0,27556	0,12450
Fitness monthly fee	0,16473	0,17622	0,17824	0,07472
Cinema ticket	0,76470	0,83716	0,12395	0,04401

By income	Too cheap	Cheap	Expensive	Too expensive
Electricity price	0,63761	0,74968	0,35869	0,12420
TV/Internet/Telephone monthly subscription	0,86087	0,81218	0,04849	0,04493
Fitness monthly fee	0,06058	0,00913	0,00120	0,01039
Cinema ticket	0,36754	0,87367	0,34892	0,36009

By age	Too cheap	Cheap	Expensive	Too expensive
Electricity price	0,14625	0,70643	0,51708	0,42770
TV/Internet/Telephone monthly subscription	0,21057	0,96970	0,44125	0,22311
Fitness monthly fee	0,20192	0,36906	0,12558	0,03877
Cinema ticket	0,05077	0,79177	0,29832	0,09712

Source: Author's calculation.

APPENDIX C. LIKERT SCALE – VALUE GAP ANALYSIS**Table C.1: LIKERT SCALE – VALUE GAP ANALYSIS**

A) Telecom value gap (Q7 vs Q4)	
Q7 Agree & Q4 Disagree	18%
Q7 Agree & Q4 Agree	5%
Q7 Disagree & Q4 Agree	1%
Q7 Disagree & Q4 Disagree	27%
B) Cinema value gap (Q9 vs Q10)	
Q9 Agree & Q10 Disagree	7%
Q9 Agree & Q10 Agree	28%
Q9 Disagree & Q10 Agree	1%
Q9 Disagree & Q10 Disagree	13%
C) Belief that electricity price increase is invested (Q3) vs resistance (Q5)	
Q3 Agree & Q5 Resistant	1%
Q3 Agree & Q5 Open	3%
Q3 Disagree & Q5 Resistant	27%
Q3 Disagree & Q5 Open	26%
D) KPIs involving Q6	
Satisfied & Resistant	18%
Dissatisfied & Open	5%
Satisfied & Believe reinvestment	7%
E) Two high-signal segments with delivery satisfaction (Q6)	
Satisfied but resistant (happy with delivery yet oppose increases)	18%
Dissatisfied but open (unhappy yet accept increases)	5%
F) Public vs private efficiency (Q1 vs Q2)	
Public efficient & Private not more efficient	2%
Public efficient & Private more efficient	6%
Public not efficient & Private more efficient	33%
Public not efficient & Private not more efficient	13%
G) Fitness value gap (Q8 vs Q11)	
Q8 Agree & Q11 Disagree	12%
Q8 Agree & Q11 Agree	10%
Q8 Disagree & Q11 Agree	6%
Q8 Disagree & Q11 Disagree	19%

Source: Author's calculation.

APPENDIX D. SURVEY

The price of energy vs. the price of entertainment: How do we value services in Bosnia and Herzegovina?

Dear Sir/Madam,

You are invited to take part in a survey exploring an interesting phenomenon in our society: Why do we so easily accept the constant rise in prices of services such as internet, TV, or entertainment, while even the announcement of price increases for basic energy sources, such as electricity, triggers strong resistance?

This research is being conducted by Vedad Suljić (Master of Environmental Economics) and Nejra Biber (Master of Mechanical Engineering) with the aim of investigating this phenomenon using a scientific approach. We want to move beyond personal observations and precisely measure the actual attitudes and perceptions of citizens.

What do we want to achieve with this research? We want to understand the deeper reasons behind consumer decisions. The main hypothesis is that households are more willing to accept price increases for services where quality improvement is visible and direct (e.g., faster internet) than for essential services, where efficiency of management and the purpose of investments are often questioned.

What are the expected results and why are they important? The survey results will help us answer following questions:

Is our resistance to energy prices purely financial, or is it also linked to (mis)trust in the management of public enterprises?

How much do visible innovations (e.g., 5G networks, better TV picture) influence our willingness to pay more?

How do these attitudes in the long term affect the ability of the energy sector to invest in urgently needed modernization and renewable energy sources, which are crucial for our future?

Understanding these questions is essential for quality public dialogue and creating sustainable economic models for key services in Bosnia and Herzegovina.

The survey is completely anonymous, and your responses will only be used in aggregated form.

It takes about 10 minutes to complete.

Thank you for contributing to this important research!

PART I: BASIC INFORMATION

These questions help us ensure the relevance of the sample.

Gender:

Age:

Your highest completed level of education:

Number of household members (including yourself):

Average total monthly net income of your household:

Place of residence:

Type of settlement where you live:

PART II: PRICES AND VALUE OF SERVICES

In order to be able to compare responses, we kindly ask you to assess the prices for standardized service levels below, regardless of your current consumption or the package you are using.

Price per kilowatt-hour (kWh) of ELECTRICITY

The current average electricity price is about 0.16 BAM per kWh. For you, what price per kWh would be...

TOO CHEAP so that you would not pay any attention to consumption? (please enter the amount in BAM/kWh)

AFFORDABLE and you would only moderately pay attention to consumption? (please enter the amount in BAM/kWh)

EXPENSIVE so that you would start saving significantly? (please enter the amount in BAM/kWh)

TOO EXPENSIVE to the point that it would endanger your household budget? (please enter the amount in BAM/kWh)

Monthly price for a STANDARD TELECOMMUNICATIONS PACKAGE

The average standard package (TV package with 150+ channels, internet speed up to 150 Mbps, fixedline telephony included) costs about 65 BAM/month. NOTE: this amount does not include mobile telephony. For you, what monthly price for such a package would be...

TOO CHEAP so that you would doubt the quality of the service? (please enter the amount in BAM)

AFFORDABLE, i.e. an excellent deal? (please enter the amount in BAM)

EXPENSIVE, but you might still consider purchasing it? (please enter the amount in BAM)

TOO EXPENSIVE and you would not purchase it? (please enter the amount in BAM)

Monthly membership fee for a STANDARD FITNESS CENTER

A standard membership fee for a fitness center with unlimited access to equipment costs about 60

BAM/month. For you, what monthly membership fee would be...

TOO CHEAP so that you would doubt the quality of the equipment and/or hygiene? (please enter the amount in BAM)

AFFORDABLE, i.e. an excellent deal? (please enter the amount in BAM)

EXPENSIVE, but you might still consider paying it? (please enter the amount in BAM)

TOO EXPENSIVE and you would not pay it? (please enter the amount in BAM)

D) Ticket for a STANDARD CINEMA MOVIE SCREENING

Imagine the price of one (1) ticket for a standard 2D screening of a new movie on a Friday evening, which on average costs about 10 BAM/ticket. For you, what ticket price would be...

TOO CHEAP so that you would doubt the quality of the cinema? (please enter the amount in BAM/ticket)

AFFORDABLE, i.e. an excellent deal? (please enter the amount in BAM/ticket)

EXPENSIVE, but you might still consider buying it? (please enter the amount in BAM/ticket)

TOO EXPENSIVE and you would not go to the cinema? (please enter the amount in BAM/ticket)

PART III: WILLINGNESS TO PAY EXTRA

Answer with YES, NO, or MAYBE.

Would you be willing to pay 5 BAM or more per month for guaranteed uninterrupted electricity supply (without failures and outages)?

Would you be willing to pay 10 BAM more per month for electricity coming exclusively from renewable sources (solar, wind, etc.)?

Would you be willing to pay 15 BAM more per month for double the internet speed in your package (e.g., from 150 Mbps to 300 Mbps)?

Would you be willing to pay 15 BAM more per month for an additional package with all premium TV channels?

Would you be willing to pay 15 BAM more per month for a gym membership that includes access to all group classes (e.g., pilates, yoga)?

Would you be willing to pay 20 BAM more per month for access to additional wellness and spa facilities in the gym?

Would you be willing to pay 2 BAM more per ticket to watch a movie in 3D instead of standard 2D?

Would you be willing to pay 3 BAM more per ticket to watch a movie from premium/VIP seats (e.g., leather chairs, more space)?

PART IV: ATTITUDES AND OPINIONS

Please rate your level of agreement with the following statements on a scale from 1 to 5, where 1 =

“Strongly disagree” and 5 = “Strongly agree.”

Public enterprises (e.g., electricity providers) operate efficiently.

Private companies (private telecoms, cinemas) are more efficient than public ones.

Money from price increases of public services (e.g., electricity) is invested into better quality.

Higher telecommunication prices are justified because I receive better service.

Any increase in the electricity price is unjustified.

I am satisfied with the quality of electricity supply.

I am satisfied with the quality of internet and TV services.

Gym membership fees are justified by the quality of the offer.

I am satisfied with cinema services (cleanliness, comfort, offer).

The cinema ticket price is justified by the quality of the experience.

It is easier for me to pay more for entertainment (cinema, travel) than for utilities.

MARKET CONCENTRATION AND INDUSTRIAL CONCENTRATION MEASURES IN THE SERVICE OF EFFECTIVE COMPETITION WITH SPECIAL REFERENCE TO THE TELECOMMUNICATIONS MARKET IN BIH

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Abstract

The problem of mergers and market concentration, especially the emergence of cartels, is becoming increasingly widespread throughout the world, and the importance of antitrust authorities is also becoming greater. It is very important to define the concept of "market dominance", which is the ability of a company or group of companies to continuously maintain high prices, significantly above long-term average costs, without significantly reducing sales due to high prices. Industry is constantly developing and is affected by various influences that lead to an increase in market concentration, and based on this, the paper points out that it is necessary to constantly analyze and monitor the movement of concentration in the leading branches of an economy, with special attention to be paid to the basic elements of industrial concentration on the basis of which it is possible to easily understand numerous and complicated processes of the economy and business. Accordingly, the subject of research in this paper is market concentration and models for measuring industrial concentration in the service of effective competition. In order to investigate the problem and the subject of research, a hypothesis was set that the telecommunications market in Bosnia and Herzegovina is highly concentrated. The following methods and techniques of scientific research were used in the paper: comparative method, inductive and deductive method, standard statistical methods, concentration indices. Based on the achieved research results, it was concluded that the telecommunications market in Bosnia and Herzegovina is highly concentrated.

Keywords: industrial organization, market concentration, oligopoly, cartel, concentration indices

1. INTRODUCTION

The basic function of the market is to link production and consumption in an economic system in which the prevailing property relations lead to the emergence of decentralized decision-making. Historical development to date has confirmed that there is no economic, technological and social progress without a market that is not efficient in business and that is not efficient in the use of available resources. Namely, there are a large number of considerations that determine the degree of concentration that will be reached at a certain time in different industries and the degree of overall concentration in the entire economy. The multitude of these considerations determines the direction and level of change in concentration, or how it develops over time. The problem of mergers and market concentration, especially the appearance of cartels, is taking on ever greater proportions throughout the world, and the importance of competition commissions is also increasing. It is very important to define the concept of "market dominance", which is the ability of a company or group of companies to continuously maintain high prices, significantly above long-term average costs, without significantly reducing sales due to high prices. Terms such as mergers, takeovers, acquisitions, and integration describe a situation in which firms that are independently owned by each other

are combined into a single-owner firm. The term merger is used to refer to any type of combined ownership, regardless of whether the merger occurred at the initiative of both firms or whether one firm took over the other. Market concentration is a dynamic category that includes various forms of connecting entrepreneurs, and accordingly, an attempt is made to explain what is happening with it in the market. Measures of industrial concentration are important for business people, the government, and those involved in collecting and processing economic data and all scientific research. The paper points out that, among other things, it is necessary to constantly analyze and monitor the movement of concentration in individual industries, with special attention paid to the basic elements of industrial concentration on the basis of which it is possible to easily understand numerous and complicated concentration processes. The main goal of this paper and research is to point out that every company strives to have as much market power as possible, or market concentration, because it leads to greater profits, and the measure of market concentration is determined using market indicators. It is quite certain that there is a tendency for a number of companies in different industries to operate as efficiently as possible

by exploiting the economy with as large a volume of production and sales as possible, and to achieve a successful level of concentration in sales on this basis.

2. LITERATURE REVIEW

The market is a system of economic relations between people, companies and the state, which are established voluntarily, without coercion and on the basis of market laws and principles. It is a mechanism based on competition, and it manages the movement of supply and demand, whose interaction is expressed through the price system (Đerić and Rebić, 2015). The main function of the market is to connect production and consumption in an economic system in which the prevailing property relations lead to the emergence of decentralized decision-making (Labus, 1997).

Historical development to date has confirmed that there is no economic, technological and social progress without a market that is not efficient in doing business and which is not efficient in using available resources. In the market, buyers appear as carriers of demand, and sellers of goods as carriers of supply. According to the relationship between supply and demand for goods, their market price is formed. Market prices represent information on the basis of which all participants in economic activity make decisions aiming to maximize the satisfaction of their interests (Babić, S., and

The basic hypothesis is that the telecommunications market in Bosnia and Herzegovina is highly concentrated.

Milovanović M., 2001). Profit maximization is achieved through various combinations of price and production quantity, and they are largely influenced by the market structure. The most important characteristics of market structure are the number of producers, the existence of entry barriers, and product differentiation (Lipczynski, Wilson, and Goddard, 2017).

If we focus only on the number of market participants, at first glance this criterion may lead us to a large number of possible combinations, because each side of the market, whether on the supply or demand side, can have a large number of economic units. In theory, it has been shown that all these structures can be combined into three typical categories that cover all situations: where one side of the market consists of only one economic participant, it is a monopoly, where it consists of a few economic units – oligopoly, and where there are a very large number of economic units, then there is perfect competition (Stackelberg, 2011). Both sides of the market, supply and demand, can be found in each of these three categories. The table provides an overview of the standard types of market structure.

Table 1: Types of market structure

	Number of producer	Entry barriers	Product differentiation
Perfect competition	Many	Free entry	Identical product
Imperfect market:			
<i>Monopolistic competition</i>	Many	Free entry	Partial differentiation
<i>Oligopoly</i>	Few	Existence of entry barriers	Partial differentiation
<i>Monopoly</i>	One	No entry	Complete differentiation

Source: Lipczynski, Wilson, ^ Goddard (2017)

In the early twentieth century, classical microeconomic analysis focused on models of perfect competition and pure monopoly. It soon became apparent that these two models were unable to explain many aspects of business behavior in the world, such as: product differentiation, advertising, price wars, parallel pricing, and collusion. A new theory was needed to cover the vast area that lies between the two polar cases of perfect competition and monopoly. This middle area can be divided into two parts: monopolistic competition, which is closest to perfect competition; and oligopoly, which occupies much of the remaining spectrum. Oligopoly theory is based on emphasizing the importance of the number of

firms in an industry and the nature of the product. In all oligopolistic markets, a few sellers account for a significant percentage of total sales. The small number of firms is a basic characteristic of oligopolies. As a result of the small number of firms in a clearly defined industry, producing a similar product or service, the main problem of oligopolies focuses on recognizing the interdependence of firms. Interdependence means that a firm is aware that its actions affect the actions of its rivals and vice versa. It is sometimes suggested that the solution to the oligopoly problem lies in one of two extremes: pure independent action or collusion. Under pure independent action, each firm makes a unilateral

decision about a course of action, without any prior contact with its competitors. Under collusion, two or more competitors recognize their interdependence and create the opportunity for negotiation to create a plan of joint action (Lipczynski, Wilson, & Goddard, 2017).

Oligopolies are afraid of a price war, which is why many forms of regulation of oligopoly markets by their participants, i.e. the behavior of one of them, have arisen. Thus, various institutions have emerged that are established to promote and organize cooperation between producers, some of which are: cartels, trade associations, joint ventures, semi-secret agreements, and state-sponsored agreements. One way to avoid the uncertainty of oligopolistic interdependence is to enter into secret agreements. If mutual agreement is possible, firms are better off choosing the output that maximizes the total profits of the industry and then dividing the profits among themselves. When firms come together

and try to set prices and production volumes in order to maximize the total profits of the industry, they are called a cartel. Cartels are direct (albeit secret) agreements between competing oligopolists with the aim of reducing the uncertainty that arises from their mutual interdependence (Koutsoyiannis, 1996).

A cartel is simply a group of companies that have agreed to behave as individual monopolists and maximize the sum of their profits (Varian, 2013). Based on the above definitions, cartels can be most simply defined as associations of entrepreneurs with monopolistic goals, as defined by the German economist Robert Liefmann. The term cartel comes from the German word "Kartelle" which means producer association, and the root of the word is found in the Latin word "charta" which means letter or paper. In the literature, cartels are often called trusts (Colander, 1998).

3. INDUSTRIAL CONCENTRATION MEASUREMENT INSTRUMENTS

According to the Competition Act, a concentration is considered to be:

- merger or acquisition of independent economic entities or parts of economic entities;
- acquisition of control or dominant influence by one or more economic entities over another or over several other economic entities or part of another economic entity or parts of other economic entities, by acquiring the majority of shares or shares of the share capital, by acquiring the majority of voting rights or in another manner, in accordance with the provisions of the law regulating the establishment of economic entities and their management;
- joint investment on a long-term basis, of two or more independent economic entities, which act as an independent economic entity.
- For the purposes of analyzing a company's competitive environment, it is necessary to identify the key elements of the industrial structure. The most important elements and characteristics of the industrial structure are:
 - number and size of enterprises,
 - existence and strength of barriers to entry and exit into the industry, and
 - degree of product differentiation.

Firm concentration refers to the first of these elements and includes: the distribution and number of firms and the size of the firms. In empirical studies of industrial

organization, firm concentration is the most commonly used indicator of industrial structure. Each particular measure of firm concentration aims to reflect the implications of the number and size of firms in an industry, using a relatively simple numerical indicator. Both the number of firms and their size (in other words, the degree of inequality in firm sizes) are important. For example, the nature of competition in an industry containing ten firms of equal size may differ greatly from the nature of competition in an industry consisting of one dominant firm and nine smaller firms. A measure of market concentration should be able to capture the implications of both the number of firms and their relative size. The most common measures of industrial concentration used to satisfy this criterion are:

- the sales volume ratio of the "big 4 firms" (C4),
- the HHI (Herfindahl-Hirschman) index,
- the Lerner index⁸ and the Lorenz curve,
- the Gini coefficient.

There are two reasons why such precise measures of market concentration are needed. The first is to enable comparisons of concentration across industries in the same or different countries. The industries being compared need not have anything in common, but an appropriate measure of concentration must allow for comparisons of concentration despite the fact that different industries have different numbers of firms and different distributions of their market shares. Second, in cases where regulators want to intervene and prevent

⁸ The Lerner index is equal to the negative reciprocal of the elasticity of demand at the monopoly equilibrium point.

changes in concentration within an industry, the regulator itself must determine a general measure by which to decide whether an industry is concentrated.

4. METHODOLOGY

During the research, all available professional literature was used and studied, the Internet as a modern method of data search, relevant journals and other sources in order to obtain necessary and important information related to the subject of research. For the purpose of research, and taking into account the specificity of the subject studied, various methods were used in the work in order to meet basic methodological requirements such as objectivity, reliability, generality and systematicity. The work used existing literature in the field of market and market structure, market concentration, mergers, available examples from these areas, then statistical data, as well as data on the work of specific companies: Telecom Srpske - Mtel, BH Telecom and HT Mostar, and various concentration indices were used to define, research and explain their work. Of the methods and techniques of scientific research work, the following were used: comparative methods of analysis, inductive and deductive methods, standard statistical methods. For the purposes of this research, the sales volume coefficient of the four largest companies and the Herfindahl-Hirschman index were used.

3.1. Sales volume ratio of the four largest companies

From 1968 to 1982, the sales volume ratio of the four largest firms was used as a measure of concentration as a guide for mergers. This index is also often referred to in the literature as the N-firm concentration index. It represents the sum of the shares of the four largest firms in the industry. The formula for calculating the sales volume ratio of the four largest firms (CR_4) is derived from the n-firm concentration index. The n-firm ratio index is denoted by CR_n and is used as a measure of the market shares of the n largest firms in a market:

$$CR_n = \sum_{i=1}^n S_i / S_t$$

where S_i represents individual sales of large firms, while S_t is total sales. Based on this, the sales volume index of the four large firms is defined as:

$$I_4 = \sum_{i=1}^4 S_i$$

$$C_4 = \frac{S_1 + S_2 + S_3 + S_4}{S_t}$$

These measures can be used in the legal system where arbitration is carried out in merger conflicts between companies and regulators (Šaj, 2005).

S_1, S_2, S_3 i S_4 are the individual sales of the Big Four, and S_t – represents total sales. The coefficient of sales volume of the four large companies expressed in this way shows how much of the production in the industry is accounted for by the four largest companies, i.e. the sum of the shares of the four largest companies in the industry. The concentration level in CR_4 can range from 0 to 100 (Šaj, 2005, p. 171). When the concentration level is 0%, then it is an extremely competitive market, and when it is 100%, then there is a concentrated oligopoly or even a monopoly on the market (if one company achieves 100% concentration).

3.2. Herfindahl-Hirschman (HH) index

Working independently, Hirschman (1945) and Herfindahl (1950) attempted to avoid the problem of measuring concentration using the sales volume ratio of the four largest firms and recommended a different measurement method, which they called the Herfindahl-Hirschman index. This index proposes that a measure of concentration be calculated based on the sum of the individual squares of the market shares of all firms in an industry. Using this index, it takes into account the existence of differences in the size of market shares between competitors and includes all firms in the calculation. The Herfindahl-Hirschman (HH) index is calculated as follows:

$$I_{HH} = \sum_{i=1}^N (S_i)^2$$

where S_i is the market share of firm i , and N is the total number of firms in the specified industry.

For an industry consisting of a single monopoly producer $I_{HH} = 1$, the monopolist has a market share $S_1 = 1$. Based on this, $S_1^2 = 1$, so the HH index $I_{HH} = 1$. The value 1, for an industry with N firms, is the highest possible value of the Herfindahl-Hirschman index, and the lowest possible value is $I_{HH} = \frac{1}{N}$. Achieving the maximum value of 1 indicates the existence of a monopoly by only one firm, or in the case when there are multiple firms, then one dominant firm has a market share that is only partially less than 1, and small firms have a market share that is slightly greater than zero. The minimum value $I_{HH} = \frac{1}{N}$ occurs when the industry consists of N firms of equal size. In this case, each firm has a market share $S_i = \frac{1}{N}$ (Lipczynski, Wilson, & Goddard, 2017).

This method of measuring market concentration allows the index to be calculated regardless of how many elements the sample contains and provides the possibility of comparing even different industries. Industries can have only a few companies, but also several thousand companies. The value of the HH index ranges from 0 to 10,000, where a value of zero is achieved in perfect competition, and a value of 10,000 in the case of a monopoly. The importance of calculating market concentration in this way can be seen in the fact that the HH index takes into account the individual market shares of all companies in the industry, but still reacts to the presence of companies with a large market share, because the value of the index increases significantly.

The importance of this index is also demonstrated by the fact that the US Department of Justice routinely uses it to determine whether an industry is competitive enough to allow a merger between two large firms in the industry. If the HH index is less than 1,000, the Department of Justice assumes that the manufacturer is competitive enough and does not look closely at the merger, as it is considered a low-concentration market. In the case where the index ranges between 1,000 and 1,800, it is interpreted as a medium-concentration market, while values above 1,800 indicate high market concentration, and in such cases, a takeover or merger of another company will not be permitted (Colander, 1998).

Table 2: HH index values and market types

VALUE HH INDEX	DEGREE OF SUPPLY CONCENTRATION
$HH_i < 1000$	Low concentrated supply
$1000 \leq HH_i < 1800$	Medium concentrated supply
$1800 \leq HH_i < 2600$	Highly concentrated supply
$2600 \leq HH_i < 10000$	Very highly concentrated supply
$HH_i = 10000$	Monopolistically concentrated supply

Source: Begović, Mijatović (2002)

Although it is accepted as a measure that makes it easier to calculate market concentration compared to some other ways of measuring market concentration, this way of measuring market concentration is not perfect and without difficulties. In the practical use of the HH index, there is a need for accurate data for each individual company in a single industry, which is sometimes not possible. In contrast, the CR_n requires only individual

data on the leading *n* companies and data on the entire sector. However, although data for extremely small companies is sometimes not available, the calculated value of the I_{HH} index does not deviate much from the actual value, because it takes into account the very small influence of small companies and their negligible market share.

5. CONCENTRATION ON THE MARKET OF MOBILE OPERATORS IN BIH

Three licensed mobile operators currently operate as users of licenses for the provision of GSM/UMTS/LTE services in Bosnia and Herzegovina, namely:

- JP BH Telecom DD, Sarajevo (BH Telecom);

- Telecommunications RS AD, Banja Luka (Telekom Srpske) and
- JP Hrvatske telekomunikacije DD, Mostar (HT Mostar).

Table 3: Statistical data of the market of mobile operators in Bosnia and Herzegovina

MOBILE OPERATORS	31.12.2021.
Total number of active mobile network subscriptions	3.728.775
Number of pre-paid subscriptions	2.793.701
Number of post-paid subscriptions	989.074
Percentage of population covered by GSM mobile network	100%
Percentage of population coverage with (UMTS) 3G mobile network	97%
Percentage of population coverage with (LTE) 4G mobile network	93%

Source: Telekomunikacijski pokazatelji BIH (2021)

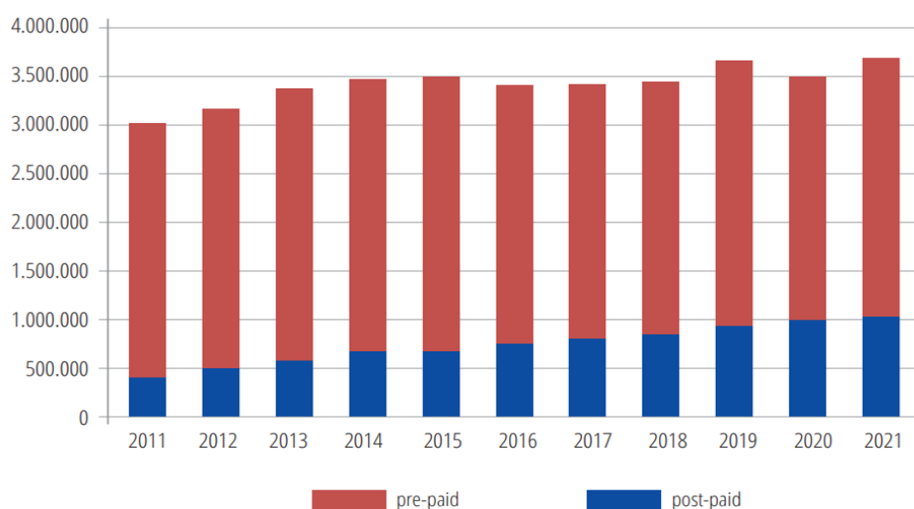
On 08.04.2019., in accordance with the Decision on Licenses for the Use of Radio Frequency Spectrum for the Provision of Services via Mobile Access Systems („Službeni glasnik BiH“, broj 23/19), the Communications Regulatory Agency granted mobile operators licenses for the use of radio frequency spectrum for the provision of services via mobile access systems to the listed licensed mobile operators.

By the end of 2021, four mobile service providers existed on the networks of three mobile network

operators: BH Telecom d.d. Sarajevo, M:tel AD Banja Luka and HT Mostar DD, as follows (Godišnji izvještaj regulatorne agencije za komunikacije, 2021):

- DASTO SEMTEL d. o. o. Bijeljina;
- LOGOSOFT d. o. o. Sarajevo;
- NOVOTEL d. o. o. Sarajevo;
- HALOO d. o. o. Sarajevo.

Figure 1: Number of mobile phone subscribers in the period from 2011 to 2021.



Source: Godišnji izvještaj regulatorne agencije za komunikacije, 2021

Based on the single definition of active prepaid and postpaid subscribers for all SMP operators in mobile telephony, which is aligned with the standards of the European Commission and ITU, the number of mobile subscribers on 31.12.2020 was 3,509,674. This number recorded a slight decrease compared to 2019, and the number of prepaid subscribers is still several times higher than postpaid subscribers (Figure 1). At the end of the third quarter of 2020, the share of postpaid users in the total number of users of telephone services in mobile telephony was 28.93%, and there is evident growth in this segment over the years, but it is still much lower than the average in the surrounding countries and the European Union. According to available data from the regulatory agencies of the countries in the region for 2019–2020, the share of postpaid users in Serbia is 61.14%, in Croatia it is approximately 56%, and in Montenegro it is 57.87%. The number of mobile

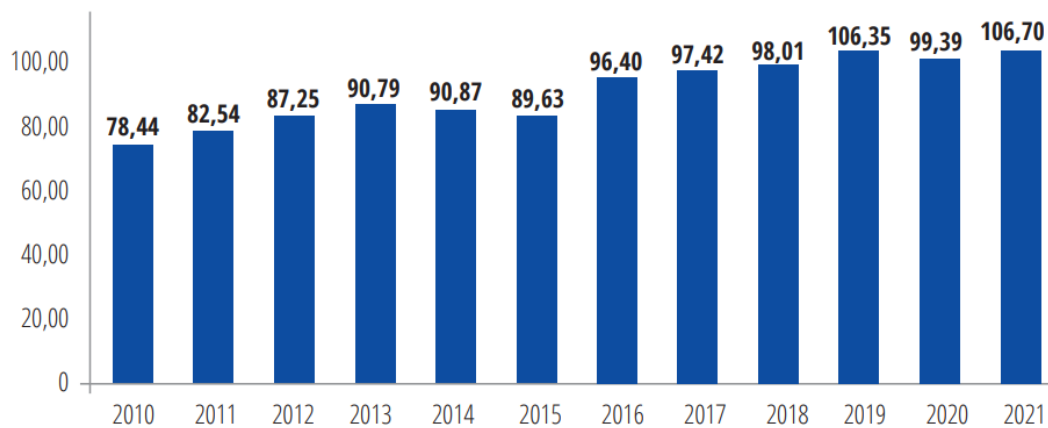
subscribers in BiH as of December 31, 2021 was 3,767,810, recording an increase of 7.35% compared to 2020⁹.

When looking at the level of penetration (number of mobile subscribers per 100 inhabitants) of mobile telephony at the end of 2020 was 99.39%, while for 2019 it was 106.35%. The mobile telephony penetration rate is below the latest available values in neighboring countries (Montenegro 174.51%, Serbia 122%, Croatia 104.36%)¹⁰. The large use of applications as substitutes for making voice calls (such as Viber, Skype, Gtalk, Whatsapp) and substitutes for SMS and MMS (such as Whatsapp, Google Talk, Facebook Messenger, Viber, Skype) has led to a continuous decline in international outgoing voice traffic and the number of SMS and MMS messages. The level of the number of mobile subscribers per 100 inhabitants of mobile telephony in BiH at the end of 2021 was 106.70%.¹¹

⁹ Regulatorna agencija za komunikacije (2022), *Godišnji izvještaj Regulatorne agencije za komunikacije za 2021*, www.rak.ba.

¹⁰ Godišnji izvještaj za poslovnu 2020, www.mtel.com.

¹¹ Regulatorna agencija za komunikacije (2022), *Godišnji izvještaj Regulatorne agencije za komunikacije za 2021*, www.rak.ba.

Figure 2: Number of mobile phone subscribers per 100 inhabitants in the period from 2010 to 2021.

Source: Godišnji izvještaj regulatorne agencije za komunikacije, 2021

5.1. Telecommunications RS AD, Banja Luka (Mtel)

“Telekomunikacije Republike Srpske” a.d. Banja Luka was founded on 20.12.1996. as the Public Basic State Enterprise for Telecommunications of the Republic of Srpska. It is headquartered in Banja Luka. Its main area of activity is information and communications. Its main activity is wireline telecommunications and related service activities, i.e. the transmission of voice, data, text, sound and image, which includes:¹²

the activity of wired telecommunications, wireless telecommunications activity, activity of satellite telecommunications, other telecommunication activities.

The ownership is divided between Telekom Srbije a.d. Belgrade (65.01%) and public funds and other shareholders (34.99%). The value of the share capital is 491,383,755 KM. Mtel has shares in seven companies, as follows:¹³

- five subsidiaries with 100% ownership: Logosoft, Telard Net, Blicnet, Elta-Kabel and Finance;
- two associated companies with less than 50% ownership: Društvo za komunikacije MTEL d.o.o. Podgorica and MTEL global d.o.o. Belgrade.

Mtel with a total number of employees in 2020 is 2,105. Business decisions were made to ensure a safe working environment for employees, given that it was necessary to maintain all business processes, as well as the quality of services, so that customers would not feel the consequences of the situation the entire planet found itself in. This is supported by the results for 2021, from which the company emerged with success and managed to maintain the level of employees in the amount of 2,085 employees on 31.12.2021.¹⁴

The strategic focus is classified into several segments – technological, user and socially responsible business segments. In addition to the above, Mtel's strategic focus is on activities aimed at preventing the spread and consequences of Covid-19. In 2021, total revenues amounted to 447.0 million convertible marks, which represents an increase of 4.3% compared to 2020. Mobile telephony revenues were realized in the amount of 191.3 million convertible marks, which is 4.3% more compared to 2020, as a result of the growth of the user base by more than 126,000 users.

Table 4: Revenue from telecommunications services (in million KM)

	2017.	2018.	2019.	2020.
Total income	1.339	1.266	1.240	1.241
Mobile telephony revenues	579	549	529	529
Fixed telephony revenues	377	365	298	340
Income from internet services	141	168	172	172

Source: Godišnji izvještaj za poslovnu 2021

Given the coronavirus pandemic since March 2020, the main goal in terms of the number of users was to

preserve the user base and focus on other ways of selling services, besides direct sales - web sales, telesales,

¹² Godišnji izvještaj za poslovnu 2020. godinu, www.mtel.com.

¹³ Godišnji izvještaj za poslovnu 2020, www.mtel.com,

¹⁴ Godišnji izvještaj za poslovnu 2021, www.mtel.com,

indirect/field sales. Also, significant growth was recorded in the segment of integrated services with TV, postpaid mobile telephony, m:SAT and internet services.¹⁵

Mtel's customer base consists of more than 1.7 million users. Despite the coronavirus pandemic and the market situation, it should be noted that the increase in the

number of users in 2021 was close to 150 thousand users, of which the most significant increase was in the mobile telephony services segment. The number of mobile telephony users as of 31.12.2021 is 1,392,979, of which the number of prepaid users is 961,154, while the number of postpaid users is 431,825.¹⁶

Table 5: Service users

	2017.	2018.	2019.	2020.	2021.	2021. vs 2020.
Mobile telephony (mil.)	1,31	1,32	1,36	1,27	1,39	10%
Fixed telephony (thousand)	235,3	227,3	220,5	212,4	203,6	-4,1%
Integrated services (thousand)	97,1	109,5	118,7	126,3	133,1	5,4%
NET services (thousand)	134,1	143,0	152,4	164,2	175,6	7,0%

Source: Godišnji izvještaj za poslovanje 2021

During 2021, there was an increase in the segment of prepaid users, with the number of users increasing by 12.1%, as a result of constant improvement of the prepaid offer and the creation of attractive prepaid packages and promotional offers. In addition to the above, there was also an improvement in the situation related to the Covid-19 pandemic, which was directly reflected in the total number of users. Prepaid users in the total user base of mobile telephony participate with 69.0%.

5.2. JP BH Telecom DD, Sarajevo (BH Telecom)

JP BH Telecom was established by the Decision of the Government of the Federation of Bosnia and Herzegovina on 20.12.2001. when two new entities JP BH Pošta and JP BH Telecom were formed from the legal predecessor of the Public Enterprise PTT Traffic of Bosnia and Herzegovina. In its current form, the Joint Stock Company BH Telecom Sarajevo has existed since 12.03.2004. when the form of the company was changed. Ownership is divided into 90% owned by the Government of the Federation of Bosnia and Herzegovina and 10% by other shareholders. The value of the share capital of the Joint Stock Company BH Telecom Sarajevo as of 31.12.2021. amounted to 634.57 million KM, divided into 63,457,358 ordinary shares, with a nominal value of 10 KM.¹⁷ According to the annual statistical report of the Sarajevo Stock Exchange (SASE), the highest turnover this year was achieved with shares of the issuer BH Telecom DD, Sarajevo and represents 18% of the total regular turnover achieved on the SASE Free Market.¹⁸ BH Telecom emphasizes the social responsibility of business, which is an integral part of its practice and which is implemented through continuous activities

such as: donations to non-profit organizations, supporting cultural, sports, humanitarian events through various sponsorship arrangements, investing in education and science projects, as well as implementing environmental protection measures. By placing service users in the spotlight, responsibly managing the implementation of new technologies and making good business decisions, they have managed to become the best provider of telecommunications services.

The number of employees was reduced by 62 compared to 2020, and as of 31.12.2021 there were 3,104 employees. Total revenues in 2021 were 471.6 million KM, which represents a growth of 3% compared to the previous year. Revenues from the mobile user segment in 2021 were 15.3 million KM higher, or 9% more than the previous year. During 2021, the offer for prepaid users was constantly improved, so the number of users at the end of 2021 was 7% higher than the previous year. The easing of measures and the lifting of travel restrictions resulted in an increase in the arrivals of people from the diaspora and tourists in the summer months.¹⁹

5.3. Public Company Croatian Telecommunications DD, (HT Mostar)

JP Hrvatske telekomunikacije DD, Mostar was created by the separation of Croatian Post and Telecommunications into Croatian Post (HP) and Croatian Telecommunications (HT), so it was officially established on 1.1.2003.²⁰ became one of the three national network operators. At the beginning of 2009, a decision was made to re-register the company from a limited liability company to a joint stock company, and the shares are listed on the free market of the Sarajevo Stock Exchange. Ownership is divided between the

¹⁵ Godišnji izvještaj za poslovanje 2020, www.mtel.com.

¹⁶ Godišnji izvještaj za poslovanje 2021, www.mtel.com.

¹⁷ Godišnji izvještaj o poslovanju 2021, www.bhtelecom.ba.

¹⁸ Godišnji izvještaj o poslovanju 2020, www.bhtelecom.ba.

¹⁹ Godišnji izvještaj o poslovanju 2021, www.bhtelecom.ba.

²⁰ HT Eronet – upoznajte nas, www.hteronet.ba.

Government of the Federation of Bosnia and Herzegovina, T-Hrvatski telekom DD, Zagreb (T-HT, Zagreb), Hrvatska pošta DD, Zagreb and small shareholders.

HT Mostar has adopted a value-based approach to its business based on social responsibility, through environmental protection activities through various

sponsorship and donation activities. Also, through sponsorship and donation activities, it supports education, culture, scientific institutions and sports. HT Eronet particularly emphasizes that the basic principle of today's society is sustainable development and that we should think about our actions today because of what we leave for future generations.

6. RESEARCH RESULTS AND DISCUSSIONS

The telecommunications market in Bosnia and Herzegovina can be characterized as oligopolistic in terms of competition (a market with a small number of participants), with a very strong level of competition between individual mobile operators. The telecommunications market is influenced by the general, economic and political conditions in the country, with a high rate of population migration (departure of the population from BiH). It is also characterized by a low level of information and communication technologies compared to the level in the European Union. Also, new technologies such as mobile phones and the Internet stand out for their rapid acceptance by the younger population. Strengthening competition in the telecommunications market of BiH, all negative influences, but also rapid progress in the development of technology has enabled the introduction of new and better services to end users, but still at a higher price than in the countries of the region.

The beginning of 2020 was marked by a major global economic crisis caused by the coronavirus, which led to the closure of borders, and the Council of Ministers declared a state of natural disaster in the country, which had a negative impact on the economy of Bosnia and Herzegovina. The economic shock hit non-financial companies the hardest, and had a negative impact on the labor market, with the transport and tourism sectors recording the highest losses. Like all other sectors, the telecommunications market in 2020 felt changes in business due to the consequences of the pandemic, with people across the country relying on technology to work from home, maintain social connections, and stay informed. The pandemic particularly highlighted the importance of the telecommunications sector in maintaining business operations and the connectivity of society. The trend of consumer habits changed, where the demand for mobile internet decreased, as most residents were at home and used wifi networks, with a pronounced need for broadband internet. Mobile operators tried to respond to these needs by increasing network bandwidth and increasing data transfer speeds due to increased user demand. Also, changes were

recorded in the increase in the problem of collecting receivables caused by the recession.²¹

Telecommunications operators were obliged to maintain the existing level and quality of services and to provide competent institutions, bodies and institutions with priority in the flow of traffic, or, at the request of competent authorities, to ensure priority access to emergency numbers. The Agency concluded that the provision of telecommunications services in Bosnia and Herzegovina was largely uninterrupted, but the use of internet traffic had clearly increased. In this regard, the Agency appealed to citizens, users of telecommunications services, to use the internet rationally in the circumstances of the declared state of emergency, or to make the use of the internet rational. The impact of the pandemic has led to cooperation between mobile operators, which was unthinkable in previous years. Given the importance of telecommunications services for the citizens of Bosnia and Herzegovina during the declared state of emergency, the Communications Regulatory Agency has called on operators of public telecommunications networks and services to provide full support to all competent institutions in Bosnia and Herzegovina in terms of urgent notification of users through all available advertising channels (SMS, e-mail, system-generated messages, info channels, etc.). During the state of emergency, telecommunications operators are called on to work together and cooperate in terms of technical support, troubleshooting and capacity sharing, if necessary. In some countries, data exchange and communication between authorities and telecom operators has been crucial in identifying infected individuals and controlling the spread of the coronavirus. Some mobile operators have even leased frequency spectrum from competitors to enable access and better quality network services.

The market leader in BiH mobile telephony is BH Telecom with a total of 1,630,440 subscribers and a 43.27% share, followed by Telekom Srpske, which controls 35.49% of the market with 1,337,534 subscribers, and HT Eronet with a 21.03% market share

²¹ Deloitte, Understanding the sector impact COVID-19, Telecommunications, www2.deloitte.com, 2021.

and 792,253 mobile subscribers..²²

Table number 6 shows a comparative analysis of mobile operators in the period from 2015 to 2021. Based on the data presented, it can be seen that Mtel and BH Telecom dominate the market of mobile operators, but following

the trend from year to year, the constant growth of HT Eronet can be noticed, which increased its market share from 13.94% in 2015 to 21.03% in the last observed year, 2021.

Table 6: Comparative analysis of mobile operators in BIH

YEAR	NUMBER OF USERS	MTEL (num. usr.)	MTEL (in %)	BHTEL (num. usr.)	BHTEL (in %)	HT ERONET (num. usr.)	HT ERONET (in %)	OTHER (in %)
2015.	3443520	1402702	40.73	1545743	44.89	479902	13.94	0.44
2016.	3404043	1303876	38.30	1595159	46.86	495353	14.55	0.28
2017.	3440085	1332479	38.73	1601462	46.55	500395	14.55	0.17
2018.	3461058	1321627	38.19	1626000	46.98	508042	14.68	0.16
2019.	3755521	1355222	36.09	1636023	43.56	760268	20.24	0.11
2020.	3509674	1266174	36.08	1526959	43.51	715113	20.38	0.04
2021.	3767810	1337534	35.49	1630440	43.27	792353	21.03	0,21

Source: Author calculation on the basis Godišnji izvještaj Regulatorne agencije za komunikacije (2021)

Applying the sales volume coefficient for the N largest firms (the “Big 4” sales volume coefficient) to the current three most dominant operators:

$$C_3 = \frac{S_1 + S_2 + S_3}{S_t}$$

S_1 , S_2 i S_3 are individual shares, and S_t – represents total sales, it follows that:

$$C_3 = \frac{35,49 + 43,27 + 21,03}{100}$$

$$C_3 = 0,9979$$

Based on the high concentration coefficient of 99.79%, it can be concluded that there is an extreme example of oligopoly in the market, which is why such a market is monitored by state regulatory bodies. This coefficient

measures linearly and does not differentiate between different sizes of firms as long as it concerns the four largest firms that hold the most market shares. To test the truth of the above statement, we also apply the HHI index:

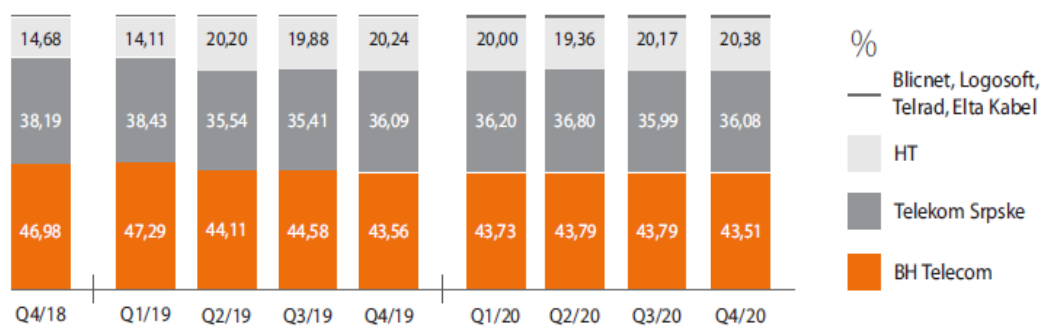
$$I_{HH} = \sum_{i=1}^N (S_i)^2$$

$$I_{HH} = (35,49)^2 + (43,27)^2 + (21,03)^2 + (0,21)^2$$

$$I_{HH} = 3574,13$$

Based on this, we see that the value of the HH index ranges from 2600 to 10000, which is interpreted as a very high concentrated supply, thus confirming the veracity of the sales coefficient of the four largest companies.

²² Regulatorna agencija za komunikacije (2022), *Godišnji izvještaj Regulatorne agencije za komunikacije za 2021*, www.rak.ba.

Figure 2: Market share of all mobile phone operators in BiH by quarter

Source: Godišnji izvještaj o poslovanju BH telecom (2020)

The figure shows the market share of all mobile telephony operators in BiH by quarter, based on data from the Communications Regulatory Agency of BiH. Since 1.1.2013, with the aim of strengthening the development of competition in the market, number portability in mobile networks has been enabled. As can

be seen in the figure, the total number of mobile telephony service users between the third and fourth quarters of 2020 has increased and has a growth trend, but in the same period, BH Telecom's market share has recorded a downward trend.

7. CONCLUSION

The degree of concentration of supply in a market is influenced by a large number of different factors. They can be divided into those that are of crucial importance for determining the degree of concentration, i.e. the main ones, and additional ones, when their importance in determining concentration is lower. Factors that influence the degree of concentration are the number of competitors in the market, the dispersion of market share and barriers to entry into the market, and they represent the main factors. Additional factors include economic potential, the geographical size of the market, technological conditions of production, etc. If we focus only on the number of market participants, at first glance this criterion can lead us to a large number of possible combinations, because each side of the market, whether on the supply or demand side, can have a large number of economic units. In theory, it has been shown that all these structures can be combined into three typical categories that cover all situations: where one side of the market consists of only one economic participant, it is a monopoly, where it consists of several economic units – oligopoly, and where there are a very large number of economic units, then there is perfect competition. Oligopoly theory is based on emphasizing the importance of the number of companies in the industry and the nature of the product.

One way to avoid the uncertainty of oligopolistic interdependence is to enter into collusion. If collusion is possible, firms are better off choosing the output that maximizes total industry profits and then sharing the profits among themselves. The collusion generally prevents the entry or development of new products that could threaten the profitability or survival of existing

firms. Economic power and economic concentration are closely related. Any form of economic concentration inevitably stems from adequate economic power. In the context of industrial concentration, the number and size of the distribution of enterprises can be cited as very important determinants of market power. Of course, there are many different ways to measure this market power.

It is quite certain that there is a tendency for a number of companies in different industries to operate more efficiently by exploiting economies of scale and sales and thereby achieve a successful degree of concentration in sales. In addition, there is a tendency for a number of companies in certain industries to develop the most efficient and profitable levels of sales promotion. There is also a group of “forces” operating in the market that cause growth or concentration. They provide an incentive for companies to progressively increase concentration within an industry or even beyond the boundaries of an industry. Merging two companies in this way has direct implications for the concentration of sellers and the structure of the industry, giving them greater market power in the combined organization. However, increasing market power is not necessarily the only reason why integration may be an attractive strategy. It may be motivated by the desire to achieve savings through economies of scale in production, purchasing, marketing or research and development.

Barriers to entry for new competitors are the production costs faced by firms seeking to enter an industry, while

firms already in that industry are exempt from these costs. Recently, a typical example of a barrier to entry into a particular market has been the control of a rare input necessary for the production process by a competitor. The mobile operator market in Bosnia and Herzegovina is an example of a market with pronounced barriers to entry, where only three operators have licenses to provide services, and the number of mobile service providers is decreasing year by year.

Based on the presented research and data, it can be concluded that the basic hypothesis has been confirmed, i.e. that the telecommunications market in Bosnia and Herzegovina is highly concentrated. Market concentration has been increasing in recent years as a result of various influences. This is also supported by the impact of the coronavirus, which has had a significant impact on both the domestic and global markets. In the example of the domestic mobile operator

market, especially at a time when the whole world was adapting to the new situation due to the pandemic, telecommunications have assumed an important role, or rather, the most important, after healthcare. After a slow recovery from the consequences of the coronavirus on the economy, global energy prices have risen sharply and caused a general increase in prices and an increase in the inflation rate. This economic environment has led to the increasing emergence of market-dominant companies, which are able to continuously maintain high prices, significantly above long-term average costs, without significantly reducing sales.

The Communications Regulatory Agency, as well as the Competition Council of BiH, through various activities of regulation and monitoring of compliance with laws and rules, are trying to combat certain irregularities in a given market, as well as the possible presence of discrimination against end users.

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EXAMINING THE ATTITUDES OF THE ACADEMIC COMMUNITY TOWARDS THE CONCEPT OF NATIONAL COMPETITIVENESS WITH A FOCUS ON THE SITUATION IN BOSNIA AND HERZEGOVINA

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Abstract

The concept of national competitiveness has been a subject of academic debate for more than seventy years. While some view it as a “dangerous obsession” (Krugman, 1994), many others consider it the most significant—typically synthetic—indicator of a country’s economic condition. The lack of consensus regarding the meaning of national competitiveness is reflected in the divergent understandings of indicators used to measure competitiveness, as well as the “pillars” (i.e., key drivers of national competitiveness), ultimately resulting in differing—and at times contradictory—assessments of which countries are genuinely competitive.

The primary objective of this research was to examine the perceptions of the domestic academic community regarding the meaning of the concept of national competitiveness, as well as the position of Bosnia and Herzegovina in terms of competitiveness within both the regional and global contexts.

The findings indicate that a majority of domestic academics share Porter’s (1990) view that productivity is the most accurate measure of national competitiveness, followed by the growth rate of GDP, the state of the trade balance, and the employment rate.

With regard to the key factors influencing the level of national competitiveness, most respondents identified education as the most important, followed by innovation and the free movement of capital. Interestingly, at the bottom of the list of influencing factors were meritocratic institutions, macroeconomic stability, and comprehensive healthcare coverage.

According to most respondents, the world’s most competitive economy is China, followed by five G7 countries (the United States, Germany, Japan, the United Kingdom, and France).

Within the regional context, Slovenia is perceived as the most competitive economy, followed—at a noticeable distance—by Croatia and Hungary. Bosnia and Herzegovina was ranked eighth out of ten observed countries, ahead only of Montenegro and North Macedonia.

Regarding measures to improve the competitiveness of Bosnia and Herzegovina’s economy, the most important were identified as increased investment in research and development, higher spending on education, and further digitalization.

Keywords: national competitiveness, pillars of national competitiveness, Western Balkan countries, world’s most competitive economies

JEL: E6, F0, O4

1. INTRODUCTION

When Michael Porter published his seminal book *The Competitive Advantage of Nations* thirty-five years ago (Porter, 1990), it seemed that economists were moving toward an almost unified and uncontested understanding of what national competitiveness is and what it depends on. Shortly thereafter, the World Economic Forum embraced Porter’s views and embedded them in *The Global Competitiveness Report* (GCR), further disseminating and popularizing his approach. By the mid-2010s, Porter’s ideas had become so widespread and broadly accepted that most alternative views were effectively pushed to the margins of economic science. Yet, for the past five years, the GCR has no longer been published, while the world has entered a period marked by wars and sanctions that compel us to re-examine everything we think we know in economics, including the very concept of national competitiveness.

Porter’s understanding—that national competitiveness is best measured by productivity—fit perfectly the circumstances of advanced globalization. In a world of

global production and distribution chains with minimal trade barriers, it was difficult to present any reasonable argument against the claim that, in the long run, national competitiveness is tantamount to a high standard of living, and that the standard of living directly depends on the level of productivity with which each economy employs its available resources. The “pillars of competitiveness” listed in the GCR served as a kind of guide for governments worldwide on what they should do to raise productivity, and thereby the living standards of their citizens.

However, the world has changed significantly in recent years. Deglobalization and the return of mercantilist policies are increasingly discussed, which has brought renewed prominence to several “older” indicators used to assess national competitiveness prior to the “Porter era,” such as the trade balance and the share of manufacturing in GDP—indicators that had lost importance over the past two to three decades. This is logical, since

the mobility of factors of production, and even the freedom of trade, can no longer be taken for granted. As a result, more and more governments are already thinking about how to secure within their borders the necessary resources, as well as production capacities and technologies for economic self-sufficiency or defense in case of attack by another state. Under such circumstances, countries are considered—and feel—more competitive if they command economic potential, even if it is not currently fully or efficiently utilized. All this turbulence prompted us to conduct a survey-based study of the academic community's views on what university-educated economists in Republika Srpska and Bosnia and Herzegovina today understand by the term national competitiveness and what they see as its determinants.

2. REVIEW OF RELEVANT LITERATURE

To the best of our knowledge, there is no comparable study that directly examines the attitudes of the academic community toward the meaning of national competitiveness anywhere in the world. Nevertheless, virtually every scholarly paper dealing with national competitiveness—explicitly or implicitly—reflects its authors' views on what national competitiveness actually represents. We therefore provide a concise historical overview of the concept.

The concept of national competitiveness first appeared and began to be actively debated among economists in the United States and Western Europe in the early 1970s. The earliest work on the topic that we were able to identify dates to 1971, when Uri defined national competitiveness as “the ability to create the preconditions for high wages” [Uri (1971), cited in Aiginger, Bärenthaler-Sieber, and Vogel (2013: 69)]. The timing was not accidental. By the late 1960s it had become clear that the dynamics of economic growth in the USSR and Western Europe had shifted. As Popov (2006: 2–3) notes, the Soviet economy, in terms of growth rates, peaked in the 1950s at around 6%—similar to Japan's growth from the early 1950s to the late 1970s, and to South Korea and Taiwan in the 1960s–1980s. By the 1960s, however, the USSR's growth rate had fallen to about 3% per year, slipped to 2% in the 1970s, and declined further to just 1% in the 1980s.

Although the 1970s were turbulent for advanced economies as well—most notably due to oil shocks that brought episodes of stagflation—these years also highlighted the greater resilience and adaptability of market economies to significant external shocks compared with centrally planned systems.

Riding the wave of new interest in national competitiveness, the World Economic Forum (WEF) was founded in 1979 as a non-governmental organization whose primary task was to compare levels of national competitiveness (World Economic Forum, 2025). At that time, competitiveness was still understood in a “classical” way: countries were considered competitive if they

The research was carried out by a group of master's students at the Faculty of Economics in Pale (Branislava Elek, Jovana Urta, and Jovana Samardžić) within the coursework for the subject Competitiveness Policy, under the supervision of Professor Marko Đogo.

Before launching the survey, the students, under Professor Đogo's guidance, conducted a review of the existing literature in the field. Based on that review of relevant work, we formulated the following null and alternative hypotheses:

- H0: The ultimate indicator of the level of national competitiveness is the productivity with which countries use their available resources.
- H1: Productivity is not the most important indicator of the level of national competitiveness.

could provide their populations with a high and rising standard of living—under conditions of free international trade—in contrast to the prevailing autarkic practices of the USSR and other Warsaw Pact states.

Even in the early 1980s, research on competitiveness already pointed toward increasing globalization as the trajectory of the world economy—globalization that, then as now, provided a rationale for such research.

During the 1980s, attention gradually shifted from macro-level comparisons of competitiveness to identifying its roots (determinants). In his 1984 presidential address, Ronald Reagan equated macro-competitiveness with an economy capable of simultaneously achieving high productivity, external balance in trade, and job creation (President's Commission, 1984, in Onuchuku & Amaefule, 2020: 2). A very similar definition was provided by B. Scott and G. Lodge (1985), who equated national competitiveness with “a nation state's ability to produce, distribute, and service goods in the international economy..., and to do so in a way that earns a rising standard of living” [Scott & Lodge (1985) in Aiginger, Bärenthaler-Sieber, and Vogel (2013: 69)].

Aiginger (1987) offered a more detailed formulation: “Competitiveness of a nation is the ability to (i) sell enough products and services (to fulfil an external constraint); (ii) at factor incomes in line with the (current and changing) aspiration level of the country; and (iii) at macro-conditions of the economic, environmental, social system seen as satisfactory by the people.” [Aiginger (1987) in Aiginger, Bärenthaler-Sieber, and Vogel (2013: 69)]. What stands out in Aiginger's definition is one of the earliest explicit mentions of environmental sustainability as a parameter for assessing national competitiveness.

The prescience of this inclusion becomes clear from the fact that Jan Fagerberg—despite being a leading scholar—did not, even in 1988, emphasize sustainability. He defined competitiveness as “the ability of a

country to realize central economic policy goals, especially growth in income and employment, without running into balance-of-payments difficulties" [Fagerberg (1988) in Aiginger, Bärenthaler-Sieber, and Vogel (2013: 69)].

The late 1980s saw the (r)evolution introduced by Michael Porter's *The Competitive Advantage of Nations*. For Porter, "the only meaningful concept of competitiveness at the national level is national productivity" (Porter, 1998: 6). While presidential economic advisers had already recognized the explanatory power of productivity, Porter's contribution was to redirect research toward the underlying causes of cross-country productivity differences. Hence the emergence of the famous "pillars" of competitiveness and the WEF's radical redesign of how national competitiveness is measured.

The early 1990s witnessed an explosion of research on national competitiveness, engaging even the most important multilateral institutions, such as the World Bank. For that institution, João Paulo dos Reis Velloso (1991: 31) defined competitiveness as "the capacity to sustain and increase the country's participation in international markets, by being able to meet the standards of efficiency of the rest of the world as to the utilization of factors of production and the quality of the product." The profession's fascination with the topic prompted Paul Krugman (1994) to describe macro-competitiveness as a "dangerous obsession." Two years later he maintained that national competitiveness was "a matter of time-honored fallacies about international trade being dressed up in a new and pretentious rhetoric" (Krugman, 1996: 18).

It is noteworthy that even by the mid-1990s, the European Union—now a global leader in the energy transition—did not fully incorporate environmental protection into competitiveness metrics. Its then definition read: "the ability to increase or maintain the living standard relative to comparable economies (e.g., developed industrialized countries), without long-run deterioration of external balance" (European Commission, 1995 in Aiginger, Bärenthaler-Sieber, and Vogel, 2013: 69). Von Tunzelmann (1995) linked national competitiveness with political, technical, and commercial leadership [in Aiginger, Bärenthaler-Sieber, and Vogel, 2013: 69]. A few years later, Oughton and Whittam (1997) defined it as long-run growth in productivity and rising living standards, consistent with increasing employment or the maintenance of near-full employment [in Aiginger et al., 2013: 69].

By the late 1990s, domestic authors also joined the global debate. Leko and Šimić (1999) distinguished between a narrower view—proxied by the trade balance—and a broader view that equates competitiveness with the ability to deliver high living standards, which depends on productivity in resource use.

In the early 2000s the European Commission finally recognized the importance of sustainability, defining

competitiveness as "the ability of an economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis" (ECR, 2001: 19). Mid-2000s contributions challenged a purely Porterian perspective. Vedriš (2005) argued that it still makes sense to speak of international competitiveness in terms of the ability to generate a trade surplus. Aiginger (2006) likewise contended that national competitiveness cannot be measured solely by GDP per capita; other indicators such as unemployment, wage levels, and process-quality metrics (institutions, technologies, etc.) must be considered. Bienkowski (2008) defined competitiveness as a country's ability to achieve faster economic growth than others and to increase prosperity by adapting its economic structure effectively to the evolution of international trade (cited in Šegota, Tomljanović, and Huđek, 2017: 123). Lovrinčević, Mikulić, and Rajh (2008: 604) highlighted that competitiveness by its very nature increasingly requires a global perspective, given that firms compete with rivals from anywhere in the world.

In the Western Balkans literature, Mladen Kovačević (2010: 9–11)—arguably the most influential author on macro-competitiveness in the region—did not offer his own definition, but criticized the Global Competitiveness Report for insufficiently covering important indicators, including the investment rate, trade deficit, and external debt.

Janger et al. (2011) defined macro-competitiveness as "the ability to raise standards of living and employment, while maintaining a sustainable environment and sustainable external balances" [in Aiginger et al., 2013: 69]. Delgado et al. (2012) provided a more philosophical formulation: "Competitiveness is what underpins wealth creation and economic performance." In a similar vein, Aiginger, Bärenthaler-Sieber, and Vogel (2013: 13) described competitiveness as the "ability of a country (region, location) to deliver the beyond-GDP goals for its citizens today and tomorrow." Domestic authors remained more concrete: Adžić and Stojić (2013) defined national competitiveness as the ability of a state or region to achieve long-term sustainable economic growth, thereby opening perspectives for higher welfare.

In 2015 another institution—the OECD—defined national competitiveness as "an ability of the country to, in free and equal market conditions, produce goods and services that pass the test of international markets, ensuring retention and long-term increase in the real income of the population" (OECD, 2015, in Šegota, Tomljanović, and Huđek, 2017). Đogo and Stanišić (2016) constructed the Six Basic Indicators of Competitiveness (6BiC) index and defined macroeconomic competitiveness as a country's capability, in free and fair market conditions, to keep its trade account balanced alongside dynamic economic growth that, by creating jobs and raising real earnings, improves living standards—ac-

accompanied by satisfactory investment rates, without increasing external public debt and without breaching environmental constraints. Šegota, Tomljanović, and Huđek (2017: 126) added that long-term competitiveness implies rising economic efficiency and quality in production and services, which is key to sustained increases in living standards; in the short run, prices, costs, wages, and exchange rates significantly affect productivity.

In one of its last editions of the GCR, the WEF defined macro-competitiveness as “the set of institutions, policies, and factors that determine the level of productivity of a country” (WEF, 2018: 43). Among more recent contributions, Stanković, Džunić, and Janković Milić (2019: 415) emphasized the multidimensionality of competitiveness, encompassing institutions, infrastructure, the macroeconomic environment, markets, human

capital, and technological development. Onuchuku and Amaefule (2020), like many others, stressed outcomes rather than pillars: competitiveness comprises the conditions necessary to achieve smart, inclusive, and environmentally sustainable growth in emerging and least-developed economies. Finally, the definition of regional competitiveness by Fang et al. (2022: 1287)—“the ability of various economies to compete for resources or markets in a region”—effectively treats national competitiveness within a regional context of competing for foreign investment. We concur with Davidson, Kauffmann, and de Liedekerke (2021: 3) that competitiveness is a multi-dimensional and somewhat nebulous concept for which no single definition exists; it is inevitably context-specific.

3. RESEARCH METHODOLOGY

We examined the views of the academic community on national competitiveness using a survey. A questionnaire was designed by a group of master’s students²³ at the Faculty of Economics in Pale under the mentorship of Professor Marko Đogo. The survey was conducted in May 2025, and the data processing took place in mid-June as part of the course requirements for Competitiveness Policy.

The questionnaire comprised six questions:

- 1) A block of demographic items (gender, age, and education level).
- 2) A list of indicators for measuring national competitiveness, in order to clarify respondents’ prevailing understanding of the concept.
- 3) A ranking task for factors that influence the level of national competitiveness.
- 4) A ranking of ten large economies (six G7 countries and four BRICS) by national competitiveness.
- 5) A ranking of ten Southeast European countries by national competitiveness.

4. RESULTS AND ANALYSIS

Regarding which indicators best capture national competitiveness, most respondents were familiar with—or at least intuitively agreed with—Porter’s view that productivity is the key. Labor productivity received the highest importance rating, followed at some distance by GDP growth, the trade balance, and the employment rate. Nearly half of respondents (9 out of 20) ranked labor productivity as the most important single indicator. Interestingly, the differences in average scores between the most and least important indicators were relatively

- 6) A final ranking of policy measures to improve Bosnia and Herzegovina’s competitiveness.

During the survey of respondents’ attitudes, they were asked to rank the offered options (answers) by importance, where 1 meant that the option was the most important (top-ranked) and 10 that it was the least important (bottom-ranked). Thus, the lower the average score, the more strongly that answer was supported by the majority of respondents.

The questionnaire was prepared in both paper and electronic form and distributed to 40 teaching and research staff at the Faculties of Economics in Pale and Banja Luka, and to a smaller number of colleagues at other faculties in the region. We received 20 fully completed questionnaires, a response rate of 50%. Most respondents were men (70%). As to age, 45% were between 25 and 35 years old, 25% between 36 and 45, another 25% between 46 and 55, and just one respondent (5%) was older than 56. Regarding education, 40% held a doctorate, six (30%) held a master’s degree, and six (30%) held a bachelor’s degree.

small (a top-ranked average of 3.45 versus a bottom-ranked average of 5.45), which suggests that the indicators of national competitiveness were well selected. This is further confirmed by the fact that the lowest-ranked indicators—environmental protection and the level of foreign exchange reserves—received the lowest score of 10 (least important) only three times each, indicating that even these indicators were not perceived as insignificant.

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Table 1: Indicators of National Competitiveness

Rank	Indicators ^{9F24}	Average Scores
1.	Labor productivity	3.45
2.	GDP growth rate	4.00
3.	Trade balance	4.10
4.	Employment rate	4.10
5.	Savings rate	4.35
6.	FDI inflows	4.40
7.	Public debt level	4.60
8.	Environmental protection	5.45
9.	Foreign exchange reserves	5.45

Source: Survey

As for the factors perceived as most important in positively influencing national competitiveness, high-quality and broadly accessible education came first (average score 2.90; nine of the twenty respondents ranked it first). It was closely followed by innovation and the free movement of capital. In contrast to education, most respondents viewed comprehensive healthcare coverage as the least important factor. An open question remains for reflection: whether these two seemingly contradictory responses (that respondents consider high-quality and broadly accessible education to be the most important factor, while comprehensive healthcare coverage is seen as the least important factor) clearly demon-

strate respondents' subjectivity. Namely, almost all respondents work in higher education (which could explain why they consider this factor the most important for economic development), while at the same time they live in a country where nearly the entire population has had access to free healthcare for almost eighty years (which may lead to overlooking the importance of this factor).

Perhaps more surprising is that macroeconomic stability and meritocratic institutions ranked only ninth and eighth, respectively—contrary to the view of today's institutionalists, who regard these as *conditio sine qua non* of competitiveness.

Table 2: Factors Influencing National Competitiveness

Rank	Factors	Average Scores
	High-quality and broadly accessible education	2.90
	Innovations	3.10
	Free movement of capital	3.20
	Developed transport infrastructure	3.35
	Digital literacy	3.45
	Free movement of labor	3.50
	Freedom of trade	3.75
	Meritocratic institutions	3.90
	Macroeconomic stability	3.90
	Comprehensive healthcare coverage	4.90

Source: Survey

The ranking of the world's large economies reveals continuing ambiguity about the concept. China emerges as the most competitive when judged by average rank. China is widely known as the "factory of the world," with a large trade surplus and rapid growth. Yet respondents placed GDP growth and the trade balance only second and third among indicators—behind labor productivity—and average wages in the United States remain several times higher than in China (even on a PPP basis), implying higher labor productivity in the U.S.

Despite China's slightly better average score, the United States was selected as the single most competitive economy by the largest number of respondents (ten of twenty), underscoring the divide between those who prioritize labor productivity and high GDP per capita and those who emphasize the trade balance and growth. BRICS economies (other than China) fared relatively poorly. Italy was the only G7 economy near the bottom, perceived as less competitive than India and Russia. This, too, is an issue that would require deeper research into respondents' attitudes to fully understand.

²⁴ During the preparation of the survey questionnaire, a technical error occurred. In consultations between the students and Prof. Đogo, it was agreed that ten indicators would be offered to respondents. However, while drafting the questionnaire, the indicator "GDP per capita" was "forgotten", probably due to its similarity to the indicator "GDP growth rate."

Table 3: Ranking of Large Economies by National Competitiveness

Rank	Country	Average Scores
1.	China	2.75
2.	United States	2.90
3.	Germany	3.55
4.	Japan	3.60
5.	United Kingdom	3.90
6.	France	4.50
7.	India	4.90
8.	Russia	5.15
9.	Italia	5.55
10.	Brazil	5.60

Source: Survey

Within the regional context, it was unsurprising that Slovenia ranked as the most competitive economy, with a considerable margin over Croatia and Hungary. Bosnia and Herzegovina tied with Montenegro for ninth (penultimate) place; only North Macedonia ranked lower. Interestingly, respondents rated Serbia (not an EU member) as more competitive than Romania and Bulgaria (both EU members). Moreover, the (relatively

high) positioning of Serbia raises the question of whether respondents are sufficiently informed about the economic progress that Romania and Bulgaria have made in recent decades, or whether perceptions are still influenced by the legacy belief that Yugoslavia was more advanced than its “underdeveloped” eastern neighbors.

Table 4: Ranking of Southeast European Economies by Competitiveness

Rank	Country	Average Scores
1.	Slovenia	3.05
2.	Croatia	3.80
3.	Hungary	4.15
4.	Serbia	4.65
5.	Romania	4.75
6.	Greece	5.15
7.	Bulgaria	5.75
8.	Bosna and Herzegovina	6.70
9.	Montenegro	6.70
10.	Macedonia	7.10

Source: Survey

Anticipating Bosnia and Herzegovina’s relatively weak position in the regional comparison, we asked respondents to rank policy measures to improve competitiveness. Their answers are broadly consistent with the fac-

tor rankings above. Respondents prioritized greater investment in research and development, increased spending on education, and accelerated digitalization. Political stability ranked only sixth, and accelerating EU accession ranked ninth.

Table 5: Policy Measures to Enhance the Competitiveness of Bosnia and Herzegovina

Rank	Recommended measures to increase level of competitiveness of B&H economy	Average Scores
1.	Increase funding for research and development	2.70
2.	Increase funding for education	2.90
3.	Digitalization	2.90
4.	Reduce the tax burden on business	3.10
5.	Reduce the size of the public sector	3.30
6.	Increase political stability	3.60
7.	Promote exports	3.60
8.	Increase subsidies to the economy	4.55
9.	Accelerate EU accession	4.60
10.	Deregulation	5.15

Source: Survey

5. CONCLUSION

This research indicates that uncertainty remains within the academic community about the proper interpretation of national competitiveness and the appropriate framework for assessing it. Although most respondents selected labor productivity as the principal indicator, GDP growth and the trade balance followed closely. The first approach (productivity) tends to favor advanced economies as the most competitive, whereas the second (trade balance and growth) suggests that some fast-growing emerging economies with trade surpluses could be more competitive.

The same duality appears in the ranking of major economies: China (a rapidly growing economy with a sizable trade surplus) ranked first by average score, closely followed by the United States (a high-productivity economy with a higher standard of living). Germany and Japan—advanced economies with robust export sectors—ranked third and fourth, respectively, suggesting that the “winning combination” may be a developed economy with an external surplus.

Accordingly, we reject the null hypothesis (that productivity is the ultimate indicator of national competitiveness) but do not fully accept the alternative (that productivity is not the most important indicator). Our conclusion is that productivity remains the primary indicator, but it is not sufficient on its own; other important indicators must also be considered alongside productivity in resource use.

Given the factor rankings, it is not surprising that high-quality, widely accessible education and innovation topped the list of determinants of competitiveness. A caveat is warranted: most, if not all, respondents work in higher education, which may introduce some degree of bias. More surprising is the low ranking of macroeconomic stability and comprehensive healthcare coverage. This may reflect Bosnia and Herzegovina’s experience over the last thirty years: with the help of multilateral institutions that “designed” its macroeconomic framework after the 1992–1995 war, the country achieved macroeconomic stability but has not experienced rapid economic growth nor sufficiently fast improvements in living standards.

The country’s relatively weak regional ranking (alongside Montenegro and North Macedonia) underscores the

point. Respondents did not appear to link certain policies that could enhance competitiveness with the current status quo. Notably, three EU member states—Slovenia, Croatia, and Hungary—ranked at the top, yet accelerating EU accession ranked only ninth among proposed measures. Similarly, respondents rated Serbia (a non-member) as more competitive than Romania and Bulgaria (EU members), suggesting some skepticism about the automatic competitiveness benefits of EU membership.

The core recommendations offered by respondents for the authorities in Bosnia and Herzegovina are to increase expenditures on research and development and on education.

The main limitation of this study is the relatively small number of respondents (twenty). In proportional terms, however, this is not insignificant. The two large public faculties of economics in Republika Srpska (Banja Luka and Pale), where the vast majority of respondents are employed, together have approximately 80–90 teaching and research staff. Our sample thus covered more than 20% of the population, which is substantial. Nevertheless, to fully overcome this limitation, it would be desirable to replicate the survey with a larger sample and to conduct a regional survey using the same methodology to enable cross-country comparisons within the region. A second limitation stems from a technical omission: we did not include GDP per capita among the indicators of national competitiveness. Including this measure would likely have sharpened the dichotomy between the two approaches—those emphasizing current levels of development (productivity and per-capita income) versus those emphasizing dynamics (GDP growth and the trade balance). Future research should address this omission.

Finally, this small study of ours, although insufficient in both scope and depth, has made an important contribution—it has pointed to a number of questions that deserve more serious research and that have remained unexplored to this day. It has also highlighted the presence of subjectivity (and even a certain degree of bias) among respondents.

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A COMPARATIVE ANALYSIS OF E-COMMERCE DEVELOPMENT IN BOSNIA AND HERZEGOVINA AND REGIONAL COUNTRIES

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Abstract

The growth of e-commerce in the Western Balkans reveals significant regional disparities, underscoring the need to examine the factors influencing the digital economy.

This paper presents a comparative analysis of e-commerce development in Bosnia and Herzegovina, situating it in relation to other countries in the region, including Serbia, Croatia, and Montenegro. The aim of the study is to identify key drivers and barriers to growth, as well as to assess Bosnia and Herzegovina's competitive position through an analysis of digital infrastructure, mobile commerce penetration, the number of active online stores, and innovation capacity.

The methodological approach is based on the analysis of secondary data obtained from relevant sources and academic literature. The findings indicate a stable but slow growth of e-commerce in Bosnia and Herzegovina compared to Serbia and Croatia, primarily due to challenges such as a lower level of digital literacy and limited trust in electronic payments. On the other hand, significant potential lies in the high share of mobile commerce and the increasing number of e-shops.

The study concludes that a more dynamic development of e-commerce in Bosnia and Herzegovina requires a comprehensive strategic approach that includes improvements to the logistical and regulatory framework.

Keywords: e-commerce, Bosnia and Herzegovina, Western Balkans, digital transformation, mobile commerce, innovation.

1. INTRODUCTION

The rapid technological development and increasing availability of the Internet have transformed modern commerce, enabling the electronic exchange of goods and services without geographical limitations. Although traditional trade has existed for many years, it cannot adequately respond to the dynamic changes occurring in contemporary society. To remain competitive, an increasing number of companies are using the Internet to provide online services and expand their market share. According to Sadiku et al. (2016), the term electronic commerce (or e-commerce) refers to the process of conducting business transactions over the Internet. As a key element of the digital economy, e-commerce has become one of the main drivers of economic growth and market modernization. Its impact is not limited to developed countries; on the contrary, the Western Balkans region is also undergoing significant digital transformation, where e-commerce creates new opportunities for both businesses and consumers.

However, the dynamics of this development are not uniform across the region. The growth of e-commerce exhibits notable regional disparities, influenced by specific economic, technological, and social factors. A key prerequisite for e-commerce development is Internet penetration and the availability of broadband access to the population.

According to the World Bank (2023), in 2023 Serbia had an Internet penetration rate of 85.4%, providing a strong foundation for further development of the digital economy. Montenegro leads among the analyzed countries, with 89.8% of the population using the Internet. Bosnia and Herzegovina recorded 83.4%, while Croatia reported 83.2% of Internet users.

These indicators point to a wide degree of digital connectivity in the Western Balkans, providing a stable basis for the expansion of e-commerce and digital services. Nevertheless, infrastructural challenges remain, particularly regarding the availability of ultra-high-speed broadband networks in rural areas (World Bank, 2023).

For these reasons, this paper provides a detailed comparative analysis of the evolution of e-commerce in Bosnia and Herzegovina, positioning it in relation to the reference countries of the region Serbia, Croatia, and Montenegro. The main objective of the research is to systematically analyze key indicators in order to identify and explain the fundamental drivers and barriers shaping the e-commerce market in Bosnia and Herzegovina.

Therefore, this study goes beyond a standard descriptive analysis and puts forward the central thesis that the lag in e-commerce development in Bosnia and Herzegovina is not primarily a consequence of technological or infrastructural gaps, but rather a direct result of the strategic and regulatory framework. It argues that the lack of harmonized legislation (particularly in the field of data protection aligned with the GDPR) and the absence of a comprehensive national digital strategy create a synergistic negative effect that systematically undermines consumer trust and discourages investment in logistics. The scientific contribution of this paper lies in demonstrating that the institutional framework is the key variable explaining why the high Internet penetration rate in Bosnia and Herzegovina has not translated into a developed e-commerce market unlike neighboring countries

that, despite similar starting positions, have made more significant progress thanks to targeted state policies. In this paper, the term “regional countries” refers specifically to Serbia, Croatia, and Montenegro. These countries were selected due to their geographic proximity, comparable economic characteristics, and relevance for benchmarking the development of e-commerce in Bosnia and Herzegovina.

2. LITERATURE REVIEW

This section presents the theoretical framework and an overview of previous research relevant to the analysis of e-commerce development. First, key concepts and basic e-commerce models are defined, followed by an analysis of global and regional trends, with a special focus on the factors influencing e-commerce growth. Finally, the current state of e-commerce in Bosnia and Herzegovina and neighboring countries is discussed. The purpose of this section is to provide a basis for comparative analysis and to identify the main differences between the Bosnian market and more developed markets in the region.

Electronic commerce (e-commerce) refers to the process of buying and selling products and services via the Internet, using digital platforms, electronic payment systems, and delivery networks (Sadiku et al., 2016). According to business models, e-commerce can be classified as B2C (Business-to-Consumer), B2B (Business-to-Business), and C2C (Consumer-to-Consumer). Jaganjac et al. (2020) note that a simple form of B2B commerce was launched in the 1970s by the pharmaceutical company Baxter Healthcare, which used a modem connected to a telephone line that allowed hospitals to order medicines directly from the company. Cheba et al. (2021) emphasize that information technology infrastructure, including access to mobile networks and the Internet, has had a significant impact on e-commerce development, particularly in urban areas.

Jaganjac et al. (2020) also identify challenges such as high delivery costs and an underdeveloped market as obstacles to rapid e-commerce growth. Peštek and Hadžijamaković (2024) mention that inadequate legal regulations and the lack of financial institutions' support for e-commerce infrastructure are also barriers. According to Isaković et al. (2019), although Bosnia and Herzegovina has consumer protection laws against hacking and data abuse, the implementation of electronic signatures remains unresolved.

Peštek et al. (2011) demonstrated that trust was the main issue for online shoppers in Bosnia and Herzegovina a decade ago, due to concerns about payment security and data privacy. Selimović and Peštek (2014) also found that trust in the safety of money and products remains a problem for online buyers in Bosnia and Herzegovina. More recent research by Peštek and Hadžijamaković (2024) confirms that the lack of trust continues to be a challenge for e-consumers in the country, especially in

Accordingly, the central research question of this study is: To what extent does the institutional and regulatory framework explain the lag in e-commerce development in Bosnia and Herzegovina compared to Serbia, Croatia, and Montenegro, despite similar levels of internet penetration?

terms of online payments. Approximately 21.4% of respondents reported using a separate bank account or card exclusively for online payments, 49.6% do not use online payment systems at all, and 69.7% prefer cash-on-delivery transactions. Isaković et al. (2019) also point out that citizens of Bosnia and Herzegovina are reluctant to shop online due to a sense of insecurity and fear of credit card misuse.

Sadiku et al. (2016) identify digital literacy as one of the barriers to e-commerce adoption in developing countries. Isaković et al. (2019) note that 36% of Bosnia and Herzegovina's population is digitally illiterate. Furthermore, the country ranks low (104th place) on the technology absorption index.

Isaković et al. (2019) emphasize that e-commerce development in Bosnia and Herzegovina largely depends on the regulatory framework and institutional support for digital business. The absence of a comprehensive national digital strategy slows the adoption of innovative business models and reduces the competitiveness of domestic e-retailers in the regional market. Unlike Bosnia and Herzegovina, Serbia and Croatia have implemented national digital economy strategies and e-commerce support programs, leading to greater consumer adoption of online shopping.

According to Mahmutović (2024), strengthening brand awareness is a key marketing tactic for e-commerce websites in Bosnia and Herzegovina. Companies should pay particular attention to improving website loading speed and user experience, especially through technical optimization aimed at improving LCP and CLS metrics. The abandonment rate is significantly higher than the global e-commerce average, indicating a need for content and navigation optimization.

A comprehensive review of the literature shows that Bosnia and Herzegovina has significant potential for e-commerce development, but this potential has not been fully realized. The main challenges include limited trust in digital transactions, infrastructure shortcomings, and the absence of a strategic approach to digital market development. By comparing Bosnia and Herzegovina with more successful regional examples, it becomes clear that targeted reforms including strengthening the regulatory framework, modernizing logistics, and promoting electronic payments could substantially enhance the competitiveness of domestic e-commerce and support Bosnia and Herzegovina's integration into the regional and European digital market.

3. METHODOLOGY

This study is based on a detailed comparative analysis of the evolution of e-commerce. The aim is to go beyond standard descriptive analysis and focus on a systemic explanation of the observed trends. The research positions Bosnia and Herzegovina in relation to reference countries in the region specifically Serbia, Croatia, and Montenegro in order to identify key similarities and differences in e-commerce development. The main goal of the study is to systematically analyze key indicators and identify the main drivers and barriers shaping the e-commerce market in Bosnia and Herzegovina. Special attention is devoted to the factors influencing e-commerce development, given the importance of Internet penetration as a key precondition for growth. The central hypothesis of this paper is that the lag in e-commerce development in Bosnia and Herzegovina is not primarily due to technological or infrastructural gaps, but rather to strategic and regulatory shortcomings.

Data were collected from relevant secondary sources, including reports from national statistical agencies such as the Statistical Office of the Republic of Serbia (RZS), the Statistical Office of Montenegro (MONSTAT), the Croatian Bureau of Statistics (DZS), and the Agency for Statistics of Bosnia and Herzegovina (BHAS). Additional data were obtained from academic and professional publications, including reports from the World Bank (2023), the Macedonian eCommerce Association (2024), the Organisation for Economic Co-operation and Development OECD (2024), and the eCommerce Association of Bosnia and Herzegovina (2024). The core comparative analysis focuses on Bosnia and Herzegovina, Serbia, Croatia, and Montenegro, which constitute the primary analytical sample of the study. Data from other Western Balkan economies, such as North Macedonia, are used selectively and exclusively as a comparative regional benchmark. These data serve to illustrate broader regional trends and to complement the analysis in cases where fully comparable and up-to-date indicators are not consistently available for all primary countries. North Macedonia is therefore not treated as a core unit of analysis.

4. ANALYSIS OF RESULTS

This chapter provides a detailed comparative analysis of the development of electronic commerce in Bosnia and Herzegovina and neighboring countries Serbia, Croatia, and Montenegro. The comparison is structured according to the key dimensions of the digital economy, enabling a comprehensive assessment of the competitive position of each observed country.

4.1. Digital Infrastructure and Internet Penetration

Analysis of World Bank data for the period 2014–2023 shows consistent growth in internet penetration in Bosnia and Herzegovina, Serbia, Montenegro, and Croatia. During the observed period, all four countries recorded a gradual increase in the share of the population using

The analysis covers the period from 2014 to 2024, although for some countries particularly Bosnia and Herzegovina the data are available only for 2018–2024 due to limited reporting. The comparison was carried out across several key dimensions shaping the digital economy:

- The state of digital infrastructure and Internet penetration level,
- The degree of e-commerce adoption and consumer trust,
- The number and growth of active online stores,
- Logistic and payment infrastructure, and
- The regulatory framework and security environment.

A combination of descriptive statistics, comparative analysis, and visual data representation was used for data processing and interpretation. Descriptive statistics provided insight into mean values, medians, and annual growth rates, while comparative analysis enabled the identification of differences in e-commerce maturity among countries. The results were presented using graphs and tables, facilitating interpretation and allowing for a clear overview of Bosnia and Herzegovina's position in relation to its regional peers, while highlighting areas with the greatest potential for improvement.

The scientific contribution of this study lies in demonstrating that the institutional framework is the key variable explaining why high Internet penetration in Bosnia and Herzegovina has not translated into a developed e-commerce market. Although the analysis includes a broad spectrum of factors, certain limitations are recognized. The research relies predominantly on secondary data and literature review and does not include primary data collection (e.g., surveys or interviews). In addition, some data vary by period depending on availability.

This structure and approach allow for a comprehensive analysis of the state and trends of e-commerce, with a particular focus on identifying the specific characteristics of Bosnia and Herzegovina within the regional context.

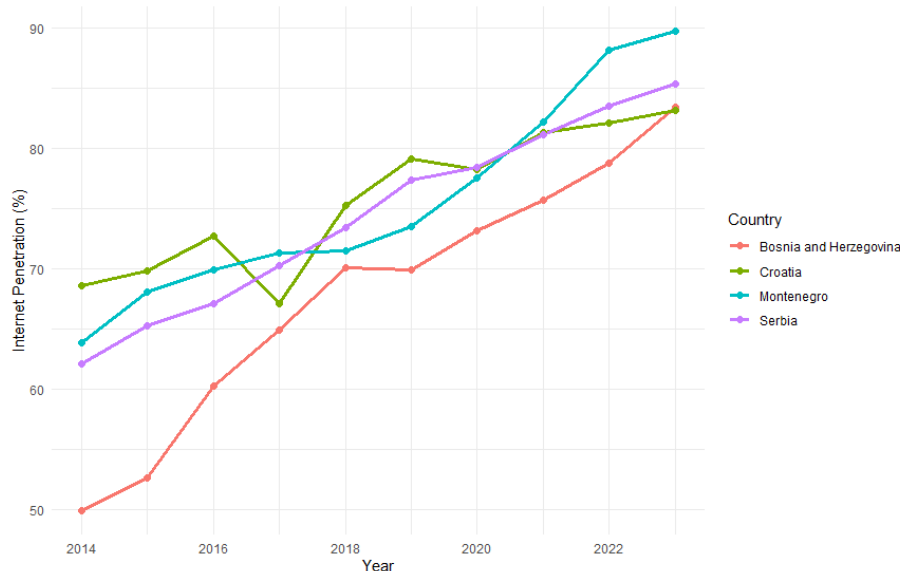
the internet, with Croatia and Serbia almost continuously holding higher positions compared to Bosnia and Herzegovina and Montenegro.

Initial values in 2014 indicate more pronounced digital differences among the countries of the Western Balkans. However, in later years, these differences gradually decreased, due to accelerated growth in internet access in countries with a lower initial penetration rate. A sharp increase is particularly visible in the period 2020–2021, which can be linked to the global COVID-19 pandemic. The pandemic significantly accelerated the digitalization process, increased the need for remote work and online education, and stimulated the wider acceptance of digital services among the population.

Current internet penetration data confirms this broad digital connectivity in the Western Balkan countries, providing a stable foundation for the expansion of e-commerce and digital services. According to World Bank data from 2023, Montenegro leads with 89.8% of the population using the internet, while Serbia records 85.4%, Bosnia and Herzegovina 83.4%, and Croatia 83.2% of internet users. These indicators are crucial because they directly support the central thesis of this paper: the lagging e-commerce in Bosnia and Herzegovina

is not primarily a result of a technological or infrastructural gap, given the high internet penetration rate. Nevertheless, it should be noted that infrastructural challenges are still present, especially regarding the availability of ultra-fast broadband networks in rural areas. Despite the positive trend of internet penetration growth in all countries, differences in the level of development of digital infrastructure and socio-economic conditions still affect the speed of internet adoption and, consequently, the development of e-commerce.

Figure 1: Internet penetration in the Western Balkan countries (2014-2023).



Source: Author, according to the World Bank (2023).

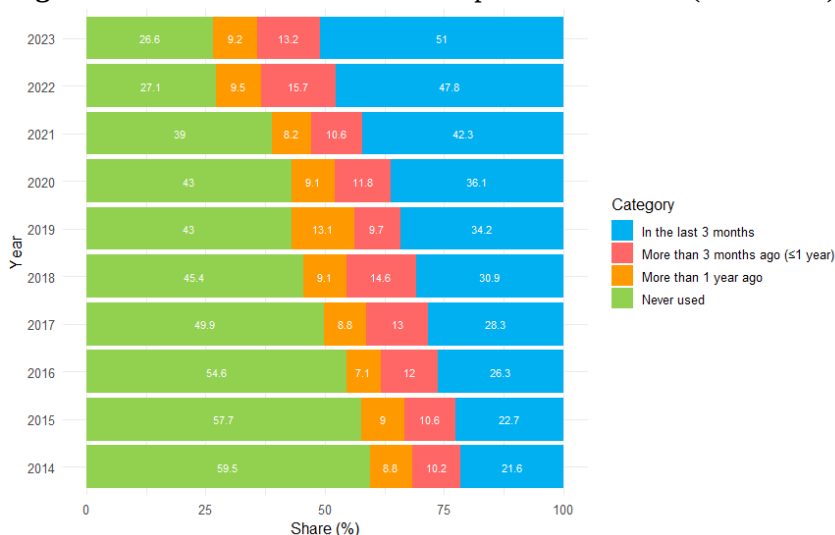
These results confirm that the growth of internet penetration in the region is not only a result of technological innovations but also a combination of regulatory measures, infrastructure investments, and socio-economic factors, with accelerated digitalization during the pandemic representing a crucial turning point in growth dynamics. Nevertheless, for Bosnia and Herzegovina, the emphasis remains that, although there is a solid digital foundation, the key obstacles to the full development of e-commerce lie in an inadequate strategic and regulatory framework, rather than in internet availability itself.

4.2. E-commerce adoption rate and consumer trust

Analysis of data from the Statistical Office of the Republic of Serbia (RZS) shows a continuous growth in the share of Serbia's population that shopped online over the past ten years. The participation of those who made an online purchase in the last three months increased from 21.6% in 2014 to 51.0% in 2023, indicating more

than a twofold increase and a growing frequency of digital transactions. The share of users who purchased online more than three months ago but within the last year varied between 9.7% and 15.7%, without a clear linear trend, which may indicate occasional changes in purchasing habits or seasonal factors. Similarly, the share of those who made their last purchase more than a year ago shows slight oscillations but generally remains below 14%.

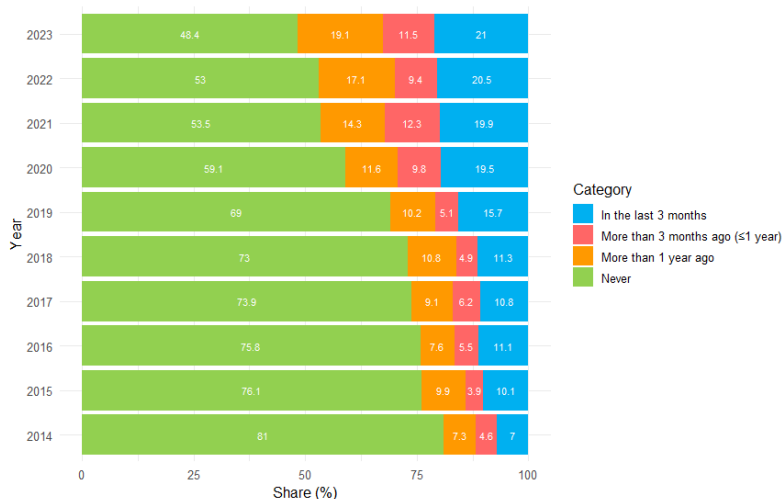
The most significant decrease was recorded in the group that never used the internet for shopping – from 59.5% in 2014 to 26.6% in 2023. This trend indicates a significant reduction in the digital divide and growing consumer trust in online commerce. Overall, the period 2014-2023 is characterized by stable growth in e-commerce, which can be linked to the development of digital infrastructure, the improvement of logistical solutions, and increased security of online payments. (Statistical Office of the Republic of Serbia [RZS], 2018-2023).

Figure 2: Timeframe of the last online purchase – Serbia (2014-2023).

Source: RZS, ICT research.

The analysis of the timeframe of the last online purchase in Montenegro for the period 2014-2023 shows a clear growth trend in the participation of users who made a purchase in the last three months. This indicator increased from only 7.0% in 2014 to 21.0% in 2023, indicating a significant increase in the frequency of online shopping. During the same period, the share of citizens who never shopped online decreased from 81.0% to 48.4%, testifying to the expansion of digital consumer

habits. The category of buyers who made their last online purchase more than three months ago, but up to one year ago, recorded a slight growth from 4.6% in 2014 to 11.5% in 2023. Similarly, the share of those who shopped more than a year ago increased from 7.3% to 19.1%. These results indicate a gradual, but persistent, transformation of consumer behavior in Montenegro, along with a reduction of the digital divide and increased trust in electronic commerce.

Figure 3: Timeframe of the last online purchase – Montenegro (2014-2023).

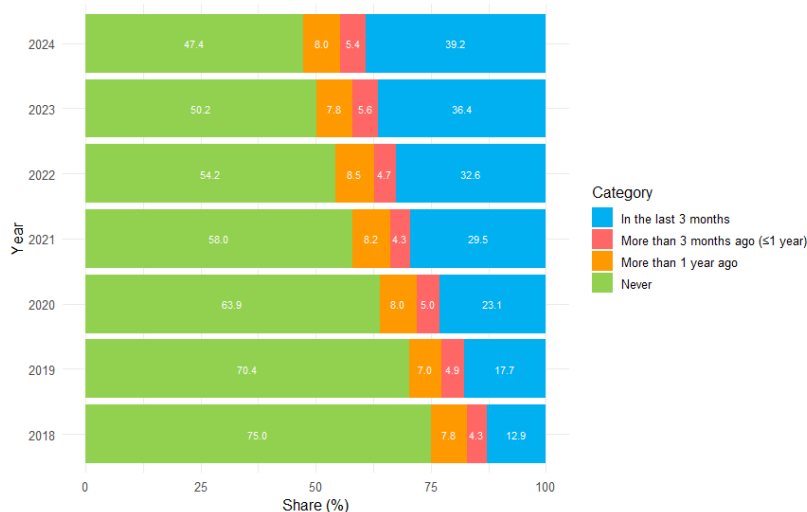
Source: ICT research (Montenegro).

The analysis of the timeframe of the last online purchase in Bosnia and Herzegovina is based on data from the Agency for Statistics of BiH (BHAS) from ICT research for the period 2018-2024. The data shows the share of the population that shopped online in four time categories: in the last 3 months, more than 3 months ago but less than a year ago, more than a year ago, and never. The results show a gradual growth in the share of the population shopping via the internet, especially in the "in the last 3 months" category, while the share of those who never shopped online significantly decreases

throughout the observed period. However, data in this form are not available for the period 2014 - 2017. Although BHAS publishes ICT bulletins for earlier years, they generally contain only the total percentages of the population that shopped online, without distribution according to the timeframe of the last purchase. This lack limits the possibility of a complete longitudinal analysis and prevents detailed tracking of changes in the customer structure before 2018. Therefore, in this research, the time structure of online shopping in Bosnia and Herzegovina can only be tracked starting from 2018, while

for earlier years, only aggregated data on the total prevalence of e-commerce can be used.

Figure 4: Timeframe of the last online purchase - Bosnia and Herzegovina (2018-2024).

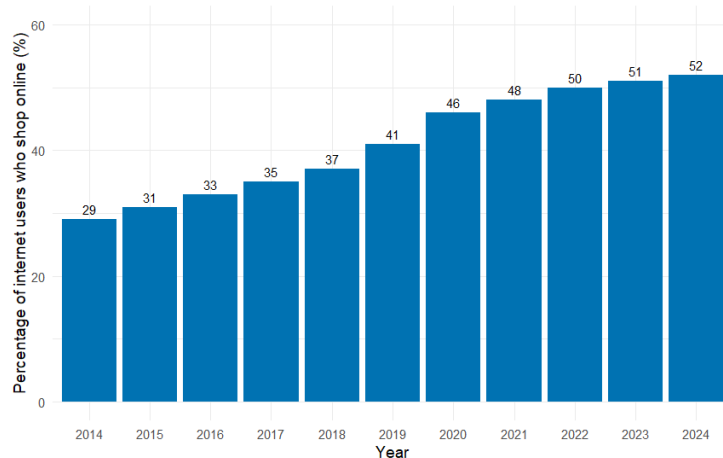


Source: ICT thematic bulletins (BiH).

According to data from the State Statistical Office of the Republic of Croatia (DZS, 2014-2024), the participation of the population that purchased goods or services via the internet shows a growth trend over the last decade. However, in available sources, the data are not separated according to the timeframe of the last purchase (e.g., in the last three months, more than three months ago, etc.), but are presented only as the total percentage of people who made an online purchase in the previous 12 months. This form of presentation hinders direct comparison with data for other countries where more detailed time distributions of purchases are available. The share of citizens who purchased goods and services via the internet increased from 29% in 2014 to 52% in 2024. This trend indicates an increasing degree of digital inclusion of the population, as well as an increase in confidence in online trade mechanisms.

Growth was moderate in the initial years (2014-2018), with an average annual increase of about two percentage points. However, the period 2019–2021 records a more intense increase from 41% (2019) to 48% (2021), which can partly be attributed to the impact of the COVID-19 pandemic, which spurred wider use of digital shopping channels. In the period 2022–2024, the share of users stabilizes at a high level: 50% (2022), 51% (2023), and 52% (2024), suggesting that e-commerce has become a standardized part of consumer behavior. These findings position Croatia as a digitally mature market in the regional context, with stable growth indicators and a pronounced presence of electronic commerce as a key segment of the contemporary economic environment.

Figure 5: E-commerce adoption rate in Croatia (2014–2024).



Source: DZS 2014-2024.

4.3 Analysis and modeling of the growth trend in the number of e-shops (2014–2023)

Based on available statistics for the period 2019-2023 and estimated initial values for 2014, a model was created for the growth of the number of e-shops in Bosnia and Herzegovina, Serbia, Croatia, and Montenegro. Data for 2023 were taken from relevant sources: the National Bank of Serbia (Serbia), AfterShip and StoreLeads (Croatia and Montenegro), and AfterShip (Bosnia and Herzegovina). Initial values for 2014 were estimated by combining available historical data on the share of e-commerce in total retail trade, internet penetration, and digital market growth rates in the region, compared with more developed markets. Estimates were derived by retroactive calculation based on known data for 2019-2023.

Modeling was performed using the Compound Annual Growth Rate (CAGR), to ensure consistent extrapolation of data between the starting and ending years. The formula for CAGR is:

$$CAGR = (EV^{(1/n)})/BV - 1$$

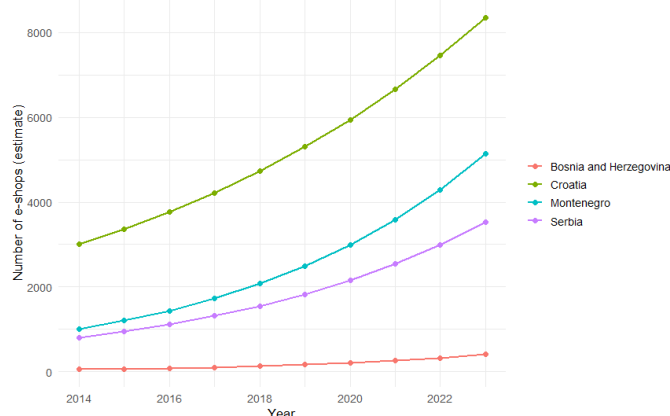
Where:

- EV (Ending Value) – Value at the end of the observed period.
- BV (Beginning Value) – Value at the beginning of the observed period.
- n - Number of years in the observed period.

This approach was chosen because CAGR ensures a smooth exponential growth curve, which better reflects the actual expansion of e-commerce than linear interpolation, and allows for model flexibility if more precise input data becomes available.

The results show that in Bosnia and Herzegovina, the number of e-shops increased from approximately 50 in 2014 to about 407 in 2023, representing an eightfold growth. Serbia progressed from approximately 800 to about 3,524 e-shops, while Croatia recorded the largest absolute growth, from about 3,000 to more than 8,361 online stores. Montenegro achieved the fastest relative growth, from about 1,000 e-shops in 2014 to approximately 5,143 in 2023.

Figure 6: Modeled growth in the number of e-shops (2014-2023).



Source: author's processing according to the National Bank of Serbia, 2024; AfterShip, 2024; StoreLeads, 2024; eCommerce Association BiH, 2024.

The graphical representation of the model clearly shows a divergence in growth dynamics among the observed countries. Croatia and Serbia lead in the absolute number of e-shops, while Montenegro achieves by far the highest density of web shops per inhabitant. Bosnia and Herzegovina records stable growth, but at a slower pace, which may indicate structural obstacles in the development of e-commerce, including logistical limitations, regulatory challenges, and insufficient consumer trust in online shopping.

4.5 Regulatory framework and security

The regulatory frameworks in the Western Balkans region exhibit varying degrees of alignment with European Union (EU) law and institutional maturity. This heterogeneity in the approach and implementation of legislation directly affects the dynamics of electronic commerce development within each country. A comparative analysis of the regulatory frameworks in Bosnia and Herzegovina (BiH), Serbia, and Croatia unequivocally indicates that institutional support is a key variable explaining the differences in the level of e-commerce development. BiH is in a transitional phase

concerning the regulatory framework for e-commerce. Although positive, but isolated, advances are visible, such as the alignment of laws with GDPR and the introduction of e-signatures, the absence of a comprehensive national digital strategy systematically undermines consumer confidence and investments in logistics. Reliance on support through EU projects and other international partners further indicates a deficit in domestic strategic capacities. In contrast, Serbia has established a stable legal framework supported by developed payment systems (NBS IPS), while Croatia, as an EU member, uses robust support mechanisms such as the National Recovery and Resilience Plan (NPOO) to directly encourage digitalization. These proactive state policies have resulted in more mature markets.

The comparative analysis unequivocally indicates that Serbia and Croatia have implemented national digital economy strategies and e-commerce support programs. This has resulted in a greater degree of consumer acceptance of online shopping and an increase in the number of e-shops. These examples emphasize that the institutional framework is a key variable explaining why

high internet penetration in Bosnia and Herzegovina (83.4% in 2023) fails to translate into a developed e-commerce market. Neighboring countries, starting from similar initial positions, have achieved more significant advances thanks to targeted state policies. The lack of a comprehensive national digital development strategy in BiH slows down the adoption of innovative business

models and reduces the competitiveness of domestic e-merchants in the regional market. Strengthening the regulatory framework, modernizing logistics, and promoting electronic payments represent key reform measures for improving the competitiveness of e-commerce in BiH and its integration into the regional and European digital market.

Table 1: Comparative overview of strategic and regulatory frameworks for e-commerce

Indicator	Bosnia and Herzegovina	Serbia	Croatia (EU)	Montenegro
National Digital Economy Strategy	No unified national strategy; digital initiatives mainly project-based (EU, EBRD, GIZ).	Targeted programs implemented (e.g., Programme for the Development of E-commerce 2019–2020; E-Government Development Strategy 2023–2027).	Digital Croatia Strategy 2032 (aligned with the EU Digital Decade).	Horizontal public administration digital transformation strategies; ongoing harmonization with EU framework.
Alignment with Data Protection Regulations (GDPR Model)	New Personal Data Protection Law adopted in 2025; full implementation expected in October 2025.	Personal Data Protection Law (2019) – “GDPR-like” provisions.	GDPR directly applicable; DSA and PSD2 also in force.	Partial alignment; national harmonization with EU GDPR framework planned.
Implementation of e-Signature and e-ID	IDDEEA PKI and e-ID-DEEA platform introduced; adoption in progress.	Fully operational e-ID/e-Signature and trust services; widely used in practice.	eIDAS regime; QTSPs (e.g., FINA, AKD); qualified e-signature legally equivalent to handwritten.	Law on Electronic Identification and Electronic Signature in force; national PKI established.
Government Support Programs for E-commerce and SME Digitalization	Limited national initiatives; reliant on EU/EBRD/GIZ instruments (EU4DigitalSME, Go Digital).	Multiple public programs and policies (E-commerce 2019–2020; E-Government).	Strong NPOO (National Recovery and Resilience Plan) voucher schemes and continuous SME digitalization calls (HAMAG-BICRO).	Partial: horizontal competitiveness and innovation programs; limited e-commerce-specific incentives.

Source: Author’s compilation based on: Government of Serbia (2020, 2023); Government of Croatia (2022); Republic of Montenegro, Ministry of Public Administration (2022); Agency for Identification Documents, Registers and Data Exchange of BiH (ID-DEEA, 2025); European Commission (2020, 2021, 2022); OECD (2024); World Bank (2023)

5. DISCUSSION

Comparative analysis of regulatory frameworks unequivocally confirms the central thesis of this paper: the lag in e-commerce in Bosnia and Herzegovina is not primarily a consequence of a technological or infrastructural gap, but a direct result of the strategic and regulatory framework. Although Bosnia and Herzegovina records a high internet penetration rate of 83.4% in 2023, which is comparable to Serbia (85.4%) and Croatia (83.2%) and represents a stable basis for the development of digital services, this potential does not translate into a developed e-commerce market due to the weakness of the institutional framework.

Unlike Serbia and Croatia, which have implemented national digital economy strategies and robust e-commerce support programs, Bosnia and Herzegovina still lacks a unified overarching strategy, relying instead on project-based initiatives, often with the support of the EU and other international partners. While Serbia records significant growth in online purchases in the last three months (from 21.6% to 51.0% from 2014 to 2023) and a drop in those who have never shopped online

(from 59.5% to 26.6%), and Montenegro shows a similar growth trend (from 7.0% to 21.0%), BiH has recorded gradual growth since 2018.

This lack of a comprehensive national digital development strategy systematically undermines consumer trust and discourages investments in logistics. For example, while Serbia (2019) and Croatia (direct application of GDPR) previously aligned their data protection regulations with the GDPR model, the new Law on Personal Data Protection in BiH only comes into force in 2025, with full implementation beginning in October 2025.

Additionally, the implementation of e-signature in BiH has not yet been resolved, although adoption is underway, while Serbia and Croatia already have widespread use of e-signature and e-ID. These regulatory deficiencies directly contribute to a feeling of insecurity among BiH citizens, which manifests in payment habits, where 69.7% of respondents prefer cash-on-delivery payments due to fear of credit card misuse and a lack of trust in online payment systems. These findings are consistent with earlier research by Peštek et al. (2011) and

Selimović and Peštek (2014), who also identified trust as the main problem for online buyers in BiH.

Conversely, in Serbia, the increase in card payments, supported by developed payment systems such as NBS IPS, has significantly reduced delays and improved order processing procedures. This clearly shows that the institutional framework is the key variable explaining why high internet penetration in BiH fails to translate into a developed e-commerce market, unlike neighboring countries which, despite similar starting positions, have made more significant strides thanks to targeted state policies. Furthermore, Mahmutović (2024) points to problems with website optimization and a high abandonment rate in BiH, which may also be indirectly related to the lack of strategic support that would encourage businesses towards technical improvements and enhancement of the user experience.

Efficient logistics and payment infrastructure are key prerequisites for e-commerce growth, as they directly affect delivery speed, shipping costs, and transaction security. In Bosnia and Herzegovina, "last mile" services are unevenly developed, with longer delivery times in rural areas, which reduces the competitiveness of e-traders. Significant reliance on cash-on-delivery (COD) for

most transactions slows down processing and increases costs, and the reason for this, as previously stated, is the lack of trust in online payment systems and the regulatory framework.

These issues contrast with Serbia, which has significantly improved the "last mile" segment by developing regional distribution centers and implementing "same-day delivery" in urban zones, alongside an increase in card payments and improved order processing procedures. Croatia, as an EU member, possesses a highly developed "last mile" network with options for pickup in parcel lockers and "click & collect" systems, and membership in SEPA enables faster payment processing.

These examples from Serbia and Croatia show how targeted policies and investments in infrastructure, supported by a stable regulatory framework and harmonized payment systems, can transform the logistics and payment ecosystem of e-commerce. In Bosnia and Herzegovina, however, the lack of clear strategic directions and institutional support contributes to the slower development of these key segments, making the market less competitive and less attractive for investment.

6. CONCLUSION

The rapid development of technology and the widespread availability of the Internet have fundamentally transformed global commerce, opening new opportunities for economic growth. This paper conducted a comparative analysis of the evolution of e-commerce in Bosnia and Herzegovina relative to Serbia, Croatia, and Montenegro, with the aim of identifying the key drivers and barriers shaping this market.

The central thesis of the study has been confirmed: the underdevelopment of e-commerce in Bosnia and Herzegovina is not primarily the result of technological or infrastructural limitations, given that the country has a high Internet penetration rate comparable to its more developed neighbors. The main reason for slower progress lies in an inadequate strategic and regulatory framework. The analysis revealed that the lack of harmonized legislation—particularly in areas such as data protection aligned with the GDPR model and the absence of a comprehensive national digital strategy systematically undermine consumer trust and discourage investment.

In contrast, the examples of Serbia and Croatia demonstrate that targeted government policies and the implementation of national digital economy strategies have resulted in more mature markets, greater acceptance of online shopping, and faster growth in the number of e-

stores. Although Bosnia and Herzegovina shows steady growth in the field of e-commerce, the pace remains significantly slower, indicating structural barriers that high Internet penetration alone cannot overcome.

The contribution of this study lies in demonstrating that the institutional framework is the key variable explaining why Bosnia and Herzegovina has not yet fully utilized its digital potential.

The recommendations for future actions are clear. It is necessary to adopt a comprehensive national strategy for digital development, strengthen the regulatory framework in line with EU standards, modernize logistics and payment infrastructures, and actively promote electronic payments to build consumer trust. Such reforms are crucial to enhancing the competitiveness of domestic e-commerce and facilitating Bosnia and Herzegovina's successful integration into regional and European digital markets. For future research, it is recommended to conduct primary studies, such as surveys and interviews with consumers and e-store owners, to gain deeper insight into specific challenges and opportunities within the market. This would complement the findings of this study, which primarily relied on secondary data sources.

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WHAT MOVES HEALTH INSURANCE IN BOSNIA AND HERZEGOVINA? AN ARDL HEALTH INSURANCE PREMIUMS STUDY

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Abstract

This study examines how macroeconomic conditions and demographic change shape the high-frequency dynamics of Bosnia and Herzegovina's health insurance market. The focus is on quarterly premium flows for health lines. The empirical design combines quarterly health insurance premium flows, along with macroeconomic and demographic factors, which, according to the literature, shape insurance and its premium flows. Annual variables are disaggregated to quarterly frequency using the Chow-Lin disaggregation method; Denton-Cholette is used as a robustness alternative, where no adequate driver is found. After stationarity diagnostics, and dimensionality reduction through principal component analysis, the Autoregressive Distributed Lag (ARDL) bounds-testing approach to cointegration with an associated error-correction form is employed, to quantify the long- and short-run links between premiums/claims and macro-demographic drivers. Data on quarterly premiums are compiled from national insurance market reports, while other variables are taken from aggregated data banks, comprising datasets created by the International Monetary Fund, World Bank, and World Health Organization. The observed data range is from 2011 to 2023. The study is implemented at the national level with a goal of providing a compact, data-driven assessment of how growth, inflation, and population factors move together with health insurance flows in Bosnia and Herzegovina.

Keywords: Bosnia and Herzegovina; health insurance; ARDL bounds cointegration testing; PCA; macroeconomic and fiscal factors; demographic factors

JEL: C32, C38, I13, H51, O52

1. INTRODUCTION

Over the last two decades, global health financing systems have undergone significant transformation, marked by rising health expenditures, demographic transitions, and the diversification of financing sources. According to the OECD, health spending has increased both in absolute terms and as a share of GDP, driven mostly by population ageing, technological change, and demand for higher quality care (OECD, 2023). In more developed and high-income countries, private health insurance often complements mandatory public schemes by covering extra services or reducing out-of-pocket expenditure (OOP) stress and costs. In contrast, in low- and middle-income economies, private health insurance plays a very limited role, but surprisingly enough, a growing one. However, as per World Health Organization (2022), such insurance unfortunately still dominates across high-income societal groups. These global patterns underline the importance of distinguishing between mandatory contribution-based systems and voluntary premium-based systems when analysing these dynamics.

Health insurance plays a dual role in transition economies. Mandatory schemes dominate across coverage, private health insurance, and health insurance outside of the mandatory framework in general, still represents a smaller but dynamic market segment. In Bosnia and Herzegovina (BiH), mandatory health insurance is pub-

licly organised and covers the majority of the population, but its premium and claims data are neither transparent nor available directly, and at high frequency. On the other hand, health insurance outside of these flows, though modest in size, provides premium data through insurance companies regulated by the entity agencies²⁵, and overseen by the Agency of Supervision of Insurance (AZOBIH).

This paper therefore focuses on health insurance premiums outside of the mandatory framework (HIPREM), and thus uses them as a proxy for high-frequency dynamics in the health insurance market. The empirical analysis narrows down to health insurance premiums outside of the mandatory framework (i.e. private health insurance). These will be referred to in the paper mostly as health insurance premiums Bosnia and Herzegovina presents a specific case of a largely decentralised health financing system, which is the result of the country's political and economic decentralised shape. The mandatory scheme is thus decentralised across the Republic of Srpska, the Federation of Bosnia and Herzegovina (further decentralised through cantons), and Brčko Distrikt. This being said, another reasoning is that the institutional framework of mandatory health insurance in Bosnia and Herzegovina does not operate on the basis of risk-rated insurance premiums but on payroll-based contributions (Law on Contributions, 1998, Law on

²⁵ In Bosnia and Herzegovina, the private insurance market is supervised by the Insurance Agency of the Republic of Srpska and the Insurance Supervision Agency of the Federa-

tion of BiH, with overall coordination by the Agency for Supervision of Insurance of Bosnia and Herzegovina (AZO-BiH). See: <https://www.azobih.gov.ba/>.

Contributions, 2017). These contributions are set administratively, usually as a fixed percentage of gross wages, and do not vary with the market conditions. As such, they cannot be directly observed or modeled as "premiums" in the actuarial and econometric sense.

WHO/IRIS reports confirm that contributions for mandatory health insurance are collected and pooled at the canton/Entity level, further reinforcing that "premiums"

2. LITERATURE REVIEW

A substantive literature has explored so far plenty of key factors influencing health expenditures and has used a variety of econometric methodologies to analyze their relationships. However, much less attention has been devoted to health insurance premiums specifically, especially in the Western Balkans, where empirical evidence remains scarce. This has been used to provide a contextual background for studying health insurance premiums and claims, particularly through an Autoregressive Distributed Lag (ARDL) lens.

Global health expenditures have seen a rapid increase over the last two decades, driven by widespread environmental deterioration, extensive economic activities, and other social factors (Usman et al., 2019). Bosnia and Herzegovina is no exemption, given the structural shocks and breaks these factors have had worldwide. On the other hand, not only rising economic activity has produced effects, but also shocks within, affecting stable and sustainable growth.

With that in mind, it is valid to observe the economic growth in that context. Since economic growth is vastly measured by gross domestic product (GDP), and its derived indicators, it is mandatory to highlight the fact that the GDP consistently shows a positive and statistically significant impact on both government and private health expenditures (Usman et al., 2019). This suggests that as economies grow, there is a corresponding increase in demand for medical services and a greater ability to finance healthcare (Ozyilmaz et al., 2022). Usman et al. (2019) found that a one percent increase in GDP can lead to a considerable rise in both government and private health expenditures. This relationship has been observed across various country groups, including emerging economies (Usman et al., 2019; Ozyilmaz et al., 2022) and OECD countries (Yang et al., 2022).

However, the nature of this causality varies in the literature. Some of these studies found a unidirectional causality from economic growth to health expenditures, like the study by Usman et al. (2019), whereas others found a bidirectional causality, indicating that health expenditures also stimulate economic growth through improved labor productivity and quality of life (Yang et al., 2022; Ozyilmaz et al., 2022).

Demographics and social factors have been proven to have a significant effect on health expenditures. Population aging is a strong determinant of increasing health expenditures for both government and private systems

under this framework are not applicable in the public sector of BiH (World Health Organization, 2022).

By employing an Autoregressive Distributed Lag (ARDL) model with quarterly data from 2011 to 2023, the paper examines whether private health insurance premiums in BiH are cointegrated with macroeconomic, fiscal-demographic, and labor-financial factors, while also accounting for structural breaks such as the COVID-19 pandemic and the conflicts in Ukraine.

in emerging economies (Usman et al., 2019; Chen and Wang, 2023). Both authors found that the elderly often require more costly medical facilities and treatments for chronic illnesses and multiple morbidities. Usman et al. (2019) project the acceleration of the trend, posing a significant challenge for healthcare budgets. Studies in China, for instance, specifically highlight that aging population induces a relatively strong reaction from health expenditure per capita (Loprete and Zhu, 2020). The aging index can significantly influence health spending (Chang et al., 2022; Yang et al., 2022).

What is also found is that private insurance and out-of-pocket payments can be alternative approaches for reducing the impact on public financing (Usman et al., 2019). This distinction is particularly relevant for BiH, where the data capture the private segment only. Because private premiums are priced and adjusted in competitive markets, they tend to be more income- and price-sensitive than contribution-financed public coverage, making them a suitable dependent variable for short- and long-run macro-linkages. Private insurance, though smaller in scope, often reacts more quickly to macroeconomic shocks and thus serves as a useful dependent variable for studying short- and long-run dynamics.

In China, aging induces more elderly people to be covered by health insurance, which consequently decreases private health expenditure (Chen and Wang, 2023). This suggests an important link between demographic trends, insurance coverage, and private spending. Moreover, expenditures related to health insurance in general are found to positively affect economic growth within Chinese provinces (Ozyilmaz et al., 2022).

When it comes to voluntary (private) health insurance, and health insurance outside of the mandatory systems, a significant impact of income on the demand was found, which consequently raises equity concerns regarding access to healthcare, especially in the context where voluntary private health insurance predominantly covers the wealthy (Ćurak et al., 2021). The present study builds on this literature by empirically testing the macroeconomic and demographic determinants of private health insurance in BiH, filling a gap where comparable analyses have been more or less absent.

In European countries, the demand for voluntary private health insurance (VPHI) has significantly increased, with density growing by 122.3% from 2004 to 2017

(Ćurak et al., 2021). Comparable statistics for Bosnia and Herzegovina are lacking, even that of health insurance in general, which further underlines the contribution of this study in addressing this empirical gap. On the other hand, in Nigeria, for example, only 5% of the population has any health insurance, with 70% still relying on out-of-pocket payments (Alawode and Adewole, 2021), mostly due to its non-mandatory nature. When it comes to what drives health insurance in general, within the observed literature, it has been shown that GDP, both in nominal, and real terms, significantly reflects overall economic capacity and is positively associated with health expenditure and insurance uptake (Atılgan et al., 2017; Qehaja et al., 2022; Stepović et al., 2020). Still, the literature largely focuses on health expenditures rather than health insurance premiums, and no study has explicitly modelled these relationships in the BiH context using an ARDL approach. Prices, proxied by consumer price index (CPI) and a narrower term - Health CPI, have been proven to capture inflationary pressures, which directly affect the cost structure of health services and insurance (Stepović et al., 2020). Additionally, Stepović et al. (2020) showed that money, defined by M2 and its ratio to GDP, serves as a proxy for financial sector development and liquidity, influencing both public and private health insurance markets. When it comes to methodological approaches, the study of long-run relationships between economic variables often employs cointegration techniques to account for non-stationary time series data (Nkoro and Uko, 2016). The Autoregressive Distributed Lag (ARDL) cointegration

technique, or bounds testing approach, is particularly favored due to its flexibility and robustness (Chang et al., 2022; Nkoro and Uko, 2016).

The ARDL model, additionally, has seen extensive and continuous usage in health economics for analyzing both short- and long-term relationships among variables with mixed integration orders, i.e. $I(0)$ and $I(1)$, making it ideal for time series data in transitional economies like Bosnia and Herzegovina (Atılgan et al., 2017). To the best of author's knowledge, no previous study has employed the ARDL bounds testing approach to investigate the determinants of private health insurance premiums in Bosnia and Herzegovina. This focus is partly a matter of data availability, but it also reflects the fact that private health insurance premiums are more sensitive to economic dynamics, unlike mandatory schemes that are politically and institutionally rigid. This study therefore contributes to filling this gap by combining PCA-based factor aggregation with ARDL modeling. Some of the key advantages found in ARDL are that, first, it is insensitive to variable integration order. It can be applied irrespective of whether the underlying variables are integrated of order $I(0)$ or $I(1)$. However, it cannot be applied if variables are integrated of order $I(2)$ (Chang et al., 2022; Nkoro and Uko, 2016; Chen and Wang, 2023). Secondly, the ARDL models allow for a simple linear transformation to an Error Correction Model (ECM), which reflects the speed of adjustment to equilibrium (Nkoro and Uko, 2016). Finally, the ARDL error correction representation is relatively more efficient for small or finite sample sizes ($n \leq 30$) (Chang et al., 2022; Nkoro and Uko, 2016).

3. DATA AND METHODOLOGY

3.1. Defining Hypotheses

Drawing on the theoretical arguments and the empirical evidence discussed in the previous section, this study formulates a set of testable hypotheses concerning the determinants of private health insurance premiums in Bosnia and Herzegovina. The purpose of explicitly defining the hypotheses is to provide a transparent empirical framework and to link the literature review with the econometric methodology applied in the subsequent sections. All hypotheses are stated in both null (H_0) and alternative (H_1) form to enable directional testing within the ARDL-ECM framework. For hypotheses that specify an expected sign (e.g., positive long-run effect), I evaluate one-sided p-values in line with the directional alternative.

Prior to elaborating on the five hypotheses, a precondition hypothesis is introduced. This tests whether a stable long-run equilibrium exists between private health insurance premiums and their key determinants. In econometric terms, this involves assessing cointegration among the macroeconomic, fiscal-demographic and labor-financial variables that in synergy, influence the insurance market. The null assumes that no such long-run relationship is present, whereas the alternative posits

that at least one cointegrating vector exists, meaning that despite short-term fluctuations, premiums and their determinants share a common stochastic trend that binds them together in the long-run.

The first hypothesis (H_1) concerns the macroeconomic environment. Previous studies consistently find that economic growth, liquidity, and price dynamics are among the strongest drivers of health-related expenditures and insurance demand. Consequently, it is hypothesised that macroeconomic performance (GDP, money supply, and consumer prices) exerts a positive long-run effect on private health insurance premiums. The null hypothesis assumes that such a relationship does not exist.

The second hypothesis (H_2) addresses fiscal and demographic pressures. Population ageing and increased public health expenditure are expected to create structural demand for complementary private health insurance. While the null hypothesis assumes no influence of these factors, the alternative hypothesis states that fiscal-demographic pressures positively affect private health insurance premiums in the long run.

The third hypothesis (H_3) focuses on labour-market and financial constraints. Since voluntary health insurance

is typically a discretionary financial product, it is sensitive to short-term shocks in income, employment, and access to credit. The null hypothesis postulates no effect, whereas the alternative hypothesis expects a negative short-run impact of labour-financial stress on insurance premiums.

The fourth hypothesis (H4) is methodological in nature and relates to the stability of the estimated system. Within the ARDL–ECM framework, stability is confirmed if deviations from the long-run equilibrium are corrected over time. The null hypothesis assumes the absence of such adjustment ($\pi \geq 0$), while the alternative hypothesis postulates a negative and statistically significant error-correction term ($\pi < 0$), indicating convergence to equilibrium.

Finally, the fifth hypothesis (H5) accounts for extraordinary structural shocks, such as the COVID-19 pandemic and the war in Ukraine. Both events are expected to reduce the uptake of voluntary insurance by increas-

ing uncertainty and reducing household disposable income. The null hypothesis assumes no effect of these shocks, while the alternative hypothesis anticipates a significant negative effect. COVID-19 and Ukraine dummies are treated as exogenous structural breaks. Given the predicted negative direction, one-sided tests are used for H5.

3.2. The Autoregressive Distributed Lag

Autoregressive Distributed Lag model (ARDL) is a technique for detecting and estimating long-run relationships among time series variables. It is particularly useful, as stated before, for not requiring pretests for unit roots. Its key advantage is robustness when there is a single long-run relationship between the variables, especially with small sample sizes.

The ARDL cointegration technique (i.e. bound test of cointegration) was proposed by Pesaran and Shin (1995) following Pesaran's earlier work on ARDL models.

General ARDL model can be written as:

$$Y_t = \alpha + \sum_{i=1}^p \gamma_i Y_{t-i} + \sum_{j=1}^k \sum_{i=0}^{q_j} \beta_{j,i} X_{j,t-i} + \delta W_t + \epsilon_t$$

where Y_t is the dependent variable at time t ; $X_{j,t-i}$ represents the j -th independent variable at lag i ; α is a constant term; γ_i are coefficients for the lagged dependent variable; $\beta_{j,i}$ are coefficients for the lagged independent variables; p is the optimal lag order for the dependent variable; q_j is the optimal lag order for the j -th independent variable; k is the number of independent variables; W_t is a vector of deterministic variables (e.g. intercept, time trends, seasonal dummies, or exogenous variables with fixed lags); u_t (or ϵ_t) are error terms, assumed to be identically and independently distributed (iid) ($0, \delta^2$; $\Phi(L, p) = 1 - \Phi_1 L - \Phi_2 L^2 - \dots - \Phi_p L^p$; $\beta(L, q) = \beta_0 - \beta_1 L - \dots - \beta_q L^q$. For the bounds test (Case 3), k denotes the number of level regressors included in the UECM, which determines the lower/upper critical bounds.

$$\min_{y_t} \sum_{t=3}^T (\Delta^2 y_t)^2 = \sum_{t=3}^T (y_t - 2y_{t-1} + y_{t-2})^2.$$

Plugging in the variables, I create a solid same-frequency dataframe.

Seasonality-wise, the seasonal components were omitted from the affected variables using CRAN's package seasonal and its included X-13ARIMA-SEATS methods developed by U.S. Census Bureau. After the dataset was uniformed, variables were natural log-transformed. Conducting test-regressional models, a high multicollinearity was noticed among the variables. This is expected when it comes to such set of macroeconomic and demographic variables given their simultaneous movements and inter-dependence. Plugging these variables in the model as such, would produce a biased output with

3.3. Data

In order to equate variable frequency, temporal disaggregation had to be conducted. This was done through CRAN's tempdisagg package, utilising Chow-Lin and Denton-Cholette methods where applicable. As the dataset is quarterly in frequency, variables such as public health expenditure (PUBHEXP) and Age 65+ to working population ratio (AGE65_PC), being published with yearly values, had to be disaggregated to quarterly frequency.

Let's assume that y_t is the goal high-frequency series, in this case quarterly series; $\Delta^2 y_t$ is the second difference of the series, and T is the total number of high-frequency periods.

The minimum problem function presents as:

deviated and untrustworthy results, providing us with zero to little economic meaning and interpretation. This was tested through variance inflation factor (VIF) tests, where the results yielded whopping VIFs, which is an indicator of high multicollinearity.

To account for multicollinearity, the model needed contraction in terms of dimensionality. This is best achieved through principal components extraction via principal component analysis, which is common preprocessing technique prior to conducting ARDL models (Hooley et al., 2022).

What was conducted can be summarized as follows. First, I summarized and ordered the dataframe, along

with all the operations done prior (disaggregation, log-transformation, seasonal adjustment, etc.). After that, potential factors were identified and grouped in the following order. Macro_vars dataframe was created consisting of nominal gross domestic product (GDP_NOM), industrial production index (IPI), consumer price index (CPI), and broad money monetary aggregate - M2 (M2). This group is to account for macroeconomic surroundings. Next, a fiscal_vars group was formed consisting of public health expenditure (PUBHEXP) and a demographic variable presenting a ratio of those aged 65+ in the BiH population (AGE65_PC). This is to account for fiscal environment along with the demographic control, given the interdependence of these two variables. Finally, thelabfin_vars frame was constructed consisting of net wage variable (NET_WAGE), a number of those actively seeking work (ACTIVE_UNEM), and finally the yearly average lending rate given at 3-month levels, to account for

banking and the sector depicting liquidity in the economy (LEND_RATE).

All data was collected from official statistical and institutional sources. Specifically, health insurance premiums were obtained from the Agency for Supervision of Insurance of BiH (Agency for Supervision of Insurance of BiH, 2024). Macroeconomic indicators (GDP, CPI, M2, IPI) were drawn from the World Bank (2024), IMF Data Portal which aggregates IMF databases (International Monetary Fund, 2024), and the Central Bank of Bosnia and Herzegovina (Central Bank of Bosnia and Herzegovina, 2024). Public health expenditure and demographic indicators (share of population aged 65+) were taken from the World Bank Database (World Bank, 2024), and Agency for Statistics of BiH (2024) respectively. Labor market and financial sector variables (wages, unemployment, lending rates) were also provided by Agency for Statistics of BiH (2024) and Central Bank of Bosnia and Herzegovina (2024). A full overview of data sources is presented in Table 1.

Table 1: Data sources

Variable	Source
Health insurance premiums	AZO BiH (2024)
GDP, CPI, M2, IPI	IMF (2024); CBBiH (2024)
Public health expenditure	BHAS (2024)
Population aged 65+	World Bank (2024)
Net wages, unemployment	BHAS (2024)
Lending rates	IMF (2024)

Source: Author's aggregation

For each block of variables (macroeconomic, fiscal-demographic, and labour-financial), two principal components were initially extracted. To facilitate interpretability, the components were subjected to orthogonal varimax rotation. Following rotation, only one component per block was retained, selected on the basis of the largest explained variance and consistent factor loadings. These retained components were then labelled as

MACRO, FISCAL, and LABFIN, and subsequently used as composite regressors in the ARDL framework. Prior to extraction, all variables were standardised using Z-score transformation. The dependent variable - health insurance premiums (HIPREM) was not subject to principal component analysis, but was rather only standardized.

Table 2: Varimax – rotated loadings for extracted components

Variable	MACRO (F1)	FISCAL (F2)	LABFIN (F3)
GDP_NOM	0.992		
IPI	-0.425		
CPI	0.833		
M2	0.941		
PUBHEXP		0.991	
AGE65_PC		0.991	
NET_WAGE			-0.947
ACTIVE_UNEM			0.786
LEND_RATE_PC			0.348

Source: Author's calculation

Factor 1 (MACRO) is defined by very high loadings on nominal GDP, consumer prices, and the monetary aggregate M2. This cluster reflects the broad stance of the economy, capturing both real activity and monetary conditions. GDP_NOM shows the scale and performance of output, CPI points to inflationary dynamics, while M2 embodies liquidity and money supply growth. Together, these variables indicate that the first component can be interpreted as a macroeconomic performance and stability factor, highlighting how output, prices, and money circulate jointly in the system. Factor 2 (FISCAL) is dominated by public health expenditure and the share of the population aged 65 and above, both with nearly perfect loadings. This dimension captures the dual challenge of aging societies: rising demand for healthcare and increasing fiscal burdens on government budgets. The tight correlation between demographic pressures and public spending justifies interpreting this factor as a fiscal-demographic burden, where structural shifts in population age drive long-term sustainability concerns for public finances. Factor 3 (LABFIN) is shaped by a strong negative loading on net wages, a strong positive loading on unemployment, and a weaker positive contribution from lending rates. This suggests a dynamic where labor market distress, low wages and high unemployment coincides with financial constraints. The factor therefore combines both social and

financial vulnerabilities, making it best understood as a labor market and financial pressure component, pointing to the interdependence of employment conditions and access to credit in shaping economic stress.

These factors as such played a key role in creating a model. A model was created using these three factors as explanatory variables. To account for structural breaks and shocks, COVID and UKR step dummies were introduced, addressing the global health pandemic starting in Q2 2020, ending in late 2022, and the war in Ukraine starting 2022 Q1 and lasting ever since.

Unit-root diagnostics (ADF/PP) indicate a mix of $I(0)/I(1)$ processes across series, with no $I(2)$, which is compatible with the ARDL framework.

Note on Software Utilisation. All estimations and diagnostic checks were conducted in the R statistical environment (R Core Team, 2024). For stability analysis, I employed the *strucchange* package (Zeileis et al., 2002). Robust covariance matrices were obtained using *sandwich* (Zeileis, 2004), while inference relied on *lmtest* functions for coefficient and diagnostic testing (Zeileis & Hothorn, 2002). Dynamic regression specifications were facilitated by *dynlm* (Zeileis, 2019), factor extraction and psychometric routines by *psych* (Revelle, 2024), and autoregressive distributed lag estimation by the ARDL package (Pesaranhader & Wagner, 2021).

4. RESULTS

4.1. Base ARDL and Model Selection

Lag orders were selected by a bounded grid search with quarterly-appropriate caps (up to four lags for the dependent variable to allow one-year persistence, up to two lags for each regressor to capture short-run propagation), while COVID/UKR indicators entered in levels without lags to represent discrete shocks. Among candidates, I minimized AIC and retained the most parsimonious specification within $\Delta AIC \leq 2$ that was meant to satisfy multicollinearity and other diagnostics.

ARDL lag order specifications ranked by the Akaike Information Criterion. The ARDL(1,2,2,1) model

achieved the lowest AIC value (−8.015), indicating that one lag of HIPREM, two lags of MACRO, two lags of FISCAL, and one lag of LABFIN provide the most adequate specification. Simpler models, such as ARDL(1,0,1,1), yield considerably higher AIC values, suggesting that some short-run dynamics in the macroeconomic and fiscal factors are required to adequately capture the data-generating process.

After settling most of the data-characteristic issues, finally I create the model equation:

$$\text{HIPREM} = L(\text{HIPREM}, 1) + \text{MACRO} + L(\text{MACRO}, 1) + L(\text{MACRO}, 2) + \text{FISCAL} + L(\text{FISCAL}, 1) + L(\text{FISCAL}, 2) + \text{LABFIN} + L(\text{LABFIN}, 1) + | \text{COVID} + \text{UKR}$$

One thing to note, before conducting the ARDL model, is the interpretation of this regression. Given that ARDL allows for $I(0)$ and $I(1)$ to be combined in the model without difference transformation, it is safe to assume that I might receive a spurious output as a result. Other authors that utilized this model received high, irrational R^2 results along with issues like heteroskedasticity of residuals, multicollinearity issues, and even non-normal residuals.

This is, in a way, expected, with all duly addressing and precautionary steps to avoid such issues. As many state, it is completely normal to expect such output given the

integration order of the variables. Given the mixed integration orders, I report levels-ARDL primarily as a staging model for the bounds test, with HAC (Newey–West) standard errors to address residual heteroskedasticity and autocorrelation. Inference on long-run coefficients is based on the UECM/RECM representation conditional on cointegration.

4.2. Diagnostic Tests

In the following section, diagnostics tests are conducted, prior to proceeding with the bounds test and other procedures, in order to ensure that the coefficients from the primary model can be safely interpreted as such. The diagnostic tests can be summarized below.

Table 3: Residual diagnostic tests for the ARDL model

Test	Statistic	df	p-value
Phillips–Perron (stationarity)	$Z(\alpha) = -71.094$	—	< 0.01
Jarque–Bera (normality)	$\chi^2 = 1.569$	2	0.456
Breusch–Pagan (heteroskedasticity)	BP = 26.923	11	0.0047
Breusch–Godfrey (serial corr., lag 4)	LM = 21.013	4	0.0003

Table notes: Residuals are stationary and normally distributed. However, heteroskedasticity and autocorrelation are present according to BP and BG tests. These issues are addressed by reporting HAC (Newey–West) robust standard errors.

Source: Author's calculation

The initial residual diagnostics (see Table 3) revealed evidence of heteroskedasticity (Breusch–Pagan test, $p < 0.01$) and autocorrelation (Breusch–Godfrey test, $p < 0.001$), despite residuals being both stationary and normally distributed. These violations imply that the classical OLS standard errors are unreliable, potentially biasing inference about coefficient significance. To address this issue, I re-estimated the model with heteroskedasticity- and autocorrelation consistent (HAC)

standard errors, following the Newey and West (1987) procedure. I use HAC (Newey–West) with prewhitening and finite-sample adjustment. Importantly, the point estimates of the coefficients remain unchanged, but the standard errors were adjusted upward or downward to correct for serial correlation and heteroskedasticity in the residuals. This ensures that the reported t-statistics and p-values are valid even in the presence of such problems.

Table 4: Coefficient estimates with HAC (Newey–West) robust standard errors

Variable	Estimate	Std. Error (NW)	t	p
Intercept	0.268	0.131	2.053	0.047*
L(HIPREM,1)	0.270	0.079	3.402	0.0016**
MACRO	0.485	0.303	1.604	0.117
L(MACRO,1)	1.114	0.469	2.376	0.023*
L(MACRO,2)	-0.414	0.241	-1.717	0.094
FISCAL	1.019	0.696	1.464	0.151
L(FISCAL,1)	-3.052	1.263	-2.416	0.021*
L(FISCAL,2)	1.929	0.805	2.397	0.022*
LABFIN	-1.024	0.347	-2.955	0.005**
L(LABFIN,1)	1.121	0.399	2.812	0.008**
COVID	-0.585	0.242	-2.413	0.021*
UKR	-1.118	0.277	-4.034	0.0003***

Notes: Standard errors are heteroskedasticity- and autocorrelation-consistent (HAC, Newey–West). Significance levels:

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Author's calculation

After the Newey–West correction (Table 4), changes can be observed. Key findings remain robust, meaning that COVID and UKR dummies remain highly significant and negative; the lagged dependent variable indicates persistence in levels-ARDL ($L(\text{HIPREM},1)=0.270$, $p=0.0016$). Some coefficients lose precision; for example, the direct effect of MACRO becomes insignificant at the 5% level, though its lag structure still shows significance. Fiscal variables show mixed evidence, with significance mainly in lagged terms, consistent with slower adjustment dynamics. Ultimately, LABFIN effects remain robust: the contemporaneous negative effect and lagged positive effect are still significant.

Overall, the substantive interpretation of the model is unchanged, but the inference is now statistically reliable. By applying Newey–West HAC standard errors, the issues of heteroskedasticity and autocorrelation have been explicitly addressed, ensuring that the reported significance levels are not artificially inflated.

To assess parameter stability, both recursive CUSUM and OLS-based CUSUM tests were applied (Brown et al., 1975) using the strucchange package in R. The recursive CUSUM statistic ($S = 0.525$, $p = 0.571$) and OLS-CUSUM statistic ($S_0 = 0.357$, $p = 0.999$) fail to reject the null of stable coefficients. The fluctuation processes remain within the 95% confidence bounds, indicating no evidence of structural instability in the estimated ARDL/ECM model. The recursive MOSUM test

indicated potential local instabilities around 2016Q2 and 2020Q1. However, Bai–Perron breakpoint selection based on BIC did not confirm these as statistically warranted structural breaks, as the inclusion of exogenous COVID-19 and Ukraine dummies already captures such shocks. This suggests that while short-lived shifts are visible in the fluctuation process, they do not undermine the overall stability of the ARDL/ECM specification.

4.3. Bounds Tests and ECM – Observing Long-Term Relationship

The relationship between health insurance premiums and the selected macroeconomic and health indicators was estimated using a clean ARDL approach. However, this approach can be reformulated to an Error Correction Model (ECM) form. This form allows for separation of short and long-run dynamics, while explicitly including the error correction term (ect_{t-1}) to capture deviations from long-run equilibrium.

The general restricted ECM can be written as:

$$\begin{aligned}\Delta y_t = & c_0 + c_1 t + \sum_{i=1}^{p-1} \psi_{y,i} \Delta y_{t-i} + \sum_{j=1}^k \sum_{l=1}^{q_j-1} \psi_{j,l} \Delta x_{j,t-l} \\ & + \sum_{j=1}^k \omega_j \Delta x_{j,t} + \pi_y ECT_t + \epsilon_t \\ \psi_{j,l} = & 0 \quad \forall q_j = 1, \quad \psi_{j,l} = \omega_j = 0 \quad \forall q_j = 0\end{aligned}$$

where ect_{t-1} denotes the error correction term obtained from the long-run cointegration

equation, and under case 3 (no deterministic trend):

$$\begin{aligned}c_1 &= 0 \\ ECT &= y_{t-1} - \left(\sum_{j=1}^k \theta_j x_{j,t-1} \right)\end{aligned}$$

The general unrestricted ECM can be written through a formula of an unrestricted ECM conditional to an ARDL($p, q_1, \dots, q_k$) is:

$$\begin{aligned}\Delta y_t = & c_0 + c_1 t + \pi_y y_{t-1} + \sum_{j=1}^k \pi_j x_{j,t-1} + \sum_{i=1}^{p-1} \psi_{y,i} \Delta y_{t-i} \\ & + \sum_{j=1}^k \sum_{l=1}^{q_j-1} \psi_{j,l} \Delta x_{j,t-l} + \sum_{j=1}^k \omega_j \Delta x_{j,t} + \epsilon_t \\ \psi_{j,l} = & 0 \quad \forall q_j \leq 1, \quad \psi_{y,i} = 0 \quad \text{if } p = 1\end{aligned}$$

In addition, if $q_j = 0$ then $x_{j,t-1}$ and $\Delta x_{j,t}$ cancel out, becoming simply $x_{j,t}$. First, however, the presence of a long-run relationship between the variables must be verified. The Bounds F-test introduced by H. Pesaran and Shin (1995) was used and applied under Case 3 (unrestricted

intercept, no trend). Long-run multipliers are obtained from the UECM as $\theta^* = -\pi^* x / \pi^* y$, where $\pi^* y$ denotes the coefficient on $L(\text{HIPREM}, 1)$ and $\pi^* x$ the coefficient on $L(x, 1)$. Standard errors for θ^* are computed via the delta method using the HAC variance–covariance matrix. The results were as depicted in the Table 5.

Table 5: Bounds F-Test for Cointegration

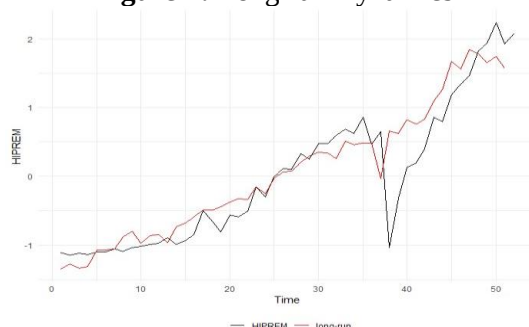
Test	Statistic	p-value
Bounds F-test (Wald)	4.774	0.015
Null hypothesis	No cointegration	
Alternative	Possible cointegration	

Source: Author's calculation

The bounds F-test statistic is 4.774 (Case 3, $k = 3$). Since F exceeds the 5% upper critical value, I reject the null of no cointegration. This provides evidence of a long-run relationship between HIPREM and the levels regressors (MACRO, FISCAL, LABFIN). COVID and UKR are treated as exogenous shock dummies and do not form part of the long-run cointegrating vector. Stability of adjustment is confirmed separately by a negative and significant error-correction term in the error-

correction model. Economically, this result implies that changes in these explanatory variables do not only affect health insurance premiums in the short run, but that they move together in the long run (see Figure 1). For instance, macroeconomic performance and demographic shifts eventually align with premium dynamics, suggesting structural co-movement.

Figure 1: Long-run Dynamics



Source: Authors' visualisation using CRAN's ggplot2 and ARDL packages

However, one potential limitation is that the test is sensitive to lag selection and small sample size. With relatively few observations (T close to 50), critical values

may not be perfectly reliable, and the evidence of cointegration should be supported by additional diagnostics (e.g., stability tests, robustness checks).

Table 6: ECM Estimates with HAC (Newey–West) Standard Errors

Variable	Estimate	Std. Error	t value	Pr(> t)
Restricted ECM				
(Intercept)	0.191	0.028	6.919	0.000***
Δ LABFIN	-0.856	0.457	-1.872	0.068*
COVID	-0.635	0.096	-6.607	0.000***
UKR	-0.912	0.140	-6.490	0.000***
ECT	-0.734	0.056	13.106	0.000***
Unrestricted ECM				
(Intercept)	0.191	0.054	3.542	0.001***
L(HIPREM, 1)	-0.734	0.060	-12.307	0.000***
MACRO	0.937	0.459	2.042	0.047*
FISCAL	0.063	0.389	0.161	0.873
L(LABFIN, 1)	0.063	0.094	0.673	0.504
Δ LABFIN	-0.856	0.343	-2.499	0.016*
COVID	-0.635	0.166	-3.820	0.000***
UKR	-0.912	0.305	-2.990	0.005**

Notes: HAC (Newey–West) robust errors. Significance codes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Author's calculation

4.3.1. Short-Run Interpretation

The restricted ECM estimates indicate that a 1% increase in the LABFIN factor immediately reduces private health insurance premiums by about 0.86%. This suggests that labor market and financial stress, characterized by lower wages, higher unemployment, and tighter lending conditions, directly suppress person's ability or willingness to pay for voluntary (i.e. private) health insurance. At the same time, the coefficients for COVID-19 (-0.63) and Ukraine (-0.91) dummies show that these structural shocks significantly reduced premiums, by around 0.6–0.9 units on average, highlighting the sensitivity of the private insurance market to extraordinary crises.

4.3.2. Long-Run Adjustment Dynamics

The bounds test confirms the existence of a cointegration relationship, allowing the estimation of both short-run and long-run coefficients. In the unrestricted ECM, the coefficient on the lagged dependent variable implies a long-run multiplier for the macroeconomic factor of $\theta^{\text{MACRO}} = 1.275$ (SE 0.653; one-sided $p = 0.025$). This confirms that stronger macroeconomic performance significantly increases voluntary health insurance premiums in the long run, supporting H1. The contemporaneous short-run effect of MACRO is smaller in magnitude (≈ 0.9), indicating that the full adjustment materialises gradually through the error-correction mechanism. By contrast, the fiscal–demographic factor is economically small and statistically insignificant ($\theta^{\text{FISCAL}} = 0.085$, $p = 0.436$), so H2 cannot be confirmed. The adjustment coefficient is negative and significant ($\pi = -0.734$, $p < 0.001$), implying rapid convergence towards the long-run equilibrium within two to three quarters, consistent with the typical renewal cycle of insurance contracts.

4.4. Hypotheses Testing and Interpretation

Precondition – Cointegration. The ARDL bounds test confirms the presence of at least one long-run cointegration

relationship between private health insurance premiums and their macroeconomic, fiscal-demographic, and labour-financial determinants. Accordingly, the null hypothesis (H0A) is rejected, and the alternative (H1A) is accepted.

The long-run multiplier for the macroeconomic factor is positive and statistically significant ($\theta^{\text{MACRO}} = 1.275$, one-sided $p = 0.025$), implying that stronger macroeconomic conditions are associated with higher private health insurance premiums. For these reasons, I reject the null hypothesis of no long-run cointegration, and accept the alternative hypothesis.

The long-run multiplier for the fiscal–demographic factor is small and not statistically significant ($\theta^{\text{FISCAL}} = 0.085$, one-sided $p = 0.436$). For these reasons, H0 cannot be rejected, implying that the evidence for H2 is inconclusive at conventional levels. The contemporaneous short-run effect of LABFIN is negative and statistically significant ($\Delta \text{LABFIN}_t = -0.856$, one-sided $p = 0.003$), indicating an immediate contraction in voluntary insurance during periods of labour–financial stress. As stated, I can reject the null hypothesis, and accept the alternative.

The error-correction term is negative and highly significant ($\pi = -0.734$, one-sided $p < 0.001$), which confirms stable adjustment toward the long-run equilibrium. Again, I reject the null.

The COVID-19 and Ukraine-war dummy coefficients are negative and statistically significant (both one-sided $p < 0.001$), consistent with a contraction in voluntary insurance during crises. Consequently, H0 is rejected and H1 accepted.

In summary, the results reject null-hypotheses of H1, H3, H4, and H5. Evidence for H2 is inconclusive at conventional levels (one-sided $p = 0.436$), so I fail to reject H0.

5. DISCUSSION

A stable long-run cointegrating relation is found between private health insurance premiums and macro-/labor-financial factors, with swift error-correction over two to three quarters. The long-run MACRO effect is positive, which is consistent with evidence that output, prices and liquidity scale health spending/insurance demand (Atılgan, 2017; Stepović, 2020; Chang, 2022). Short-run dynamics are dominated by LABFIN: adverse wage/unemployment/credit conditions immediately depress premiums, with a delayed rebound as conditions normalise, which can be noticed as a pattern aligning with demand elasticity and postponable personal expenditures (Casabianca, 2022). In contrast, the fiscal-demographic factor is not significant in the long run over the sample, which diverges from studies on public health expenditures (Usman 2019; Yang 2022) but is plausible for private premiums priced in competitive markets and over a shorter horizon. COVID-19 and the

Ukraine war exert significant negative shocks, reinforcing international evidence that crises curtail voluntary insurance uptake. The significant intercept and fast ECT suggest a drifting equilibrium level and quick mean-reversion in premium flows. Together, results position private premiums as an income-sensitive barometer of household financial resilience rather than a proxy for structural ageing/fiscal pressures.

These results have important policy implications. They suggest that macroeconomic stability and labor market recovery play a decisive role in sustaining the voluntary insurance segment, while fiscal and demographic pressures act mainly through public channels. Strengthening household financial security and improving credit access may, henceforth, enhance insurance penetration more effectively than demographic subsidies or short-term fiscal measures.

5.1. Limitations

Although the ARDL-ECM approach offers robustness in modelling short- and long-term dynamics, several limitations should be considered. First, the sample covers a relatively short time span (2011–2023) and a small cross-sectional domain limited to Bosnia and Herzegovina, which constrains the generalisability of results. Quarterly frequency improves estimation efficiency but inevitably compresses structural shifts that may have occurred gradually, such as regulatory reforms or market liberalisation episodes.

Second, data availability restricts the inclusion of microeconomic and institutional variables that could better capture the behavioural dimension of health insurance demand. Aggregate macro-fiscal indicators proxy these mechanisms only imperfectly, leaving potential measurement bias in unobserved heterogeneity, especially across income and age groups. Moreover, the absence of continuous data on public health expenditure and demographic transitions narrows the ability to fully identify long-run fiscal–demographic pressures.

Third, the estimation strategy assumes linear and symmetric adjustment, whereas the insurance market may respond non-linearly to shocks and policy uncertainty. Future research could explore asymmetric ARDL specifications, regime-switching, or structural break modelling to capture such complexities. Additionally, the analysis excludes cross-country spillovers and regional integration effects, which could be relevant given the common exposure of Western Balkan economies to EU monetary and financial conditions.

5.1.1. Factor Limitations

A further limiting concern might be the construction of the FISCAL factor. The almost perfect correlation between public health expenditure and the share of population aged 65+ (reflected in their near identical factor loadings), implies that this composite variable might not be able to separate fiscal from demographic effects. As a consequence, the insignificance of FISCAL in the long-run equation might reflect two points: either a genuine absence of fiscal-demographics pressures on private health insurance premiums, or on the other hand, an identification problem which arises from the collinearity of the two variables. The aggregation into a factor was necessary however, due to the fact that, when these two regressors were included separately, the model exhibited clear signs of overfitting, including unstable coefficient estimates, inflated standard errors and weak out of sample performance, again due to high collinearity among the two, combined with limited sample size. Collapsing them into a single factor was therefore necessary in terms of contractionary mathematical rigor.

6. CONCLUSION

In conclusion, this study demonstrates that private health insurance premiums in Bosnia and Herzegovina are not merely passive indicators but are statistically and economically linked to broader fundamentals. Macroeconomic performance (H1), labour-financial stress in

Future research with longer time series, higher-frequency fiscal data, or cross-country panel structures could attempt to separate these channels more precisely. Moreover, the negative IPI loading in the MACRO factor ($IPI = -0.425$) requires clarification. This pattern might indicate what structural composition of BiH economy looks like, where, as expected, the services sector accounts for the dominant and growing share of GDP, while industrial output has exhibited flat or countercyclical movements relative to aggregate economic expansions (predominantly in nominal terms), e.g. COVID and Ukraine-Russia conflict. During the observed period (2011–2023), nominal GDP growth was driven primarily by trade, financial services, and public administration, whereas industrial production remained subdued due to the legacy of deindustrialisation and limited manufacturing investment. Similar patterns have been documented in other post-transition economies of the Western Balkans, where service-led growth coexists with stagnant industrial bases (Bartlett, 2009; Uvalić, 2010). The negative loading thus captures the divergence between overall macroeconomic performance and industrial activity, rather than a statistical anomaly. As a robustness consideration, an alternative MACRO factor excluding IPI was tested, yielding qualitatively similar results.

Concludingly, the interpretation of PCA-derived factors requires caution, as these are latent constructs rather than directly observable economic variables. Each factor represents a weighted combination of its constituent indicators, and the factor scores capture common variation rather than the isolated effect of any single variable. The MACRO factor should therefore be understood as a composite index of macroeconomic conditions (output, prices, and liquidity) rather than as a proxy for GDP alone. Similarly, LABFIN reflects the joint state of labour market tightness and credit conditions. This aggregation approach, while necessary to address multicollinearity, implies that coefficient estimates represent the response of health insurance premiums to broad economic dimensions rather than to specific policy instruments. The trade-off between multicollinearity reduction and interpretability is a recognised limitation of factor-augmented regression approaches (Stock & Watson, 2002).

Despite these limitations, the present model offers a coherent empirical framework for understanding the macro-fiscal linkages of private health insurance premiums and establishes a foundation for subsequent regional and micro-level extensions.

the short run (H3), stable adjustment (H4), and extraordinary shocks (H5) emerge as robust determinants of private health insurance premiums. Fiscal-demographic pressures (H2) are not statistically significant in the long run over the sample period. The existence of a long-run

cointegration relationship underscores that premiums adjust over time to changes in macroeconomic conditions (GDP and prices). Demographic–fiscal pressures do not exhibit a statistically significant long-run effect over the sample. This resonates with evidence from OECD countries, where insurance markets are found to co-evolve with growth. (Younsi et al., 2024). Additionally, the significant negative impacts of COVID-19 and the Ukraine conflict illustrate that external shocks materially affect the premium setting in the private insurance sector, reinforcing that this market is sensitive to both domestic and global disturbances. Similar results were observed in international contexts, where voluntary insurance uptake decreased under adverse economic shocks or crises (Casabianca et al., 2022). The robustness of these findings, confirmed via ARDL-ECM modeling, HAC standard errors, and diagnostic plus stability testing, suggests that private premiums

could function as an early warning mechanism for deteriorations in economic or labor-financial health. This is consistent with recent meta-analytical evidence showing that health insurance and broader economic performance are tightly interlinked, with causality running in both directions (Fan et al., 2024).

For policy, this suggests that regulators, insurers, and government actors should not ignore the trajectories in private insurance premium data when crafting health financing strategies. Measures such as transparency in premium setting, support for financial resilience among households, and macroeconomic stability policies could help mitigate adverse impacts of shocks. It may also be useful to develop data collection mechanisms for the mandatory contribution-based side of health insurance so that future studies and policy decisions can consider the system as a whole.

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LABOUR MARKET TRANSFORMATIONS AND DUALITY IN CENTRAL AND SOUTHEASTERN EUROPE: A COMPARATIVE FACTOR ANALYSIS

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Abstract

This study offers a comparative analysis of labour market transformations in twelve Central and South-eastern European countries: Albania, Bosnia and Herzegovina, Serbia, North Macedonia, Bulgaria, Romania, Croatia, Slovenia, Slovakia, Poland, Hungary and the Czech Republic, covering the period 1993 to 2024. It examines the major structural shifts associated with the transition from centrally planned to market economies, marked by significant output declines, enterprise closures and substantial job losses that contributed to persistent and often long-term unemployment. Using the theoretical framework of labour market duality, the study explores segmentation between primary and secondary labour market segments, the prevalence of vulnerable and informal employment and the impact of institutional legacies such as rigid labour regulations, high employment protection and skill mismatches. Methodologically, the analysis combines descriptive indicators with factor analysis to reduce a wide set of seventy nine labour market variables into composite labour market dimensions obtained through dimensionality reduction., allowing for the identification of shared regional patterns and country specific disparities.

Sectoral differences remain particularly evident in agriculture, which continues to employ a considerable share of the workforce in parts of Southeastern Europe despite low productivity and limited technological modernisation. The largest labour market gaps appear between Western Balkan economies and more advanced EU member states, most visibly in employment rates, labour force participation, youth unemployment and long-term unemployment. These persistent disparities reflect deep structural constraints and institutional weaknesses that continue to hinder labour market convergence across the region.

Keywords: Post-socialist economies, labour market duality, sectoral disparities, comparative analysis, Western Balkans, labour market convergence.

JEL: J21, J60, F66.

1. INTRODUCTION

Labour markets in Central and Southeastern Europe underwent profound structural transformations during the transition from centrally planned to market economies. This shift was characterised by substantial declines in output, widespread closures of state-owned enterprises and significant job losses, particularly among mid-career workers who faced considerable barriers to re-employment. In this context, labour mobility—especially emigration—has been identified as a key mechanism of macroeconomic adjustment in developing and transition economies, often reflecting deeper structural constraints and policy trade-offs within monetary integration processes (Đogo et al., 2023). These developments generated persistent unemployment and underscored the need for comparative analyses that link institutional arrangements, sectoral adjustments and macroeconomic reforms to labour market performance. Against this background, the present study employs the theoretical framework of labour market duality to analyse primary and secondary labour market segments, the distribution of vulnerable forms of employment and the interactions between formal and informal labour markets.

The analysis covers twelve Central and Southeastern European countries: Albania, Bosnia and Herzegovina, Serbia, North Macedonia, Bulgaria, Romania, Croatia,

Slovenia, Slovakia, Poland, Hungary and the Czech Republic, and examines long-term transition outcomes across key indicators such as employment, labour force participation, youth and long-term unemployment and sectoral labour distribution. Previous empirical evidence indicates that the largest performance gaps persist between Western Balkan economies and the more advanced EU member states in the region, particularly regarding employment outcomes, labour mobility and institutional adaptability. Methodologically, the paper combines descriptive analysis with econometric techniques, including factor analysis (principal component method), to group a large set of 79 labour market indicators into a smaller number of interpretable composite dimensions across seven thematic segments: labour force, non-active population, potential labour force, discouraged workers, employment, unemployment and youth unemployment. Standard diagnostic tests, such as the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity to ensure data adequacy and statistical validity, while Varimax rotation provides a clear and meaningful factor structure. This approach makes it possible to identify shared structural patterns as well as country-specific constraints and thereby offers an empirically

grounded basis for policy formulation aimed at enhancing labour market efficiency, inclusiveness and convergence toward EU standards.

The paper is structured as follows. Section 2 provides a detailed overview of the historical, institutional and macroeconomic developments that shaped labour market trajectories in Central and Southeastern Europe during the transition period. Section 3 outlines the theoretical framework of labour market duality and its empiri-

cal relevance for the analysed countries. Section 4 presents the data, methodological approach and the application of factor analysis used to identify composite structural patterns of labour market performance. Section 5 provides a comparative assessment of labour market indicators across the twelve countries, followed by Section 6, which discusses the main findings and policy implications. The paper concludes with Section 7, which summarises the key contributions and highlights areas for further research.

2. THE THEORY OF DUAL LABOR MARKETS – EMPIRICAL RELEVANCE IN THE CASE OF CENTRAL AND SOUTHEASTERN EUROPEAN COUNTRIES

Labor markets in the countries of Southeastern Europe are facing structural disparities, that is, mismatches between the supply and demand of labor in specific activities, sectors, and professions, which lead to a deficit of certain worker profiles while simultaneously experiencing significant levels of unemployment. Labor markets in highly developed countries, but also in developing countries, are a reflection of numerous economic, political, social, cultural, historical, as well as traditional factors. Some of the key determinants influencing the characteristics and performance of the labor market in the countries of Central and Southeastern Europe are related to the efficiency and effectiveness of economic processes, demographic processes, the educational system, the structure of the economy, the healthcare system, the scope and type of the informal labor market, the institutions of the formal labor market, as well as a set of other factors. In summary, these factors contribute to the insufficient, suboptimal utilization of the labor market's potential in some of the countries of Central and Southeastern Europe, primarily in the Western Balkan countries, which results in the so-called “questionable sustainability,” that is, the absence of opportunities and perspectives for convergence toward the highly developed European countries. These tendencies contribute to the perception of the Western Balkan countries as the European periphery (Bartlett & Prica, The deepening crisis in the European super-periphery, 2013).

The significant differences in the performance of labor markets between these countries, as well as between individual segments of the labor market within each country, contribute to their dual character. Hence, it is considered justified to emphasize that labor markets in the countries of Southeastern Europe are characterized by a certain degree of duality, without clearly delineating the market segments that are marked by a significant gap in economic performance. The problem of labor market duality implies the existence of long term and systemic challenges that limit the possibilities for worker mobility, particularly the possibility of transitioning from one to another (higher) segment of the labor market. Some economists explain the concept of labor market duality through the significant degree of segmentation (duality) of the overall economy, which is also reflected in the

labor market (Lewis, 1954). The concept of dual labor markets was initially considered through the prism of urban and rural regions, where a rural labor market and an urban labor market existed. The rural labor market is primarily focused on increased engagement of workers in specific activities, with agriculture being particularly emphasized, while in the labor markets of urban areas, the focus is placed on non-agricultural activities. As an additional segment, or form of labor market duality, the formal labor market and the informal labor market also appear (Harris & Todaro, 1970).

In a general theoretical context, the duality of labor markets in developing countries can be analyzed through two segments: the primary and the secondary labor market. Within the context of the theory of dual labor markets, it is understood that labor markets are divided into markets with good jobs (primary markets) and labor markets with poor jobs (secondary labor markets) (Dickens & Lang, 1992). In summary, the classical formulation of the theory of labor market duality starts from the assumption that the labor market is segmented into a primary and a secondary labor market. Jobs in the primary labor market are characterized by high wages, good work environment and working conditions, stable employment, opportunities for career advancement, as well as compliance with labor legislation. Jobs categorized as belonging to the secondary labor market are characterized by low wages and insufficient contributions for health and pension insurance, poor working conditions, a significant degree of worker mobility, and insufficient opportunities for career advancement (Doeringer & Piore, 1971). Of course, in practice, certain jobs, according to their characteristics, may fall “in the middle,” meaning that according to some criteria they may belong to the primary labor market, while according to other criteria they may be part of the secondary labor market (Osterman, 1975). Hence, in addition to the division between the primary and secondary labor markets, some authors supplement this theory with a primary labor market characterized by lower and upper levels of jobs (Osterman, 1975; Piore, 1975). Additionally, some economists, in defining jobs within the secondary labor market, differentiate between jobs charac-

terized by low wages and jobs that fall within the informal economy and illegal activities (Bluestone, 1970). Furthermore, it is particularly important to emphasize that, in addition to the significant segmentation of labor markets, this theory assumes low and limited labor mobility between different segments. Therefore, the problem of labor market duality should not be analyzed solely through the prism of the existence of jobs within the secondary labor market, but it is especially important to analyze the (im)possibility for workers to advance toward jobs within the primary labor market (Freedman, 1976).

The concept of duality, or segmentation, of the labor market can also be examined through the lens of different types and forms of employment. The primary labor market consists of sectors characterized by high, above-average wages, high labor productivity, workers employed full time on permanent contracts, and marked by pronounced job and income stability. Employment within the secondary labor market is concentrated in sectors that provide low, below average wages to employees, low labor productivity, a significant presence of self-employed individuals, part time workers, as well as employees on fixed-term contracts (Michael, et al., 1973; Hudson, 2007). Following the previously stated assumptions, it can be concluded that the difference in characteristics, working conditions, and the attractiveness of jobs within the two separate segments creates a significant gap in the supply and demand for workers in the labor markets. In the sectors that belong to the secondary segment, unemployment arises primarily as a result of a large labor supply which, in terms of workers' skills and qualifications, significantly exceeds the labor demand in these sectors. On the other hand, the situation in the sectors that fall within the primary labor market points to a deficit, for example a shortage of jobs requiring specific skills and qualifications.

The duality of the labor market should also be analyzed through the prism of employment status and the various forms of employment. According to employment status, individuals may occupy one of the following forms of employment: wage employees, self-employed, and unpaid family workers. Hence, individuals who are self-employed, as well as those engaged in unpaid family work, fall into the category of persons with vulnerable employment and are therefore classified as workers operating within the secondary labor market (Saunders, 2003). Theoretical and empirical studies show that wage employment, or employment under an employer, provides greater job security and higher earnings for workers (Neal and Rosen, 2000; Polhemus, 2001; McNabb and Whitfield, 2007; Bargain and Kwenda, 2011). Additionally, the so-called vulnerable employment includes the following categories of employment (Saunders, 2003):

- Workers who are self-employed and who fall outside the scope of labor legislation. However, it should be taken into account that not all workers or

job positions that fall into the category of self-employed persons belong to the category of vulnerable employment, or fall within the secondary labor market. Some job positions, such as lawyers, consultants, and other self-employed professionals, are characterized by high earnings and stable employment. Furthermore, some individuals who are knowingly and voluntarily self-employed, for various reasons, intentionally register their employment with low earnings or low social security contributions in order to avoid taxation on part of their income and receive it in cash (off the books, outside official statistics).

Nonetheless, a significant share of self-employed workers fall into the category of workers with low and unstable incomes. This is a consequence of the fact that a large part of their total income depends on business collaboration with a few clients. Additional factors that contribute to the categorization of these workers as part of the secondary labor market include: the inability to fully exercise labor rights, such as the right to paid annual leave, overtime pay, statutory minimum wage, paid public holidays, etc.

- Workers who are covered by labor legislation but face difficulties in exercising and realizing their guaranteed labor rights. These outcomes are primarily due to low levels of knowledge and awareness about their labor rights, but also as a result of fear of losing their job if they attempt to claim or exercise part of these rights;
- Workers who are not able to qualify for, or do not meet the conditions for, programs such as unemployment insurance or do not have the ability to exercise the right to a pension;
- Workers characterized by low, long-term earnings, which are primarily the result of jobs with low added value, as well as a lack of stable employment.

The degree of segmentation, or the duality of labor markets, especially in developing countries, should also be analyzed through the prism of the existence of the informal labor market. Hence, the existence of a dual labor market is also a result of the high level of worker engagement within the informal labor market. The share of informal employment in total employment is particularly relevant in developing countries, whereby duality in these countries demonstrates empirical relevance also from the aspect of the engagement of informal employment within both the formal and informal labor markets. Regarding the prevalence of different types of informal employment in developing countries, it is most commonly present in the form of self-employment, while in terms of distribution across sectors, it most frequently occurs in agriculture, personal services, as well as in retail trade and construction.

In terms of sectoral patterns and the distribution of employment across activities, the theory of dual labour markets also demonstrates strong empirical relevance.

The duality of labour markets by sector is particularly evident when contrasting agricultural employment with employment in non-agricultural sectors, a distinction repeatedly emphasized in the literature on labour market segmentation in Southeastern Europe. The share of agriculture in total employment remains especially high in Albania, Romania, Serbia and North Macedonia, where agriculture continues to absorb a large portion of the labour force and plays a critical role in sustaining household livelihoods and rural economies (Bojadjieva et al., 2022; Bucevska & Kozheski, 2022). This sector exerts both direct and indirect effects on employment, particularly in developing economies where agriculture contributes significantly to gross value added and serves as a key input to manufacturing activities, especially the food processing industry (Trpeski et al., 2024; Trenovski et al., 2021).

In the Western Balkans—most notably Albania, Bosnia and Herzegovina, Serbia and North Macedonia—the structure of the economy points to a pronounced duality within the agricultural sector itself. Employment is dominated by numerous small-scale, low-productivity farms operating with fragmented land and limited technological capacity, a pattern consistent with broader findings on labour productivity constraints across the region (Trenovski et al., 2020; Borovic, Z., et al., 2020; Trenovski et al., 2023; Trpeski, Kozheski & Merdzan, 2024). These small agricultural holdings coexist with a very small number of large agricultural enterprises that account for a disproportionate share of total agricultural output. The persistence of such structural polarization aligns with empirical work showing deep productivity

divides and uneven sectoral performance between primary and secondary segments of the labour market (Slaveski & Kozheski, 2024; Kozheski et al., 2024). Furthermore, ongoing migration from rural to urban areas, combined with a gradual shift of the labour force from agriculture to other sectors, contributes to a long-term decline in agricultural employment. This trend is consistent with broader evidence of structural transformation and labour reallocation dynamics documented in the SEE region (Trenovski & Kozheski, 2020; Trpeski et al., 2021). As a result, the dual structure of agriculture reinforces wider labour market disparities, limiting productivity growth, constraining formal employment creation and reinforcing the segmentation that is characteristic of labour markets in Central and Southeastern Europe.

The concept of duality in labor markets is also reflected through the prism of significant differences in labor productivity, especially when comparing labor productivity in agriculture with that in non-agricultural activities (Kołodziejczak, 2020). Higher productivity in the industry and service sectors implies that labor and capital in these sectors generate higher added value compared to the gross value added in agriculture. Hence, the reduction of employment in agriculture, that is, the migration of workers from agricultural activities in favor of non-agricultural activities, represents a basis for generating more intensive rates of economic growth. Table 1 presents the structure of jobs according to the theory of dual labor markets, showing the distribution of jobs between the primary and secondary labor market.

Table 1: Segmentation of the Labour Market

Segments of the Labor Market	Workers	Job Characteristics
Primary Labor Market – Upper Segment (Good Jobs)	Workers employed in the public sector on permanent contracts; Workers employed in the primary private sector (Information Technology, financial services, large corporations).	High job security and stability; Wage rigidity, or resistance to wage reductions.
Primary Labor Market – Lower Segment (Average Jobs)	Workers employed in the private sector on permanent contracts in sectors such as industry, traditional services, small and medium-sized enterprises; Owners of small firms and self-employed persons; Registered farmers.	Moderate job security; wage flexibility reflected in the likelihood of downward wage adjustments; the statutory minimum wage functioning as a lower employment threshold, with occasional delays in payment; and the presence of elements of undeclared or unregistered labor.
Secondary Labor Market (Poor Jobs)	Formally employed workers with flexible contracts: fixed-term, part-time, temporary employment, freelance contracts, etc.; Informally employed workers (individuals informally employed for wages by another employer, unpaid family workers).	Minimal or nonexistent job security; Flexibility of earnings/wages.

Source: Adjusted from (Arandarenko, 2018)

3. DATA AND METHODOLOGY

As emphasized earlier, the analysis of the fundamental characteristics and performance of labor markets in selected Central and Southeastern European countries, to-

gether with the mapping of key differences and the development gap across various labor market segments, represents the primary objective of this study. Hence, when analyzing the condition of the various segments

of the labor market, it is essential to devote special attention to the structure of the respective national economies in these countries. The structure of the national economy, as well as the stage of economic development in which the national economies are situated, is in direct correlation with the structure and characteristics of the labor market. Additionally, various non-economic factors, such as labor legislation, labor market institutions, respect for workers' individual rights and freedoms, and the active and passive labor market measures, have a significant impact on labor market performance and the characteristics of the workforce.

The analysis of labor markets through individual segments is the subject of research in both theoretical and empirical literature (Reich, et al., 1973; Pages & Stampini, 2009; Obadic & Viljevac, 2023; Baht, et al., 2023; Kottelenberg & Lehrer, 2019). The contribution

of this analysis within the framework of the doctoral dissertation is focused on a detailed analysis of the condition and performance of labor markets in the countries of Central and Southeastern Europe through seven segments of the labor market. The empirical analysis covers 79 labor market indicators that are analyzed using the example of 12 countries from Central and Southeastern Europe: Albania, Bosnia and Herzegovina, Serbia, Macedonia, Bulgaria, Croatia, Slovenia, Romania, Slovakia, the Czech Republic, Poland, and Hungary. The analysis focuses on the period from 2005 to 2022, which implies a large dataset through which the individual segments of the labor market are analyzed. The specific labor market segments and the indicators within each individual segment of the labor market, which are the subject of this analysis, are presented in Table 2.

Table 2: Distribution of the Labor Market by Individual Segments and Groups of Indicators

Segment	Indicators – Number and Characteristics
Total labor force in the labor market	10 indicators – by gender, age, and level of education
Persons outside the labor force	11 indicators – by gender, age, and level of education
Potential labor force	11 indicators – by gender, age, and level of education
Discouraged job seekers	11 indicators – by gender, age, and level of education
Employment	17 indicators – by gender, age, level of education, and type of employment (full-time or part-time)
Unemployment	13 indicators – by gender, age, level of education, duration of unemployment
Youth unemployment	6 indicators – by gender, duration of unemployment

Source: Author's own elaboration

The econometric analysis applied in this paper is based on factor analysis (FA), using the principal component method, which enables the analysis of a large dataset. This type of factor analysis is a widely used and accepted statistical and econometric technique for analyzing trends and causalities in the social sciences. From a theoretical standpoint, factor analysis is divided into two main categories: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) (Williams, et al., 2010). Some researchers in their empirical studies have noted that during the period 2003–2004, around 1,700 empirical studies were conducted in which factor analysis was applied (Costello & Osborne, 2005). Factor analysis primarily enables the transformation of large sets of variables (indicators) into a smaller and, more importantly, understandable and easily analyzable set of factors. If researchers applying factor analysis do not have prior assumptions about the number, significance, and interrelationship of the individual indicators, the method of exploratory factor analysis is used. This type of analysis is directed toward creating a model based on a set of factors derived from a large number of variables and data. Conversely, confirmatory factor analysis is used when the selection of variables and factors in the model is guided by a form of structural modeling, meaning that the intention is to test or confirm a

theoretical assumption within the empirical framework. In summary, unlike exploratory factor analysis, confirmatory factor analysis is most often used when starting from the a priori assumption of proving a theoretical relationship between the variables (Williams, et al., 2010; Taherdoost, et al., 2022).

For the purposes of this research, Exploratory Factor Analysis (EFA) is applied, which is considered a widely used instrument in the social sciences, especially among socio-economic disciplines, where the analysis is based on the assumption of a certain correlation between individual variables, as well as a theoretical connection regarding their mutual influence (Thompson, 2004; Williams, et al., 2010; Pitombo, et al., 2011). In this study, Exploratory Factor Analysis is primarily used as a data reduction technique rather than as a strict latent-variable modelling framework. The objective is to condense a large set of highly correlated labour market indicators into a smaller number of interpretable composite dimensions that summarize labour market performance across countries. Many of the indicators in the dataset represent demographic and structural disaggregations (by gender, age and education). Consequently, the extracted factors should be interpreted as empirical summaries of correlated labour market characteristics rather than la-

tent theoretical constructs. As the analysis relies on exploratory factor extraction using the principal component method, the emphasis is placed on variance explained, eigenvalues and interpretability of factor structures rather than on global model fit indices typically

used in confirmatory factor analysis. Chart 1 presents the individual steps necessary for the implementation of exploratory factor analysis.

Figure 1: Steps in the Implementation of Exploratory Factor Analysis (EFA)



3.1. Sample Size and Data Suitability

The suitability and degree of optimality in the application of factor analysis primarily depend on the dataset and the sample size. Quantitative economists hold a consensus regarding the need for a large dataset in order to ensure proper application and relevant results from factor analysis. Some economists start from the assumption that at least 300 observations are necessary for the appropriate use of factor analysis, while others argue that a sample with more than 100 observations can be considered a sufficiently large dataset (Tabachnick & Fidell, 2001). In this context, some economists make a classification of sample adequacy for the application of factor analysis. Accordingly, a dataset with up to 100 observations is considered poor and suboptimal for factor analysis; a sample of 200 observations is regarded as an adequate sample; 300 observations as a good sample; 500 observations as very good; and finally, a sample with more than 1000 observations is considered an excellent sample.

Additionally, some quantitative economists emphasize that the need and level of optimality for applying factor analysis are not determined solely by the number of observations, but also by the characteristics of the data. Namely, if the data in the analysis are characterized by a high degree of correlation between indicators, as well as significant repetition (recurrence) of indicators within the respective factors, this serves as an indication that the dataset is suitable for the application of factor analysis (Costello & Osborne, 2005).

3.2. Correlation Matrix

One of the necessary statistical techniques for determining the degree of correlation between individual variables (indicators) is the correlation matrix (Henson & Roberts, 2006). The construction of the correlation matrix is considered one of the preliminary steps, which should precede and establish the justification for the application of factor analysis. Accordingly, the degree of correlation between individual indicators is compared to the total variance of the individual factor, which is comprised of the variables within it. If the correlation coefficient shows a degree of correlation lower than 0.3, then the necessity and suitability of applying factor

analysis is called into question. In summary, the coefficients from the correlation matrix serve as the basis for both the possibility and the necessity of factor analysis on the given dataset.

3.3. Kaiser–Meyer–Olkin (KMO) and Bartlett’s Test for the Adequacy and Suitability of the Dataset for the Application of Factor Analysis

Before proceeding with the application of factor analysis, it is necessary to conduct the Kaiser–Meyer–Olkin (KMO) test and Bartlett’s test in order to assess the adequacy of the sample and the suitability of the data for applying factor analysis. For this purpose, when grouping some of the indicators into individual factors that can be appropriately analyzed and interpreted, adequacy tests are used with the main goal of determining the degree of correlation among them (Laura, et al., 2011). The application of the Kaiser–Meyer–Olkin test is specifically aimed at determining the adequacy of the dataset for the application of factor analysis. The value of this test ranges from 0 to 1, whereby values above 0.5 indicate a model suitable for applying factor analysis. Some quantitative economists start from the assumption that if the coefficient value falls within the range of 0.6 to 0.7, then exploratory factor analysis is considered an optimal model for application (Netemeyer, et al., 2003). Additionally, Bartlett’s test is also applied in the empirical analysis as a supplementary indicator of sample adequacy and data suitability. This test assumes the existence of statistically significant matrices that are appropriate for applying factor analysis (Tabachnick & Fidell, 2001). Therefore, if the p-value of this test is statistically significant, then it is possible to proceed with the creation of factor analysis.

3.4. Method for factor extraction (selection): Principal Component Method vs. Factor Analysis

The application of different methods for the extraction of the optimal number of factors is observed among empirical studies, as well as among the views of quantitative economists, who state that there is almost no significant difference between the application of the principal component method and factor analysis (Velicer & Jackson, 1990; Steiger, 1990). In the context of extracting

the optimal number of factors, the following approaches are most commonly used: Principal Component Analysis (PCA), Principal Axis Factoring (PAF), Maximum Likelihood, Unweighted Least Squares, and Generalized Least Squares (Costello & Osborne, 2005). Among these, Principal Component Analysis (PCA) and Principal Axis Factoring (PAF) are highlighted as the most commonly applied methods in socio-economic research in the empirical literature (Henson & Roberts, 2006). It is important to note that no significant differences are observed between these two methods; the only reason why PCA is more frequently used in practice is that it is set as the first or default option in statistical software.

Methods for Selecting the Optimal Number of Factors (Factor Retention Methods)

After the phase of factor extraction, in which factors are selected based on the extent to which their indicator structure explains the largest share of variance, the next step involves determining the appropriate number of factors to be rotated in the model. If a suboptimal number of factors is chosen—either more or fewer than the optimal number—and they are subjected to rotation, this may negatively affect the final results. Selecting the optimal number of factors to which the rotation method will be applied helps reduce the likelihood of obtaining irrelevant results that could lead to incorrect interpretation and understanding of the effects of individual factors. Therefore, when selecting the number of factors, attention must be paid to both over-selection and under-selection of the number of factors in the model. The criteria used in the selection of factors include: the cumulative percentage of variance explained by the factors, and the Kaiser criterion (eigenvalue > 1). In some empirical studies, the aforementioned criteria are used in parallel.

Given the importance of these two criteria, it is considered justified to provide a brief explanation of their role in selecting the factors to which the rotation method will be applied. The cumulative percentage of variance refers to the conclusion that factors which cumulatively

explain 95% of the total variance are selected. Regarding Kaiser's eigenvalue > 1 , factors with an eigenvalue greater than 1 are selected. These values represent a set of scalar values associated with the set in matrix equations (Bentler & Kano, 1990; Velicer & Jackson, 1990). Some economists emphasize the need for caution when using this criterion to select the number of factors to be considered in the analysis, as it may lead to suboptimal selection of factors, it may result in an overestimation of the number of factors (Ledesma & Valero-Mora, 2007).

3.5. Method of Factor Rotation in the Model (Rotation Method)

The next phase in the application of factor analysis is the rotation method. The purpose of applying this method is to simplify and clarify the structure of the variables within the individual factors. The rotation method does not affect the fundamental aspects of the analysis; in other words, it does not influence the degree of variation between or within the individual variables (indicators) within the factor. In the application of the rotation method, different approaches exist, of which only the Varimax rotation will be highlighted here, as it is the most widely used method in practice. In addition to Varimax, econometric software typically also offers the quartimax and equamax orthogonal rotation methods. For the purposes of this analysis, the Varimax rotation method was used.

It should be noted that the purpose of applying factor analysis in this study is primarily analytical and descriptive, aiming to summarise highly correlated labour market indicators into a smaller set of composite empirical dimensions. Given that many indicators represent structural disaggregations of labour market variables (e.g. by gender, age and education), the extracted factors should be interpreted as empirical patterns of labour market characteristics rather than strictly latent theoretical constructs.

4. DISCUSSION OF FACTOR ANALYSIS RESULTS

4.1. Factor Analysis Results for Segment 1: Employment

The results of the applied factor analysis presented in Table 3 show that, using the principal component method, four factors were retained. This method allows for the identification of the factors that explain the maximum variance in the data with the smallest number of factors. The results for Factor 1 show that it has the highest eigenvalue of 7.2 and explains approximately 42% of the variance. The difference between its eigenvalue and that of the next factor is 4.06, which emphasizes the strong distinction and significance between Factor 1 and Factor 2 in explaining the variance in the model. Regarding the results of Factor 2, it has an eigenvalue of 3.2 and explains an additional 18.5% of the variance, making these two factors together account for

about 61% of the total variance. Furthermore, Factor 1 includes demographic and educational indicators and characteristics of the labor market (see Table 4). These indicators show high loadings in employment among women (0.9146), men (0.8938), and individuals with secondary education (0.9120), indicating their key role in shaping the structure and performance of the labor market. Factor 2, with an eigenvalue of 3.2, explains an additional 18.5% of the variance and is strongly associated with part-time employment, highlighting the distinction between this form of employment and full-time employment.

Regarding the next factor, the eigenvalue of Factor 3 and the degree of variance it explains suggest that this factor has a smaller, yet still significant, contribution to

explaining the variations in the model. Factor 3 addresses the challenge of the educational level of workers relative to that required in available jobs. Specifically, the results indicate high loadings for individuals with a lower level of education compared to what is required in relevant jobs (0.9749), for workers with a higher level of education than required (0.9612), as well as those with only primary education (0.9042). These results underscore a structural issue in the labor market that calls for investment in lifelong learning programs and improved alignment between educational qualifications and labor market needs. Factor 4, with an eigenvalue of 1.77, reflects the role of older workers (0.892) and employment in the industrial sector (0.8244), highlighting the continued strong dependence on traditional sectors

and the limited transition toward the tertiary sector (see Table 4).

In summary, the results from the conducted factor analysis indicate the successful identification of four distinct factors that explain about 85% of the total variation in the model. The results emphasize the complex demographic, educational, and sectoral characteristics of the labor market. These factors reflect the need to improve the participation of women and various age categories of workers in the labor market, as well as to introduce structural changes that promote diversification and productivity growth, particularly through the development of the tertiary sector and educational programs. The identified factors provide a basis for the development of measures and policies aimed at increasing the efficiency and inclusiveness of the labor market.

Table 3: Factor Analysis Using the Principal Component Method, Retained Factors: 4

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	7.21965	4.06829	0.4247	0.4247
Factor 2	3.15136	0.86133	0.1854	0.6101
Factor 3	2.29003	0.51661	0.1347	0.7448
Factor 4	1.77342	0.98373	0.1043	0.8491

Source: Author's Own Calculations

Table 4: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Female Employment Population Ratio	0.9146	0.3012	0.1593	0.0276	0.0466
Employment Population Ratio by Intermediate Education Level	0.912	0.0704	0.2353	-0.0944	0.099
Employment Population Ratio (Age 25-54)	0.9032	0.2675	0.2171	-0.1143	0.0524
Male Employment Population Ratio	0.8938	0.2749	0.253	0.0773	0.0556
Employment Population Ratio (Age 25-54)	0.7462	0.443	0.1442	-0.0525	0.2234
Employment Population Ratio (Age 55-64)	0.7288	0.0786	-0.0781	0.2811	0.3775
Employment Population Ratio (Advanced Education)	0.5481	-0.0263	0.4765	-0.3017	0.3809
Part time Employment (Female)	0.2472	0.9557	0.0035	0.0704	0.0207
Part Time Employment (Male)	0.2407	0.9549	0.0742	0.0222	0.0243
Employment by Educational Mismatch (Matched)	0.1907	0.9412	-0.0677	0.0488	0.0708
Employment by Educational Mismatch (Undereducated)	0.1333	0.021	0.9749	-0.0697	0.0265
Employment by Educational Mismatch (Overeducated)	0.1696	-0.0295	0.9612	-0.051	0.0439
Employment Population Ratio (Basic Education)	0.2854	0.0789	0.9042	0.0166	0.0944
Employment Population Ratio (Age 65+)	0.0277	0.1208	-0.1749	0.892	0.1585
Manufacturing Employment	0.1939	0.0688	0.155	0.8244	0.2539
Employment Population Ratio (Less than Basic Education)	0.4394	-0.0028	0.0728	-0.7195	0.2839

Source: Author's Own Calculations

4.2. Results from Factor Analysis – Segment 2: Labor Force

The labor force represents one of the fundamental segments of the labor market. By encompassing the total

working-age population, which constitutes the overall labor supply in the economy, it provides information about the capacity and relevant characteristics of the supply side of labor in individual national economies. In analyzing the performance and dynamics of the labor market, factor analysis is applied to identify the key characteristics and differences among the various groups of workers that comprise the total labor force. In the countries of Central and Southeastern Europe, where labor markets have been significantly shaped by transition processes—particularly the shift from a planned to a market economy—these transitions have also substantially influenced labor market structures (Hornstein Tomic, 2019). The results of the factor analysis contribute to the segmentation of the labor force by age, gender, and level of education in the selected Central and Southeastern European countries. Hence, the factor analysis helps to better understand the significance and role of these variables in labor market performance, as well as the extent to which education and demographic characteristics contribute to labor force segmentation and to the possibility of worker integration into the labor market.

The labor force, as one of the most comprehensive labor market indicators—representing the total working-age population—is included in the factor analysis as Segment 2 of the labor market. The results from the conducted factor analysis for the selected countries of Central and Southeastern Europe (Albania, Bosnia and Herzegovina, Serbia, Macedonia, Slovenia, Croatia, Bulgaria, Romania, Slovakia, Czech Republic, Poland, and Hungary) for the period 2005–2022 are presented in Table 2.7 and Table 2.8. The results show that Factor 1 has the highest eigenvalue of 3.26, meaning it contributes the most to explaining the variance among factors, accounting for approximately 33% of the total variance. Factor 1 is significantly influenced by the total labor force, as well as variables that segment the labor force by age categories and gender distribution.

One of the variables representing a significant source of variation in the labor market is the female labor force aged 25–54, with a factor loading of 0.95. Another variable with a strong influence on the model's variations is the labor force aged 25–54, with a loading of 0.91. The substantial difference between Factor 1 and Factor 2 demonstrates that the individual variables in Factor 1 contribute significantly to the total variance in the model. The cumulative proportion of variance explained by the four factors is 80.61%, suggesting that

these four factors account for the majority of variability in labor force-related variables in these countries.

Furthermore, Factor 2 includes indicators related to the educational level of the labor force. In the countries of Central and Southeastern Europe, the level of education—as well as labor market performance—is highly correlated with the characteristics and dynamics of the labor force. The results of the factor analysis suggest that the educational level of the labor force is a determinant explaining a significant portion of the variation within Factor 2. In the context of labor market segmentation, and with respect to the relevance of dual labor market theory, workers with higher education tend to form a distinct market segment, as confirmed by the high factor loadings in Factor 2. This indicates that higher education is correlated with labor force participation.

Additionally, these results reflect a tendency toward the employment of highly educated workers, as well as an increased demand for highly qualified workers in the labor market. Conversely, individuals with low levels of education—based on their characteristics, performance, and qualifications, form a distinct labor market contingent likely to face challenges in labor market integration.

Moreover, Factor 3 (16.6% of the variance) emphasizes the role of the labor force with secondary and higher education, with special emphasis on those with secondary education (0.7573). This indicates that this group remains a significant component of the labor market, although it is less competitive compared to highly educated workers. On the other hand, Factor 4 (12.42% of the variance) is associated with young workers (aged 15–24), with a loading of 0.9027, highlighting the vulnerability of this group, particularly in the face of economic shocks and insufficient integration.

The cumulative variance of 80.61%, explained through the four factors, suggests that the factor analysis successfully captures the main aspects of the labor force in the selected countries. The results show that demographic characteristics, education, and age structure play a key role in shaping the labor force in the countries of Central and Southeastern Europe. This implies that effective policies to improve employability and worker mobility should be aimed at supporting vulnerable groups, increasing educational attainment, and enhancing skills—particularly for young and low-educated workers.

Table 5: Factor Analysis Using the Principal Component Method, Retained Factors: 4

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	3.26205	1.36562	0.3262	0.3262
Factor 2	1.89643	0.23595	0.1896	0.5158
Factor 3	1.66049	0.41855	0.1660	0.6819
Factor 4	1.24194	0.47052	0.1242	0.8061

Source: Author's Own Calculations

Table 6: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Female Labor Force	0.9526	-0.0173	0.0257	0.0634	0.0876
Labor Force (Age 25-54)	0.9124	-0.2080	-0.0724	0.0597	0.1154
Male Labor Force	0.7871	0.0789	0.4791	0.0492	0.1422
Labor (Age 55-64)	0.6507	0.1230	0.0295	-0.6278	0.1664
Labor Force (bachelor's degree Holders)	-0.1436	0.8943	0.1266	0.0356	0.1623
Labor Force (Age 65 and Over)	0.1506	0.7658	-0.2702	0.0940	0.3091
Labor Force (Less than Basic Education)	-0.3632	0.5283	0.4210	-0.4908	0.1708
Labor Force (Intermediate Education)	0.4054	0.1090	0.7573	0.0844	0.2432
Labor Force (Advanced Education)	-0.1799	-0.1893	0.6729	0.2426	0.4202
Labor Force (Age 15-24)	0.1283	0.1265	0.1756	0.9027	0.1218

Source: Author's Own Calculations

4.3. Factor Analysis Results – Segment 3: Unemployment

The results of the factor analysis for the unemployment segment offer a broad coverage of the various characteristics and categories of unemployed individuals across different educational and demographic groups of workers. Using the principal component method, three factors were retained, which account for 96.16% of the cumulative variance and explain approximately 96% of the total variability (see Table 7 and Table 8). The first factor, with an eigenvalue of 8.6, represents the largest portion of the variance, at 70.41%, which indicates its dominant role in explaining unemployment patterns. The second and third factors, with eigenvalues of 2.0 and 1.14 respectively, represent smaller proportions of variance (16.4% and 9.3%), but together with the first factor contribute to the overall explanatory power of the model.

The first factor shows high similarities between the various variables that make up this indicator. Within this indicator, significant positive loadings are observed for unemployment by gender, according to the level of education, as well as according to whether individuals are located in rural or urban areas. These results indicate that these variables share a significant underlying factor that drives unemployment in the selected countries. Thus, the first factor represents the structural characteristics of unemployment that have a significant impact

on overall labor market performance. Regarding youth unemployment (ages 15–25), it represents a significant indicator that contributes to the overall variability of unemployment.

With regard to Factor 2, the results indicate that it captures unemployment from the perspective of duration, specifically the length of time individuals remain actively engaged in job search. The highest positive loadings within this factor are observed for unemployment duration from 6 to 12 months (0.95), and for less than 6 months (0.86), which indicates that in the overall variance of unemployment, short-term and medium-term unemployment have the greatest impact. Therefore, it can be stated that a significant share of workers experience short-term, or frictional, unemployment, which reflects situations where individuals remain unemployed only briefly while transitioning between jobs, as well as cases where recent graduates enter the labor market within a relatively short period. Thus, it can be concluded that frictional unemployment represents an immanent characteristic of modern labor markets. However, the fact that in this factor the level of education of the unemployed is also emphasized, as an indicator that contributes to the total variability, requires special caution when analyzing such relations. Namely, within this factor, a relatively high loading is observed for unemployed individuals with incomplete primary education,

indicating that some of these workers may face additional challenges in integrating into the labor market and may therefore remain outside employment for a longer period.

Within the third factor, high loadings are also observed for unemployment, especially among individuals with incomplete secondary education (0.85), as well as among unemployed individuals with primary education (0.51). This suggests that Factor 3 captures the educational aspect of unemployment, particularly for those with lower levels of education. The strong positive loading on this factor implies that individuals with lower educational levels and qualifications face significant challenges in integrating into the labor market and exhibit lower employability compared to workers with higher levels of education. Additionally, long-term unemployment (12 months or more) moderately loads on this factor, which shows that individuals with lower educational qualifications are more likely to experience long-term unemployment. Furthermore, the uniqueness values provide additional insights, with most variables showing low uniqueness, which suggests that the retained factors explain a significant portion of the variance in the data set. However, higher uniqueness values for long-term unemployment (0.1461) and unemploy-

ment among individuals with less than primary education (0.2274) suggest that these variables may have unique characteristics that are not fully captured by the three factors.

In conclusion, the factor analysis identifies three essential dimensions of unemployment within the labor market. First, unemployment emerges as a structural determinant that shapes overall labour market performance. Second, the duration of unemployment represents a distinct temporal dimension that influences both the characteristics and the intensity of unemployment. Third, the educational profile of unemployed individuals constitutes an additional dimension that affects the aggregate unemployment rate and the likelihood of successful labour market integration for certain groups. Therefore, these results suggest that addressing unemployment requires a multi-layered approach aimed at structural factors and specific challenges faced by workers with lower levels of education, as well as long-term unemployed individuals. Such results can serve in the creation of additional measures and policies aimed at reducing unemployment in different segments of the labor market, with particular attention to individuals with insufficient skills and qualifications, as well as workers facing long-term unemployment.

Table 7: Factor Analysis Using the Principal Component Method, Retained Factors: 3

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	8.62226	6.61154	0.7041	0.7041
Factor 2	2.01072	0.86888	0.1642	0.8683
Factor 3	1.14184	0.80133	0.0932	0.9616

Source: Author's Own Calculations

Table 8: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Factor 3	Uniqueness
Unemployment (Age 15 and Above)	0.9902	-0.1068	-0.0265	-0.0004
Unemployment (Male)	0.9895	-0.0789	0.0202	-0.0004
Unemployment (Intermediate Education)	0.9869	-0.0869	-0.0878	0.0016
Unemployment (Age 15-25)	0.9814	-0.0307	-0.0997	0.0131
Unemployment (Female)	0.9794	-0.1405	-0.0709	-0.0012
Unemployment (Urban Areas)	0.9642	-0.0959	-0.1692	0.0052
Unemployment (Rural Areas)	0.9350	-0.1417	0.1926	0.0293
Unemployment (Advanced Education)	0.8813	-0.1323	-0.2228	0.0485
Unemployment (Basic Education)	0.7620	-0.1574	0.5147	0.0378
Long-Term Unemployment (12 months or more)	0.6286	0.5001	-0.1158	0.1461
Unemployment (Duration 6-12 months)	-0.0366	0.9493	0.0412	0.0846
Unemployment (Duration Less than 6 months)	-0.4037	0.8604	-0.0282	0.0734
Unemployment (Less than Basic Education)	-0.2135	0.0418	0.8496	0.2274

Source: Author's Own Calculations

4.4. Factor Analysis Results – Segment 4: Discouraged Workers Seeking Employment

The results of the conducted factor analysis related to the category of discouraged job seekers emphasize that

two factors have been identified as relevant (see Table 9 and Table 10). Factor 1 contains a dominant portion of the variations in the model, with an eigenvalue of 6.53435 it accounts for around 72.6% of the total variance. This proportion points to the high significance of the individual variables that are part of Factor 1 and that have a considerable impact in determining the share of the labor force that is discouraged from seeking employment. The results from Factor 1 show that particularly significant categories of workers who are discouraged from job searching are individuals aged 25–54, as well as those who have only completed primary education. Regarding Factor 2, although it has a smaller contribution to explaining the total variance in the model, with an eigenvalue of 1.26273 it explains about 14% of the total variance in the model. This factor highlights the importance of discouraged workers aged over 65, as well as individuals with higher education in determining the total variance in the model. Hence, the cumulative variance explained by Factor 1 and Factor 2 reaches 86.6%, which emphasizes the high level of coverage of the individual variables in the model.

The results from the loadings within the factors show that variables such as gender, age structure, and educational level are key determinants in determining discouragement in the labor market. For example, discouraged women and men show high positive loadings

within Factor 1, with values of 0.9250 and 0.8918, respectively, which suggests that discouragement is a widespread phenomenon in terms of the gender distribution of the labor force. Furthermore, the high loadings for discouraged workers with primary education (0.9369) indicate significant challenges faced by this group, especially due to the mismatch of their skills and qualifications with the needs of the labor market. Factor 2, on the other hand, highlights the importance of specific groups, such as workers aged over 65 (loading of 0.8703) and those with higher education (loading of 0.7106). These results indicate the existence of different mechanisms and barriers that influence discouragement, which require detailed analysis for a better understanding of their nature. In this regard, it is worth noting that some empirical studies that also emphasize the demographic and educational structure as part of the determinants of the labor market particularly highlight the educational level of the labor force, as well as its alignment with the needs of the labor market (Yunisvita, et al., 2021). The results of the factor analysis in this segment lead to the conclusion that among discouraged workers seeking employment, the main indicators are considered to be the level of education and the age of the workers.

Table 9: Factor Analysis Using the Principal Component Method, Retained Factors: 2

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	6.53435	5.27162	0.7260	0.7260
Factor 2	1.26273	0.60568	0.1403	0.8663

Source: Author's Own Calculations

Table 10: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Uniqueness
Discouraged Job Seekers (Age 25-54)	0.9462	0.2707	0.0315
Discouraged Job Seekers (Basic Education)	0.9369	0.0260	0.1215
Discouraged Job Seekers (Female)	0.9250	0.3179	0.0433
Discouraged Job Seekers (Male)	0.8918	0.3628	0.0732
Discouraged Job Seekers (Age 15-24)	0.8858	-0.0331	0.2142
Discouraged Job Seekers (Intermediate Education)	0.7492	0.5218	0.1665
Discouraged Job Seekers (Age 55-64)	0.6567	0.6230	0.1806
Discouraged Job Seekers (Age 65 and above)	-0.0635	0.8703	0.2386
Discouraged Job Seekers (Advanced Education)	0.6014	0.7106	0.1335

Source: Author's Own Calculations

4.5. Factor Analysis Results – Segment 5: Youth Unemployment

Youth unemployment and its far-reaching implications for labor markets in Central and Southeast European countries is a subject of analysis among academic economists (O'Reilly, et al., 2015; Tomic, 2018; Cefalo & Scandurra, 2023). High rates of youth unemployment not only represent an indicator of the level of underuti-

lization of human potential, but also contribute to an increased risk of social exclusion, poverty, and reduced employment prospects for this category of workers. The labor markets in Southeast European countries, especially among the Western Balkan countries, are characterized by significant structural distortions, increased levels of mismatch between the educational profile of workers and the required qualifications for available

jobs, which lead to a permanent reduction in the potential for generating new added value from young workers. Reducing youth unemployment is a key factor in creating and maintaining long-term economic growth rates, improving and strengthening social cohesion, and ensuring the successful integration of young people into the labor market, either as wage employees or entrepreneurs who establish their own businesses.

The results from the conducted factor analysis of this labor market segment, youth unemployment, based on the structure of the indicators, identify only one relevant factor (Table 11). Factor 1, with an eigenvalue of 3.78, explains about 94.4% of the total variance among the individual variables that contain data on youth unemployment. These results point to the high significance of the variables related to demographic characteristics and the variables that indicate the duration of youth unemployment. Particularly high factor loadings, ranging from 0.9625 to 0.9772, signal a strong correlation within the variables of Factor 1. This structure of variables, complemented by the high level of loading within

the factor, is an indicator of its importance in determining youth unemployment in Central and Southeast European countries. Additionally, one of the variables that has a significant impact on youth unemployment is long-term youth unemployment, that is, young workers who have been unemployed for more than 12 months (see Table 12). Long-term youth unemployment is particularly prominent among the female labor force, indicating gender disparities in the success rate of youth integration into the labor market. Furthermore, significant loadings within Factor 1 are also observed among men and women aged 15–29, which shows that, although with different intensity between men and women, they face a range of challenges in the process of finding sustainable employment in the countries of Central and Southeast Europe. In summary, the factor analysis applied to youth unemployment – as one of the segments of the labor market – points to the significance of long-term youth unemployment as one of the factors that negatively affects the potential for increasing medium- and long-term labor productivity in the countries of Central and Southeast Europe.

Table 11: Factor Analysis Using the Principal Component Method, Retained Factors: 1

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	3.77666	3.59216	0.9442	0.9442

Source: Author's Own Calculations

Table 12: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Uniqueness
Youth Unemployment (Duration More than 12 months, Female)	0.9772	0.0451
Youth Unemployment (Age 15-29, Male)	0.9756	0.0483
Youth Unemployment (Age 15-29, Female)	0.9714	0.0565
Youth Unemployment (Duration More than 12 months, Male)	0.9625	0.0736

Source: Author's Own Calculations

4.6. Factor Analysis Results – Segment 6: Persons Outside the Labour Force

Persons who are outside the labor force represent a significant segment of the labor market, especially in developing countries that are facing an intensive outflow of the working-age population. Therefore, within the individual segments of the labor market, factor analysis is also applied to persons who are outside the labor force. The analysis of this category of workers enables a detailed examination of the determinants that influence their exclusion from the labor market, as well as the opportunities and potentials for their activation. In this regard, the conducted factor analysis explores the basic characteristics of persons who are outside the labor force.

The results of the factor analysis identify one dominant factor, with an eigenvalue of 8.66, which explains 86.6% of the total variance in the model (see Table 13). This indicates that Factor 1 successfully consolidates the most important variables related to persons outside the labor force, including gender, age groups, and level

of education. The high factor loadings, ranging from 0.3185 to 0.9993, indicate a strong correlation among these indicators within Factor 1. It is important to note that these high loadings are observed equally for both men and women, which indicates a pronounced participation of both genders in the overall variability within this segment of the labor market. These results point to the pronounced contribution to the total variation of both men and women who are outside the labor force (Table 14).

In terms of age categories, the high factor loadings for young people (15–24 years) and persons aged over 55 indicate that these groups are particularly represented among persons who are outside the labor force. For example, for persons aged over 65, the factor loading is 0.9738. These results show that, despite different reasons (e.g., educational obligations, retirement, or health limitations), these age groups are highly represented among the inactive population. In the context of educational level, persons with primary and secondary education dominate in this segment, with factor loadings of

0.9616 and 0.9828, respectively. Additionally, the results show that persons with higher education (loading of 0.9080) are also significantly represented, indicating the existence of challenges for their activation in the labor market. However, the lowest loading is recorded among persons with less than primary education (0.3185), which suggests their marginalization and potential exclusion.

The results of the analysis serve as a basis for the creation of additional measures and policies aimed at activating and integrating persons outside the labor force, with a focus on youth and older working-age groups, as

well as those with lower education. Policies should include educational and training programs to improve the qualifications and skills of young people, inclusive measures for older workers such as flexible work arrangements and improved working conditions, and initiatives for reintegrating marginalized groups through training, as well as opportunities for upskilling and re-skilling these individuals. These findings confirm the claims of empirical research on the importance of demographic and educational characteristics as key determinants of labor market activity, providing a foundation for identifying specific groups that should be targeted to increase economic activity or reduce inactivity.

Table 13: Factor Analysis Using the Principal Component Method, Retained Factors: 1

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	8.66049	7.71562	0.8660	0.8660

Source: Author's Own Calculations

Table 14: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Uniqueness
Persons outside the labor force (Male)	0.9993	0.0015
Persons outside the labor force (Female)	0.9989	0.0022
Persons Outside the Labor Force (Age 15-24)	0.9816	0.0365
Persons Outside the Labor Force (Age 55-64)	0.9854	0.0289
Persons Outside the Labor Force (Age 65 and above)	0.9738	0.0517
Persons Outside the Labor Force (Advanced Education)	0.9080	0.1756
Persons Outside the Labor Force (Intermediate Education)	0.9828	0.0340
Persons Outside the Labor Force (Basic Education)	0.9616	0.0754
Persons Outside the Labor Force (Less than Basic Education)	0.3185	0.8986

Source: Author's Own Calculations

4.7. Factor Analysis Results – Segment 7: Potential Labour Force

The results from the factor analysis in the case of the potential labor force, as one of the segments of the labor market, using the principal component method, indicate the retention of two factors which significantly explain the variations affecting the potential labor force in the labor market in the countries of Central and Southeastern Europe (see Table 15). Namely, the values of Factor 1 show that it has an eigenvalue of 7.58704, which accounts for approximately 76 percent of the total variance, while Factor 2, with an eigenvalue of 1.58636, explains an additional 16 percent of the total variance in the model. Cumulatively, these two factors explain 92% of the total variance in the model. This high cumulative proportion indicates the fact that the structure of the variables (indicators) in these two factors explains the largest part of the variance within the potential labor force. The application of the rotation method enables analysis of the structure and loadings with the individual determinants that make up the potential labor force within the two factors. Factor 1 is strongly associated with variables representing the age structure, gender structure, and

level of education of the potential labor force (see Table 16). Thus, with the exception of persons who have not completed primary education, persons with completed primary, secondary, or higher levels of education show positive loadings within factor 1. The significant positive degree of loading for both men and women leads to the conclusion that this factor does not make a significant distinction between male and female potential participants in the labor force. Furthermore, within factor 2, a different dimension of the potential labor force is represented, focusing on the positive loading of persons who have not acquired primary education, which indicates that within this factor, workers who have no formal education are included and may be influenced by factors that will affect their inclusion in certain segments of the informal labor market as a result of educational barriers and insufficient qualifications for integration into formal employment (see Table 16).

The negative loading values for workers with higher education within this factor suggest that these individuals are less likely to participate in the informal labor market and are more likely to be integrated into the formal economy. Regarding the results for uniqueness in the

model, they represent the variance within each variable that is not explained by the retained factors, and they are relatively low for most variables, which shows that the two factors have a significant scope in the total variance in the model. However, the relatively high uniqueness value for individuals with incomplete primary education indicates that certain characteristics within this group of the potential labor force require further examination, as they are not fully captured within the scope of this analysis.

Summarized, the factor analysis reveals a clear dichotomy within the potential labor force, based on the tradi-

tional determinants of employability such as educational attainment and age (Factor 1), as well as the likelihood of integration into the informal labor market, particularly among individuals who have not completed primary education (Factor 2). These findings underscore the presence of segmentation and duality within the labor markets of Central and Southeastern European countries, reflecting a dual structure even within the pool of potential workers. This, in turn, highlights the need for differentiated and well-targeted policy measures aimed at ensuring the effective and sustainable integration of these groups into the labor market.

Table 15: Factor Analysis Using the Principal Component Method, Retained Factors: 2

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	7.58704	6.00068	0.7587	0.7587
Factor 2	1.58636	1.13702	0.1586	0.9173

Source: Author's Own Calculations

Table 16: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Uniqueness
Potential Labor Force (Education Intermediate)	0.9731	0.0972	0.0435
Potential Labor Force (Age 55-64)	0.9694	-0.0526	0.0574
Potential Labor Force (Advanced Education)	0.9531	-0.1589	0.0664
Potential Labor Force (Female)	0.9483	0.2673	0.0293
Potential Labor Force (Male)	0.9461	0.2715	0.0311
Potential Labor Force (Age 25-54)	0.9263	0.3605	0.0120
Potential Labor Force (Age 65 and above)	0.9039	-0.2739	0.1079
Potential Labor Force (Age 15-24)	0.8324	0.4473	0.1071
Potential Labor Force (Less than Basic Education)	-0.1619	0.8682	0.2200
Potential Labor Force (Basic Education)	0.6144	0.6861	0.1517

Source: Author's Own Calculations

5. DISCUSSION OF THE RESULTS OF THE CONDUCTED FACTOR ANALYSIS ON LABOUR MARKET PERFORMANCE AND CHARACTERISTICS

5.1 Structural Determinants of Labour Market Performance

The results of the conducted factor analysis provide a comprehensive and comparative overview of the performance and specific characteristics of labour markets in the countries of Central and Southeastern Europe. The analysis highlights the importance of demographic, educational and structural factors in shaping labour market outcomes across the analysed economies.

The findings indicate that the labour force aged 25–54 represents a key segment of economic activity, with high factor loadings reflecting its central role in sustaining labour productivity. The availability of a qualified labour force as a determinant of labour market performance has also been emphasised in previous empirical studies (Gebel, 2022). At the same time, unemployment emerges as a multidimensional challenge reflecting the structural characteristics of individual economies. These challenges are closely related to the limited absorption capacity of labour markets and the mismatch between the qualifications and skills of workers and those required by employers.

In several Western Balkan countries, Albania, Serbia, North Macedonia and Bosnia and Herzegovina, unemployment rates have remained in double digits for extended periods, particularly with regard to youth and long-term unemployment. The persistent presence of long-term unemployment, especially in North Macedonia, further illustrates the structural constraints affecting labour markets in this part of the region. Long-term unemployment reflects deep and persistent imbalances associated with the transition from centrally planned to market economies. The transition process exposed structural weaknesses within national economies and highlighted the limited ability of labour markets to absorb labour supply. In this sense, long-term unemployment can be interpreted both as a consequence and as a symptom of broader structural challenges, including shifts in industrial structures, weaknesses in education systems and limited opportunities for employment in dynamic and high value-added sectors. Consequently, long-term unemployment should not be viewed solely as a result of short-term macroeconomic fluctuations but rather as a structural phenomenon associated with

insufficient economic adaptation and limited labour market flexibility.

Empirical studies frequently identify long-term unemployment as one of the most severe forms of unemployment and a significant challenge for developing and transition economies. Prolonged exclusion from the labour market often leads to economic inefficiency and increased financial dependency among affected individuals. Structural weaknesses and incomplete economic transformation reduce the capacity of labour markets to absorb additional labour supply, particularly within industrial sectors undergoing restructuring. When technological progress is not accompanied by sufficient job creation, a segment of the labour force remains persistently excluded from employment, contributing to the persistence of long-term unemployment. Individuals affected by long-term unemployment often include workers with lower levels of education, inadequate skills and qualifications, as well as older workers who have been outside the labour market for extended periods. Although this labour force could potentially contribute to economic productivity, prolonged absence from employment increases the risks of marginalisation and socio-economic exclusion. In addition, long-term unemployment may increase dependence on social transfers, which can also affect the fiscal capacity of national economies.

The importance of long-term unemployment within the principal component analysis further highlights the structural characteristics of labour markets in the analysed region. Workers experiencing prolonged unemployment frequently face significant barriers to re-employment, including skill obsolescence, limited opportunities for retraining and social or psychological factors that reduce job-search intensity. Empirical research suggests that when effective retraining and reintegration policies are absent, long-term unemployed individuals face continued economic exclusion and declining labour market participation (Carter, 2015). High levels of long-term unemployment may also affect the broader economic potential of a country. Some authors associate persistent long-term unemployment with low growth in labour productivity, which may lead labour markets into a so-called “low equilibrium trap”, a state characterised by a high share of long-term unemployment, weak productivity growth and low labour force participation. In many countries of Central and Southeastern Europe, persistently high levels of long-term unemployment indicate limited capacity to create sustainable employment opportunities that correspond to the evolving structure of the economy and technological change (Landmann, 2004; Berger et al., 2019). Consequently, long-term unemployment represents not merely a statistical indicator but an important socio-economic signal of deeper structural challenges. Addressing this issue requires targeted policy measures, including retraining and upskilling programmes that enable the reintegration of long-term unemployed individuals into the labour

market and support productivity growth and sustainable economic development.

5.2 Labour Market Segmentation and Vulnerable Groups

The results of the principal component analysis applied to different labour market segments indicate a significant presence of discouraged workers, particularly among individuals aged 25–54 with basic levels of education. Although these individuals belong to the economically active population, their withdrawal from active job search reflects broader structural inefficiencies within labour markets. Discouraged workers often emerge as a consequence of prolonged unemployment, persistent skill mismatches and insufficient labour market integration measures. Empirical literature on transition economies highlights the role of structural segmentation in shaping labour market outcomes (El-hadj & Brada, 2014). The presence of discouraged workers therefore reflects not only individual characteristics such as education and skills but also broader structural limitations, including the lack of available employment opportunities and the limited effectiveness of labour market institutions.

The analysis further indicates that workers with lower levels of education frequently experience marginalisation within labour markets. This marginalisation often results in exclusion from the formal sector and limited access to stable and secure employment. Such patterns contribute to the emergence of labour market “vicious circles”, where individuals remain outside the labour market, engage in informal employment or become trapped in low-paid positions. The results also support the concept of labour market duality. Workers with secondary and higher education are more likely to be integrated into the formal sector and to participate in employment aligned with modern labour market demands. Conversely, individuals with incomplete or only primary education face higher risks of long-term unemployment and lower participation in formal employment. As a result, these workers often experience increased dependence on social transfers and passive labour market measures.

5.3 Cross-Country Differences in Labour Market Performance

The factor analysis results reveal significant differences in labour market performance among the countries of Central and Southeastern Europe. These differences reflect varying models of economic transition, the effectiveness of institutional reforms and the capacity of labour markets to integrate diverse groups of workers. It is important to note that labour market outcomes are influenced not only by economic policies but also by broader historical, social and cultural factors.

Countries such as Slovenia, Czechia, Slovakia and Poland demonstrate comparatively stronger labour market performance. In these economies, labour market institutions appear more effective in facilitating the integration

of women and individuals with lower levels of education. The successful integration of these groups reflects both effective transition processes and the diversified industrial structures of these economies. For example, Slovenia exhibits relatively high female labour force participation, supported by active labour market policies and social measures encouraging labour market integration. Similarly, Czechia shows a high participation rate of workers with tertiary education, reflecting policies aimed at retraining and skill upgrading in response to technological and structural economic changes. In contrast, Western Balkan countries, including Albania, North Macedonia and Bosnia and Herzegovina, continue to face significant structural challenges. High levels of youth and long-term unemployment indicate limited labour market capacity to generate sufficient employment opportunities. Workers with lower education levels, women and older individuals often experience reduced prospects for labour market integration. Some studies attribute these outcomes to insufficient labour market reforms and limited effectiveness of policy measures implemented in these economies (Pizzinelli et al., 2023).

Another important challenge concerns the mismatch between education systems and labour market demands. In several Western Balkan countries, individuals with tertiary education are often employed in positions requiring lower levels of qualification, while workers with limited education encounter serious barriers to stable employment. Such mismatches contribute to persistent labour market segmentation and high levels of youth

6. CONCLUSION

This study examined the long-term structural transformations of labour markets in twelve Central and South-eastern European countries during the period 1993–2024, drawing on a multidimensional analytical framework that combines descriptive statistics, labour market theory and factor analysis. The findings reveal that despite more than three decades of transition, labour markets in the region continue to exhibit profound differences in performance, institutional capacity and structural resilience. These differences stem not only from initial transition conditions, but also from the varying depth, pace and sequencing of economic reforms across countries.

The results demonstrate that labour market duality remains a defining structural feature of the region. Advanced EU member states such as Slovenia, Slovakia, the Czech Republic and Poland have gradually consolidated primary labour market characteristics higher-quality jobs, more stable employment relations, and stronger social protection systems. In contrast, Western Balkan economies continue to face persistent vulnerabilities, including high informality, low employment rates, limited mobility and pronounced skill mismatches. These factors contribute to the sustained pres-

ence of a large secondary labour market segment characterised by precarious work, vulnerable self-employment and weak institutional protections. The application of factor analysis enabled the identification of latent structural patterns that underpin labour market outcomes. The extracted factors—relating to inactivity, discouraged workers, the structure of employment, unemployment dynamics and youth labour market performance—collectively illustrate the multidimensional nature of labour market disparities. The separation between Western Balkan countries and more advanced EU members is structurally embedded across several factor dimensions, suggesting that convergence cannot be achieved solely through economic growth, but requires deeper institutional reforms and targeted labour market interventions.

Overall, the analysis indicates that labour market performance across Central and Southeastern Europe is shaped by a complex interaction of demographic, educational and structural factors. Economies with higher levels of economic development, such as Slovenia, Czechia and Slovakia, demonstrate stronger capacity to integrate vulnerable groups into the labour market. These outcomes suggest more effective labour market institutions and more successful implementation of economic reforms. At the same time, education level, gender and age emerge as key determinants of labour market outcomes. In more developed labour markets these factors contribute to higher productivity, stronger inclusiveness and lower structural unemployment. In contrast, Western Balkan economies continue to face persistent structural challenges, including lower productivity levels, gender disparities in employment, skill mismatches and the continued presence of informal labour markets.

Sectoral disparities, particularly the enduring reliance on agriculture as a major source of employment in parts of Southeastern Europe, further amplify the structural divide. Low productivity, technological stagnation and fragmented agricultural structures continue to limit the capacity of these economies to generate quality non-agricultural employment and to transition workers toward higher productivity sectors. These constraints are exacerbated by demographic pressures, including migration,

population aging and shrinking labour force participation. Institutional factors also remain central in shaping labour market performance. Rigid labour regulations, insufficient enforcement, low awareness of worker rights and weak social protection frameworks continue to constrain market efficiency and adaptability. The 2008 financial crisis and the COVID-19 pandemic exposed these vulnerabilities, revealing limited capacity to respond to external shocks and highlighting the need for more resilient labour market institutions.

Taken together, the findings underscore the importance of a multidimensional reform agenda aimed at strengthening labour market resilience, enhancing inclusiveness and supporting convergence with EU standards. Priority areas include: improving the alignment of education and training systems with labour market needs; accelerating structural transformation toward higher-productivity

sectors; strengthening activation policies; modernising labour regulations to balance flexibility and security; and addressing informality through incentives, enforcement and improved social protection coverage.

Ultimately, this comparative assessment demonstrates that labour market transformation in Central and South-eastern Europe is an ongoing and uneven process. While significant progress has been made in several countries, persistent structural gaps—especially between the Western Balkans and the more advanced EU members—highlight the need for sustained policy commitment and long-term institutional strengthening. Only through coordinated reforms can the region achieve durable labour market convergence, enhance economic competitiveness and improve social and employment outcomes for its populations.

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THE RELATIONSHIP BETWEEN ENTREPRENEURIAL ACTIVITY AND THE LEVEL OF DEVELOPMENT – PRELIMINARY EMPIRICAL ANALYSIS IN SELECTED COUNTRIES

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Abstract

Recently, a new direction of research on the connection between entrepreneurial activity and development has emerged. In the scientific literature that deals with the subject matter, there is a great variety of variables that express the level of entrepreneurial activity. The mentioned diversity is the result of differences in the interpretation of entrepreneurship. The research results vary depending on how entrepreneurship is interpreted, whether as a way of behaving, a business registration process, or a productive activity. This paper aims to: (a) present, in a systematic way, indicators that can be employed as direct or indirect measures of the level of entrepreneurship and (b) examine the relationship between entrepreneurship and the level of country development. For the purpose of the mentioned analysis we used the Global Entrepreneurship Monitor (GEM) 2024 data relevant and comparable for 46 selected countries. The results of our preliminary research indicate that internationally oriented businesses have statistically significant positive influence on development. Based on the obtained results, the conclusion is that there cannot be a general assessment of the relationship between entrepreneurship and the level of development. Instead, it is necessary to consider the fact that entrepreneurship is a complex phenomenon. When analysing its relationship with macroeconomic performance, one should take into account some of its specificities (which are expressed and measured by different indicators).

Keywords: entrepreneurial activity, entrepreneurship indicators, development, international businesses

1. INTRODUCTION

In practice, entrepreneurship is most often identified with the process of registering one's own private business. Nevertheless, the theoretical scope of the term is much broader. In addition to the mentioned interpretation, entrepreneurship can be seen as a form of behaviour or as a process that brings a productive result. Entrepreneurship as a form of behavior is based on the view that an entrepreneur is defined by the recognition and exploitation of an opportunity. In this approach, the focus is on the individual rather than the organization, meaning that any individual who assumes risk is considered an entrepreneur, regardless of the type of activity they engage in or whether the business is formally registered. According to the third perspective, only those businesses that achieve a high level of performance (innovation or growth) are considered entrepreneurial. This type of entrepreneurship is known as productive entrepreneurship and is characterized by boldness, deviation from established business patterns and practices, and a constant search for introducing new products and new markets and creating new organisational forms. In academic literature, the first and third approaches to entrepreneurship are most often used, i.e. entrepreneurship based on business registration and performance-based entrepreneurship. From an economic point of view, the first approach is acceptable even

though it does not necessarily include innovative businesses, since a product or production process does not have to be new in order to have an economic impact. Given that there are three different ways to interpret entrepreneurship, research papers must clearly specify which indicator (variable) is employed to measure the level of entrepreneurial activity to avoid methodological issues and problems with result interpretation. It is rather important in studies dealing with the (cause-and-effect) relationship between entrepreneurship and other phenomena. Analysing the link between entrepreneurship and development requires the specification of indicators to measure both observed phenomena so that adequate recommendations can be given to policymakers. Considering the above, this paper has two parallel goals: a) to offer a systematic presentation of the indicators used to measure the level of entrepreneurial activity and b) to evaluate the connection between the level of entrepreneurial activity and the level of development. In the following, i.e., the second part of the paper, the results of research by other authors who observed the relationship between entrepreneurship and development are presented, with an emphasis on the variables they used. The third part presents the methodology and data used in our preliminary research, followed by a discussion of

the obtained results in the fourth section. The last, i.e. fifth part of the paper offers concluding considerations.

2. LITERATURE REVIEW

The variables most used in the literature to measure the level of entrepreneurial activity were taken from the Global Entrepreneurship Monitor (GEM) study, which collects data on entrepreneurial activity by surveying the adult population. In a 2020 paper, a group of authors examined the impact of entrepreneurial activity on economic growth. Entrepreneurial activity was measured using the "new businesses" indicator. The analysis was conducted on a sample of 74 economies, categorised by their level of economic development, over a six-year period. The results revealed a positive impact of entrepreneurship on economic growth in developed countries, and a negative impact on developing countries. The fact that the drivers of entrepreneurship in developed countries are simultaneously economically beneficial, while those in developing countries tend to hinder economic growth, suggests that promoting entrepreneurship may not be as relevant for developing economies as it is for developed ones (Almodovar-Gonzalez, Fernandez-Portillo & Diaz-Casero, 2020, p. 14). The authors emphasise that the variable "new businesses" used to measure entrepreneurial activity is of a generic type and that it has a stronger component of necessity in developing countries, and a stronger component of opportunity in developed countries. In developing countries, it tends to reflect necessity-based entrepreneurship, whereas in developed countries, it more often reflects opportunity-based entrepreneurship. Necessity-driven entrepreneurship indicates starting a business as a result of adverse economic circumstances faced by the individual. It is not about choosing between two alternatives, but about choosing the only possible option for securing existence. It is why entrepreneurship based on necessity has a passive character. On the other hand, opportunity-motivated entrepreneurship involves recognising a perceived market gap or unmet need. It implies monitoring market demands, technological advances, and striving for innovation and growth.

Some authors have taken into account the mentioned shortcomings of the generic "new businesses" variable, so they have either omitted it or observed it in combination with other indicators. Galindo and Mendez (2014) analysed the impact of opportunity-driven entrepreneurship on economic growth in 13 developed countries over a decade. Their results indicate that higher entrepreneurial activity increases economic growth, but that there is also an inverse relationship. Other authors used the same variable. Aparicio, Urbano, and Audretsch

(2015) analysed the impact of opportunity-driven entrepreneurship on economic growth in 43 countries with varying levels of economic development from 2004 to 2012. The results of their study showed there is a statistically significant and positive relationship. These findings served to suggest that policymakers should redefine their strategies to encourage this type of entrepreneurship. In terms of long-term growth, strategies that support entrepreneurship driven by exploration and evaluation of opportunities are significant. Otherwise, necessity-driven entrepreneurship may help address short-term issues, but has no impact on long-term economic growth (p. 58). The authors reached the same conclusions when they included two additional variables for measuring the level of entrepreneurial activity. In a 2016 paper, the positive impact of entrepreneurship on economic growth was confirmed, with this connection being stronger in OECD countries (Urbano & Aparicio, 2016). Entrepreneurship was measured using three variables - new businesses, opportunity-driven entrepreneurs, and necessity-driven entrepreneurs.

A group of authors combined the new businesses variable with medium-growth and high-growth entrepreneurship. These refer to entrepreneurs who intend to employ six or twenty workers, respectively, within the next five years, and can therefore be characterised as ambitious entrepreneurs. The results showed that ambitious entrepreneurship contributes more strongly to macroeconomic growth than overall entrepreneurial activity, i.e. new businesses. The performance of high-growth entrepreneurship is particularly strong for countries in transition (Stam, Suddle, Hessels & Van Stel, 2007). Nevertheless, the authors state that it would be naïve to recommend that policy focuses entirely on ambitious entrepreneurs, as economic growth is most likely to be achieved through a combination of small, fast-growing and large, mature firms. Also, one should be cautious not to consider high growth ambitions as inherently valuable because entrepreneurs can be overly ambitious relative to the financial resources they have access to, leading to the premature businesses failure. The study was conducted on a sample of 36 countries of various levels of development. In addition to the variables drawn from the GEM study, other papers on the same or similar topics have used alternative measures of entrepreneurial activity, such as the number of registered businesses, new business density (number of newly registered businesses per 1,000 working-age inhabitants), and the self-employment rate (Apostu & Gigauri, 2023;

Ben Youssef, Boubaker & Omri, 2018; Castano, Mendez & Galindo, 2015; Bjornskov & Foss, 2013).

When talking about development, most papers examine the impact of entrepreneurship on economic development. It is generally expressed by variables such as GDP, GDP per capita or GDP growth rate. However, some papers examine the relationship between entrepreneurship and human development, most often measured by the Human Development Index (HDI). Rojas, Chavez-Bustamante & Rubilar-Torrealba (2024) investigated the connection between entrepreneurship and human development and concluded that human development is negatively related to new business ventures. Lower human development in a nation can encourage a higher level of entrepreneurial activity, but also a higher rate of business termination. These findings indicate a paradoxical relationship: areas with lower human development may inspire more entrepreneurial ventures due to necessity and limited employment opportunities. On the other hand, the same environment makes it harder to sustain these ventures, as evidenced by the higher rate of business closure.

The impact of entrepreneurship on human development was also examined by Ballesta, Rosales & Torres

(2020). The authors used innovative entrepreneurship and necessity-driven entrepreneurship as measures of entrepreneurial activity. Panel analysis showed that innovative entrepreneurship improves quality of life in the dimensions measured by the Social Progress Index and the Modified Human Development Index. On the other hand, necessity-driven entrepreneurship does not contribute to human development, at least in the dimensions measured by these two indices, since this type of entrepreneurship is primarily aimed at provision of existential needs.

The Human Development Index is a more comprehensive component than GDP, as it includes both economic and social dimensions. It represents a holistic approach to understanding development, in contrast to other measures that focus solely on economic expansion. Therefore, it is significant to avoid relying exclusively on economic indicators, given the growing importance of non-economic measures (Maniyalath & Narendran, 2016). The relationship between entrepreneurship and human development has been explored by other authors (Rani & Kumar, 2021; Dvoulety, Gordievskaya & Prochazka, 2018).

3. DATA AND METHODOLOGY

Due to the existence of diverse approaches to entrepreneurship, different indicators for measuring entrepreneurial activity emerged. These range from indicators of self-employment to indicators of innovation-based entrepreneurship. Most researchers use the Global Entrepreneurship Monitor indicators. The GEM study offers the most comprehensive range of indicators and is currently the largest and most recognised international research initiative for studying the level and consequences of entrepreneurial activity (Koellinger, 2008). The main advantages of the GEM project are definition consistency and internationally comparable data. The Global Entrepreneurship Monitor was one of the first initiatives to collect harmonised international data. Today, there are other databases focusing on the unification of data on new businesses (OECD, Eurostat, World

Bank), but their emphasis is on formally registered businesses, i.e. legal subjects. On the other hand, the GEM focuses on early-stage entrepreneurial activity and entrepreneurial intentions.

Table 1 shows the indicators of entrepreneurship that have been collected in recent years as part of the GEM study. Indicators represented in the GEM study since its inception are nascent entrepreneurs, newly registered businesses, new businesses (total early-stage entrepreneurial activity) and ambitious entrepreneurs (growth-oriented entrepreneurs). The value of the indicators is obtained by surveying the adult population in the countries included in the research. One of the challenges for entrepreneurship researchers is the irregular participation of countries in the study, which makes long-term analysis difficult.

Table 1: GEM entrepreneurship indicators

Indicator	Definition
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<i>Nascent Entrepreneurship Rate</i>	Percentage of adults aged 18-64 years who are actively involved in setting up a business they will own or co-own - nascent entrepreneurs
<i>New Business Ownership Rate</i>	Percentage of adults aged 18-64 years who are owner-managers of a new business, i.e. who own and manage a running business, not older than 3.5 years - newly registered businesses
<i>Total early-stage Entrepreneurial Activity (TEA)</i>	Percentage of adults aged 18-64 years who are either a nascent entrepreneurs or owner-managers of a new business, not older than 3.5 years - new businesses
<i>Established Business Ownership Rate (EBOR)</i>	Percentage of adults aged 18-64 years who own and manage businesses older than 3.5 years - established businesses
<i>Business Services</i>	Percentage of new businesses involved in business services
<i>Consumer Services</i>	Percentage of new businesses involved in consumer services
<i>High Growth Expectation Entrepreneurial Activity</i>	Percentage of new businesses that expect to employ six or more people five years from now - ambitious entrepreneurs
<i>Internationally Oriented Entrepreneurial Activity</i>	Percentage of new businesses that anticipate 25% or more revenue coming from outside their country - internationally oriented businesses
<i>Scope (local/national/international)</i>	Percentage of new businesses having customers only within their local area, only within their country, or those having international customers
<i>Product/Services Impact (local/national/global)</i>	Percentage of new businesses having products or services that are either new to the area, new to their country, or new to the world - product innovative businesses
<i>Technology/Procedures Impact (local/national/global)</i>	Percentage of new businesses having technology or procedures that are either new to the area, new to their country, or new to the world - technologically innovative businesses
<i>Business Exit Rate</i>	Percentage of adults aged 18-64 years who have exited a business in the past 12 months, either by selling, shutting down or in another way
<i>Exit, Business Continues</i>	Percentage of adults aged 18-64 years who have exited a business in the past 12 months and that business has been continued
<i>Exit, Business Does Not Continue</i>	Percentage of adults aged 18-64 years who have exited a business in the past 12 months and that business has not been continued

Source: Adapted from Global Entrepreneurship Monitor, 2025, p. 212-213.

The "new businesses" indicator is calculated as the sum of two indicators: entrepreneurs who have not yet registered their business, but have defined an idea and are in the process of registration (nascent entrepreneurs) and entrepreneurs who own and manage a running business, not older than 3.5 years (newly registered businesses). Based on that, it can be said that the "new businesses" indicator combines entrepreneurship based on entrepreneurial behaviour and entrepreneurship based on business registration. Along with growth-oriented entrepreneurs

(entrepreneurs aiming to grow through employment), the "new businesses" indicator is one of the most commonly used indicators for measuring the level of entrepreneurial activity, and will therefore be the subject of further analysis in this paper. In addition, the subject of analysis in this paper will also be established businesses and internationally oriented businesses.

The "established businesses" indicator represents the percentage of the adult population that owns and manages a business older than 3.5 years. Some authors con-

sider this indicator as an alternative to sustainable entrepreneurship (Stephan & Uhlaner, 2010, p. 1348). Established businesses ensure the majority of jobs in the economy, as well as employment stability, so the survival of businesses on the market should be one of the key political goals. The importance of this indicator is also reflected in the fact that, when compared with the rate of new businesses, a high ratio of new to established businesses may indicate difficulties in business survival, sometimes due to an unfavourable entrepreneurial environment.

Internationally oriented businesses, according to the standards of the GEM study, are those that plan to generate 25% or more of their revenue in the foreign market. Internationalisation contributes to market expansion and provides access to new resources and talents, which results in increased income and opportunities for growth and development of the company. Furthermore, entering the foreign market enables taking advantage of economies of scale, extends the life cycle of products and improves competitiveness.

The following section of the paper examines the relationship between entrepreneurship and human development. The level of entrepreneurial activity is expressed through four GEM indicators: new businesses, established businesses, ambitious entrepreneurs and internationally oriented businesses. Human development is measured using the Human Development Index (HDI), with the aim of capturing not only the economic but also the social dimension of development. Data were obtained from the GEM study and the Human Development Report for 2024 and include 46 countries.²⁶ The relationship is measured by the Pearson correlation coefficient for each pair of variables (new businesses - Human Development Index, established businesses - Human Development Index, ambitious entrepreneurs - Human Development Index, internationally oriented businesses - Human Development Index). For pairs of variables where a statistically significant correlation has been identified, a regression analysis was conducted with the aim of examining the impact of entrepreneurship on the Human Development Index.

4. RESULTS AND DISCUSSION

Table 2 presents Pearson's correlation coefficients for all pairs of variables.

Table 2: Correlation matrix

	New_bu~s	Establ~s	Ambiti~s	Intern~s	HDI
New_busine~s	1.0000				
Establishe~s	0.3601* 0.0129	1.0000			
Ambitious_~s	0.6515* 0.0000	0.4229* 0.0031	1.0000		
Internatio~s	-0.1507 0.3119	-0.0700 0.6401	0.0678 0.6509	1.0000	
HDI	-0.2683* 0.0714	0.0141 0.9259	-0.0352 0.8163	0.5562* 0.0001	1.0000

Note: 5% level of significance

Source: Author's calculation

²⁶ The countries included in the sample are Argentina, Armenia, Austria, Belarus, Bosnia and Herzegovina, Canada, Chile, China, Costa Rica, Croatia, Cyprus, Ecuador, Egypt, Estonia, France, Germany, Greece, Guatemala, Hungary, In-

dia, Israel, Italy, Jordan, Kazakhstan, Latvia, Lithuania, Luxembourg, Mexico, Morocco, Norway, Oman, Poland, Puerto Rico, Qatar, Romania, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Thailand, United Arab Emirates, United Kingdom and United States of America.

The results of the correlation analysis indicate that the Human Development Index is statistically significantly related to internationally oriented businesses ($r = 0.5724$, $p\text{-value} = 0.0000$). A positive sign indicates that the variables move in the same direction.

The obtained results served as the basis for conducting the regression analysis. Given that only internationally oriented businesses showed statistically significant correlation with the Human Development Index, this

variable will be used as the independent variable in the regression analysis. The control variables were determined by data availability, namely GDP per capita and the unemployment rate.

$$\text{HDI} = \beta_0 + \beta_1 \text{International} + \beta_2 \text{GDPpc} + \beta_3 \text{Unemployment}$$

The results of the regression analysis are presented in Table 2.

Table 2. Regression analysis

Variable	Coefficient	Std. error	p-value (5% sign. level)	t-ratio
International businesses	0.002034	0.0008506	0.021	2.39
GDPpc	1.48e-06	4.67e-07	0.003	3.17
Unemployment	-0.000407	0.0027929	0.885	-0.15
R-squared	0.5562			
p-value (5% sign. level)	0.0017			
F-statistics	5.99			

Source: author's calculation

The results of the analysis show that internationally oriented entrepreneurs have a positive and statistically significant effect on the Human Development Index ($\beta_1 = 0.002034$, $p\text{-value} = 0.021$) at the 5% significance level. Of the used control variables, GDP per capita is statistically significant ($p\text{-value} = 0.003$), while the unemployment rate is not ($p\text{-value} = 0.885$). Internationally oriented businesses enable increased access to resources and markets, but also contributes to improving the quality of life and fosters economic inclusion. Entrepreneurs who engage in international markets facilitate the transfer of knowledge and technology and increase access to basic services (employment, education) in regions with a lower level of development.

The contribution of this paper lies in introducing internationally oriented businesses into the analysis. Most existing papers focus on the impact of other types of entrepreneurship on the Human Development Index, such as nascent entrepreneurs, new businesses, innovative businesses, etc. The limitation of this study is that the analysis was conducted for a single year and the countries in sample are at different levels of development. Recommendations for future research include covering a longer time period in order to conduct a panel analysis and excluding low-development countries from the sample. A limiting factor for such research is the small number of countries participating in the GEM study each year, which

significantly reduces the sample size and restricts the analysis to an unbalanced panel. In addition, some of the indicators within the GEM study, although diverse, have shortcomings when examined in a combined sample. One such indicator is new businesses. This indicator has a composite structure and includes both necessity-driven and opportunity-driven businesses. The economies that record the highest rates of new businesses are those with a lower level of development, predominantly from Latin America and Asia. According to 2024 data, the highest rates of new businesses there are in Ecuador – 33.4%, Chile – 27.2%, Saudi Arabia – 26.4%, Guatemala – 23.7%, Argentina – 23.4%, Bosnia and Herzegovina – 22.7%, Jordan – 21.1%, Brazil – 20.3%, Thailand – 19.7%, etc. (GEM, 2025). Given the low levels of development in the listed economies, these data imply that this type of entrepreneurship is necessity-driven. Economies with a lower level of development provide fewer opportunities for employment and career development, so the population is forced to start their own business ventures with the aim of securing existence for themselves and their families. Lacking knowledge and experience to run a business, such businesses fail more often, as confirmed by the business exit rates. These are the highest in countries with lower development levels: Ecuador – 9.5%, Jordan – 9.1%, Brazil – 7.4%, etc. (percentage of adults who have exited a business in the past 12 months and that business has not been continued).

5. CONCLUSION

The broad scope of the concept of 'entrepreneurship' and the multitude of indicators that can be used to express the level of entrepreneurial activity provide researchers with a wide range of opportunities for investigation, but also limit the ability to draw generalised conclusions. The indicators included in the GEM study encompass all three aspects of the entrepreneurship interpretation – behaviour-based entrepreneurship (nascent entrepreneurs), entrepreneurship based on the business registration (newly registered businesses) and productive entrepreneurship (ambitious entrepreneurs, internationally oriented businesses, product innovative businesses, technologically innovative businesses). Of the four indicators included in this paper, it was found that only internationally oriented businesses have a statistically significant impact on the Human Development Index. The internationalisation of business can be considered a form of productive entrepreneurship, so the first conclu-

sion of the preliminary analysis in this paper is that certain forms of productive entrepreneurship have an impact on human development. For a more detailed analysis, it is necessary to observe a more extended period of time and more homogeneous sample. Furthermore, future analyses can be expanded by including additional variables that measure productive entrepreneurship, such as innovation-oriented businesses.

The second conclusion of the preliminary analysis presented in this paper is the need to strengthen international cooperation. The state plays an essential role in this through employing financial and non-financial measures to achieve internationalisation. It is not enough to stimulate entrepreneurs merely to start a business, but to strengthen their competitiveness by entering the international market. It offers the opportunity to increase revenues, strengthen brands, and improve business survival rates.

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EXPLORING THE ETHICAL ROLE OF ARTIFICIAL INTELLIGENCE IN TOURISM: A FOCUS ON USER PREFERENCES

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Abstract

In the era of accelerating digital transformation, artificial intelligence (AI) has become an indispensable tool in strategic decision-making, supporting organizations in achieving sustainability while upholding ethical standards. Within the tourism sector, this transformation raises complex challenges related to user security, privacy, and trust, as well as broader principles of accountability, transparency, and fairness. These dimensions form the fundamental pillars of long-term tourism sustainability and represent key priorities for all stakeholders. This study provides clear definitions of essential ethical principles—security, data protection, and trust—emphasizing both their interconnections and their distinct characteristics. The discussion is broadened to address the irreversible nature of this digital trend. Special attention is given to how AI technologies influence these principles, alongside the critical need for education, training, regulatory, and legal frameworks to ensure their protection. Furthermore, the paper argues that responsible and explainable AI must be inclusive and socially responsible, not only in tourism but also in other sectors, such as banking, where transparency and fairness are of crucial importance. Finally, the paper outlines directions for future research, with particular emphasis on ethical challenges such as bias, inaccuracy, and the demand for algorithmic explainability—underscoring the need to create fair and sustainable digital ecosystems.

Keywords: Artificial Intelligence, Tourism, Ethics, Security, Privacy, Trust, Sustainability, Transparency, Accountability, Fairness.

1. INTRODUCTION

As artificial intelligence (AI) becomes an integral part of modern society, it is profoundly reshaping business models, personal interactions, and decision-making processes (Bansal, 2025). Alongside these advancements, however, AI introduces significant ethical challenges, particularly in relation to security, privacy, algorithmic transparency, and bias (Ali et al., 2025). Given its widespread adoption across organizational activities, the ethical and responsible implementation of AI is no longer optional but essential (Papagiannidis et al., 2025). The growing reliance on AI therefore imposes a responsibility to uphold fundamental moral and ethical principles throughout its development and application. In this context, AI ethics play a critical role in strengthening security and trust, safeguarding privacy, mitigating bias, promoting transparency, and ensuring inclusivity, particularly for vulnerable groups such as individuals with disabilities. Security and privacy, identified as key user priorities (Korać & Simić, 2017, 2019), are central to the sustainability of AI systems, requiring robust data protection measures, privacy-preserving algorithms, and anonymization techniques (Holzinger et al., 2021). As organizations increasingly rely on AI for strategic decision-making that directly affects user needs, it is essential to address the complex ethical implications associated with these technologies.

The misuse of AI may lead to far-reaching consequences for stakeholders, society, and organizational reputation. Addressing these risks requires substantial investment in education, awareness, and interdisciplinary collaboration. Effective application of AI across

domains depends on the involvement of diverse stakeholders, including developers, experts, policymakers, and end users. Without such collaboration, AI systems risk embedding errors and biases, particularly those arising from insufficient integration of social and ethical perspectives (Shestakova, 2021).

AI sustainability emphasizes the responsible design and management of AI systems to minimize ethical risks while reducing environmental and societal impacts (Leimanis & Palkova, 2021). The convergence of responsible AI practices and ethical frameworks represents a paradigm shift with the potential to drive sustainable development and enhance organizational performance. However, the understanding and definition of key AI ethics concepts remain inconsistent and often ambiguous, as illustrated by terms such as ethical risk and cybersecurity (Schatz et al., 2017; Douglas et al., 2024). This conceptual ambiguity further highlights the need for systematic and structured analysis.

Within the tourism sector, the application of AI raises additional ethical considerations. Existing studies emphasize the importance of privacy, transparency, and responsible data use (Gretzel et al., 2015), as well as the ethical implications of automation for user experience (Tussyadiah, 2020). AI-driven personalization and recommendation systems, while enhancing service quality, also introduce challenges related to fairness and bias (Li et al., 2019). Furthermore, research highlights the importance of responsible AI use in destination management and the role of emerging technologies such as

chatbots and recommendation systems in shaping tourism experiences (Buhalis & Sinarta, 2019; Mariani & Borghi, 2021; Guttentag, 2019).

Motivated by these challenges, this study explores AI-driven strategic decision-making in tourism through the lens of ethical principles, with a particular focus on user preferences. Given the increasing complexity of digital environments and the evolving nature of technological threats, addressing ethical and sustainability challenges in AI has become a critical priority for decision-makers in the tourism industry.

2. RELATED LITERATURE REVIEWS

As discussed earlier, numerous comparative research based on AI ethical issues have been extensively explored in the literature. For instance, in the papers of (Papagiannidis et al., 2025; Robles-Carrillo, 2020; Taddeo and Floridi, 2018; Floridi, 2019), AI-related ethical and legal standards, principles, and technical complexities were addressed, focusing on their definition, purpose, and consequences. Several authors such as Kazim and Koshiyama (2021) explored AI ethics through engineering approaches, emphasizing principles, processes, ethical consciousness, and the application of ethics in practice, while Afroogh et al. (2018) investigated ethical issues through trustworthiness metrics, proposing future directions and potential solutions for the transition to trustworthy AI. Besides the above-mentioned research, numerous other studies focused on AI in specific contexts. For example, Meske et al. (2022) addressed explainable artificial intelligence (XAI), including stakeholders, aims, and future opportunities. Chng et al. (2025) examined ethical considerations in AI for child health, offering recommendations for child-centered medicine with a focus on the ethical principle of trustworthy AI. Hickman and Petrin (2021) explored trustworthy AI for sustainability related to reliable, transparent, and ethically aligned AI systems that support environmental goals and build trust in sustainable development. On the other side, there are research efforts (Korać et al., 2020; Bhattarai et al., 2024) focused on all three user preferences, in which security is highlighted as the primary research aim.

In the context of tourism, relevant research highlights the intersection between AI, ethics, and sustainability.

3. AI ETHICS BASIC TERMS AND DEFINITIONS

Given the conceptual vagueness and significant overlap among key terms used in AI-driven strategic decision-making, careful disambiguation is required (Jobin et al., 2019). To address this issue, Table 1 provides a concise overview of core concepts in AI ethics—such as ethical risks, cybersecurity, privacy, and trust—along with their respective definitions. These concepts are inher-

This paper contributes to the literature by clarifying key AI ethics concepts relevant to strategic decision-making, emphasizing security, privacy, and trust as core principles reflecting user preferences, examining the relationship between these principles and user-centered AI applications in tourism, and identifying current trends as well as future research directions in this domain.

The remainder of the paper is structured as follows: Section 2 reviews relevant literature, Section 3 defines key AI ethics concepts, Section 4 analyzes core ethical principles, Section 5 presents the discussion, and Section 6 concludes with future research directions.

Gretzel et al. (2015) provide an in-depth analysis of the ethical implications of digital and AI technologies in tourism, emphasizing the importance of privacy, transparency, and the responsible use of data. Tussyadiah (2020) discusses the ethical challenges of automation in tourism services and its impact on user experience, while Buhalis and Sinarta (2019) elaborate on the role of AI in creating personalized tourist experiences, stressing the necessity of adhering to ethical norms and sustainable destination management. Similarly, Li, Buhalis, and Weber (2019) address transparency and fairness issues in AI-based recommendation systems in tourism, underlining the importance of including multiple stakeholders in the design and implementation of such systems. More recently, Mariani and Borghi (2021) investigated algorithmic transparency and accountability in tourism platforms, arguing that opaque AI systems may undermine consumer trust and long-term destination sustainability. In addition, Gajdošík (2022) emphasized the ethical dimension of smart tourism ecosystems, highlighting risks of surveillance and bias while calling for governance frameworks that ensure fairness, inclusiveness, and responsible innovation in tourism AI applications.

While existing literature reviews have given coverage of numerous AI ethical principles from various perspectives—including tourism and service industries—there remains a need to provide their comprehensive and systematic consideration, which represents the key research aim of this study.

ently complex, interconnected, and often subject to differing interpretations, which can create challenges for their consistent application in practice.

The concept of cybersecurity serves as a clear example of such ambiguity. Its definition has evolved over time and remains contested, with ongoing debates regarding whether it should be understood as a role, a discipline, or a multidimensional field encompassing information,

operational, and network security (Schatz et al., 2017). This lack of conceptual clarity is particularly relevant in

the context of AI ethics, as it directly affects the effective, secure, and sustainable integration of AI technologies within tourism systems.

Table 1: Key terms and definitions associated with AI ethics

S.No	Term	Definition	Ref.
1	Ethical risks	The possibility that a stakeholder may neglect their ethical responsibilities toward others involved in the AI system.	Douglas et al., 2024
2	Cybersecurity	Security risk management involving strategies, policies, and tools used by organizations and states to protect data and assets in cyberspace, ensuring confidentiality, integrity, and availability.	Schatz et al., 2017
3	Privacy	The need for protection of personal and sensitive information.	Jobin et al., 2019
4	Trust	The extent to which individuals have confidence in a model's ability to handle sensitive data securely and reliably.	Humphreys et al., 2024

As emphasized by Jobin et al. (2019), the overlap and ambiguity of these terms necessitate precise interpretation in order to avoid misunderstandings and ensure their effective use in both strategic and operational contexts. This is especially important in tourism, where issues such as user trust, data protection, and transparency are fundamental to long-term sustainability and system acceptance.

To further reduce ambiguity and strengthen the conceptual foundations of ethical AI deployment, it is necessary to consider the broader set of ethical principles that guide AI development and application. Widely recognized principles in academic and policy discourse include beneficence, which emphasizes the contribution of AI to individual and societal well-being; justice and fairness, which require equitable access and the prevention of discrimination; and non-maleficence, which focuses on avoiding harm to individuals, communities, and the environment. In addition, autonomy highlights the importance of respecting user agency and informed consent, while accountability and responsibility stress the need for clearly defined obligations regarding AI outcomes. Transparency ensures that AI systems are ex-

plainable and understandable, and sustainability underscores the importance of aligning AI development with long-term environmental and societal goals.

These principles are reflected in major international policy frameworks, including the European Commission's Ethics Guidelines for Trustworthy Artificial Intelligence (2019) and UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021). Both frameworks emphasize that AI systems must be lawful, ethical, and robust, while promoting human rights, inclusivity, and sustainable development.

In the context of tourism, these ethical principles provide a critical foundation for balancing user preferences with broader societal and environmental considerations. For instance, while AI enables personalized travel experiences, such personalization must not compromise user privacy or data protection. Similarly, AI-driven decision-making processes must remain transparent and accountable to prevent bias and ensure fairness in recommendation systems. Integrating sustainability into AI applications further ensures that smart tourism ecosystems support the long-term well-being of destinations, local communities, and the environment.

4. REVIEW OF BASIC AI ETHICAL PRINCIPLES

A more detailed examination of these foundational principles reveals that their interplay is far more dynamic and recursive than a simple linear model might suggest. While security and privacy indeed serve as essential prerequisites, trust is not merely a passive outcome but an active, evolving force that shapes user engagement from the very first interaction (Gillespie, 2020). Users often approach digital tourism platforms with a baseline of initial trust derived from brand reputation, third-party endorsements, or visible regulatory compliance signals such as GDPR badges, and this initial trust determines whether they will engage deeply enough to evaluate the platform's actual security and privacy practices (Mcknight & Chervany, 2001). Once established, trust operates within a continuous feedback loop: each positive, secure, and privacy-respecting interaction reinforces user confidence, creating a virtuous cycle of en-

gagement, while even minor failures—such as a recommendation that feels uncomfortably accurate, suggesting excessive data surveillance, or a cumbersome authentication process that prioritizes security over usability—can rapidly erode trust and diminish the perceived value of the system's other ethical safeguards (Tussyadiah & Pesonen, 2018). This dynamic underscores the need to view security, privacy, and trust not as isolated concepts but as mutually reinforcing elements that must be managed holistically (Floridi et al., 2018).

Moving from conceptual principles to operational realities, the true challenge lies in how AI systems can translate these ethical commitments into concrete, user-facing mechanisms within the tourism context. In the domain of security, the central tension is the paradox between robustness and usability, where overly aggressive security measures risk alienating users who prioritize seamless experiences (Korać et al., 2022). AI addresses

this through adaptive authentication systems that employ risk-based analysis, applying minimal friction during routine activities such as booking a familiar hotel from a recognized device, while seamlessly escalating security protocols—such as multi-factor authentication—when anomalous patterns emerge, such as a login attempt from a new geographic location combined with a request to change payment details (Schneier, 2019). This approach aligns security with user preferences for both protection and convenience. Furthermore, AI enhances security proactively by analyzing network traffic to predict and neutralize cyber threats like credential stuffing or distributed denial-of-service attacks before they impact users, effectively transforming operational stability into a security feature that reinforces confidence (Kshetri, 2020).

In the realm of privacy, the growing tension between personalization and data protection demands a shift from the outdated model of static, one-time consent to a framework centered on continuous user agency and transparency (Nissenbaum, 2009). AI-driven tourism platforms rely heavily on user data to deliver tailored recommendations, yet users increasingly expect granular control over how their information is collected, processed, and shared (Acquisti, Brandimarte, & Loewenstein, 2015). This can be operationalized through dynamic privacy controls that present users with contextual choices—for instance, allowing a user to specify whether a restaurant recommendation system should utilize precise location data, past dining history, or only the current city as a general parameter (Bélanger & Crossler, 2011). Such approaches transform privacy from a passive legal obligation into an active, transparent dialogue. Additionally, privacy-enhancing technologies such as federated learning offer a powerful means of reconciling personalization with privacy by training AI models across decentralized devices without exposing individual user data; a tourism application could thus identify general patterns—for example, that a significant percentage of visitors to a particular museum also enjoy a nearby cultural tour—without any single user's data ever leaving their device, thereby delivering personalized insights while fundamentally respecting user privacy (McMahan et al., 2017; Hardt et al., 2020). Trust, as the higher-order principle that consolidates the successful implementation of security and privacy, is increasingly contingent upon the explainability and fairness of AI systems (Ribeiro, Singh, & Guestrin, 2016). In tourism environments where users rely on unfamiliar platforms and automated recommendations, opaque decision-making undermines confidence, whereas transparent systems empower users to make informed choices (Miller, 2019). Explainable AI addresses this by providing contrastive explanations that clarify not only what is being recommended but why alternative options were deprioritized; rather than simply suggesting a particular hotel, a trustworthy system might explain that the chosen option is fifteen percent closer to the user's

stated points of interest, offers higher ratings for family-friendliness, and remains within the specified budget, while noting that an alternative, though highly rated, is less conveniently located (Gunning et al., 2019). This level of clarity not only builds trust but also respects user autonomy by enabling informed override of automated suggestions (Lepri, Oliver, & Pentland, 2021). Fairness constitutes another critical dimension of trust, as users who perceive biased outcomes—such as systematic differences in accommodation recommendations based on demographic characteristics—will rapidly lose confidence in the system, making continuous auditing for disparate impact and the implementation of algorithmic fairness constraints essential components of ethical AI deployment (Barocas, Hardt, & Narayanan, 2019; Mehrabi et al., 2021).

A comprehensive analysis must also acknowledge the inherent tensions that arise when these principles are pursued simultaneously, as they are not always harmonious and often require deliberate trade-offs (Rahwan, 2018). The central paradox of personalization versus privacy captures this conflict vividly: the more data an AI system collects regarding a user's dietary restrictions, travel habits, budget, and personal preferences, the more effectively it can deliver the seamless, tailored experiences that build trust and demonstrate security value, yet this very data collection poses inherent privacy risks (Zuboff, 2019). Resolving this tension requires a transparent value exchange in which users willingly cede a degree of privacy only when the perceived benefits—such as time savings, superior recommendations, or exclusive offers—are sufficiently compelling and when trust in the platform's data stewardship is firmly established (Cranor, 2012). Similarly, the security-usability trade-off demands continuous calibration, as excessive authentication requirements can drive users away even as they provide robust protection (Weir et al., 2020). Perhaps most significantly, a tension exists between explainability and performance, as the most accurate AI models, particularly complex deep learning networks, often function as black boxes resistant to straightforward interpretation (Lipton, 2018). In high-stakes tourism applications—such as recommending medical tourism services or facilitating complex, high-value bookings—the ethical imperative for transparency may justify selecting a slightly less performant model that can offer clear, intelligible explanations over a superior but opaque alternative (Doshi-Velez & Kim, 2017).

Finally, these ethical considerations do not unfold in a vacuum but are profoundly shaped by the external context of regulation and cultural diversity. The absence of a universal binding standard for AI ethics has led to a fragmented landscape in which frameworks such as the European Union's General Data Protection Regulation (GDPR) and the proposed EU AI Act function as de facto ethical benchmarks, making principles like the right to explanation not merely aspirational but legally

enforceable requirements (European Commission, 2016; European Commission, 2021). For tourism organizations operating globally, this regulatory complexity often necessitates adopting the strictest standards as a baseline to ensure compliance and maintain trust across multiple jurisdictions (Voigt & Von dem Bussche, 2017). Simultaneously, user preferences regarding privacy exhibit significant cultural variation: travelers from regions with strong data protection traditions may expect rigorous data minimization and explicit consent mechanisms, whereas users from other cultural contexts may demonstrate greater willingness to share personal information in exchange for tangible economic benefits such as discounts or loyalty rewards (Milberg et al., 1995; Krasnova et al., 2012). A truly

5. DISCUSSION

This discussion emphasizes that the role of each stakeholder is crucial in developing and implementing AI ethical principles to minimize risks, such as unethical behavior, privacy violations, or the dissemination of misinformation (Floridi et al., 2018; Jobin et al., 2019). All participants within AI-driven tourism systems—including developers, managers, and end-users—should be aware of both the potential benefits and risks associated with AI applications. Understanding AI ethics from a human-centered perspective requires addressing not only security concerns but also complex moral and ethical issues related to privacy, fairness, and accountability. The stakeholder landscape in tourism AI is notably diverse, encompassing technology developers who design algorithms, organizational leaders who determine deployment strategies, frontline staff who interact with AI tools, and end-users whose data and engagement sustain these systems, each bringing distinct perspectives, vulnerabilities, and ethical responsibilities to the ecosystem (Shneiderman, 2020). Developers, for instance, hold particular responsibility because the values and biases embedded in algorithms during the design phase become inscribed into systems that may operate at scale, affecting countless users without ongoing human oversight (Rahwan, 2018). Managers and organizational decision-makers, conversely, shape the governance structures within which AI operates, determining which ethical principles are prioritized, how transparency is implemented, and what recourse mechanisms exist when systems fail or cause harm (Mittelstadt, 2019). End-users, while often positioned as passive recipients of AI services, also play an active role in shaping ethical outcomes through their choices, feedback, and willingness to hold organizations accountable for ethical lapses (Buhalis & Sinarta, 2019).

Comprehensive AI education and awareness programs should be implemented across all organizational levels to address ethical and moral principles relevant to specific roles (Shestakova, 2021; Bansal, 2025). These programs should evolve alongside AI advancements, integrating real-world case studies and interactive learning

user-centric ethical framework must therefore be culturally adaptive, allowing for regional customization of privacy and personalization settings while maintaining a consistent core commitment to security, transparency, and user agency (Hofstede, 2001). In navigating these interconnected dimensions—the dynamic interplay of principles, the operational mechanisms that bring them to life, the inevitable trade-offs they entail, and the external regulatory and cultural forces that shape their implementation—tourism organizations can move beyond a superficial adherence to ethical ideals toward a sustainable model of AI deployment that places user confidence and long-term trust at the very center of strategic decision-making (Buhalis & Sinarta, 2019; Tussyadiah, 2020).

methods to bridge the gap between ethical theory and practical application (Tussyadiah, 2020). The effectiveness of such educational initiatives depends critically on their contextual grounding; abstract ethical principles, when presented without concrete operational relevance, fail to equip stakeholders with the practical judgment needed to navigate the nuanced dilemmas that arise in daily AI deployment (Whittlestone et al., 2019). For frontline tourism staff, this may involve training on how to recognize when an AI recommendation system is producing biased or inappropriate suggestions for certain demographic groups and how to escalate such concerns appropriately. For managers, education should focus on understanding the trade-offs inherent in AI deployment—such as the tension between personalization and privacy—and developing the organizational processes necessary to audit AI systems for fairness, accuracy, and unintended consequences (Raji et al., 2020). For developers and programmers, training must extend beyond technical proficiency to incorporate human rights, inclusivity, and sustainability considerations, ensuring that ethical reflection becomes embedded within the software development lifecycle rather than treated as an external compliance exercise (Morley et al., 2020). Interactive learning methods, including scenario-based simulations and post-deployment case study analyses, have proven particularly effective in helping stakeholders internalize ethical reasoning skills that can be applied flexibly as new challenges emerge (Saltz & Dewar, 2019).

Special attention must be given to developers and programmers, ensuring their training incorporates human rights, inclusivity, and sustainability considerations. The decisions made during algorithm design—from data selection and feature engineering to model architecture and evaluation metrics—profoundly shape the ethical performance of AI systems in ways that may not become apparent until deployment (Holstein et al., 2019). Developers must be equipped to recognize how seemingly technical choices carry moral implications;

for example, the selection of training data that underrepresents certain geographic regions or socioeconomic groups can result in recommendation systems that systematically disadvantage travelers from those backgrounds, perpetuating existing inequalities within tourism (Hao, 2021). Similarly, the choice to optimize for engagement metrics without considering broader user welfare may lead systems to prioritize sensational or divisive content, a dynamic that has particular relevance for tourism platforms featuring user-generated reviews and recommendations (O'Neil, 2016). Incorporating human rights frameworks into technical education helps developers understand that issues such as non-discrimination, freedom of choice, and informational self-determination are not peripheral concerns but central to responsible AI design (United Nations, 2021). Inclusivity considerations demand that development teams themselves reflect the diversity of the populations their systems serve, as homogeneous teams are more likely to overlook bias and accessibility issues that affect marginalized user groups (West et al., 2019). Sustainability considerations, meanwhile, extend beyond environmental impact to encompass the long-term viability of AI systems in supporting resilient and equitable tourism development, ensuring that technological deployment does not come at the expense of local communities or cultural heritage (Gössling & Hall, 2019).

Beyond the core AI ethical principles of security, privacy, and trust, organizations should incorporate additional principles such as fairness, avoidance of bias, accuracy, explainability, and accountability (European Commission, 2019; UNESCO, 2021). For instance, fairness and bias principles are grounded in moral values that ensure individuals are not subjected to discrimination or inequitable treatment (Floridi & Cowls, 2019). In the tourism context, fairness concerns manifest across multiple dimensions: algorithmic bias may result in differential pricing based on perceived user characteristics, exclusionary recommendation patterns that disadvantage certain demographic groups, or unequal access to promotional opportunities based on opaque algorithmic ranking systems (Travaini et al., 2022). Addressing fairness requires not only technical interventions—such as bias audits and fairness constraints in model training—but also organizational commitments to transparency about how algorithmic decisions are made and mechanisms for users to contest outcomes they perceive as unjust (Barocas, Hardt, & Narayanan, 2019). Accuracy, while often framed as a technical metric, carries profound ethical significance in tourism where inaccurate information can have tangible consequences for traveler safety, financial outcomes, and overall experience quality (Tussyadiah, 2020). A recommendation system that consistently misrepresents accommodation locations, fails to account for seasonal closures, or overlooks critical safety information undermines user trust and may expose organizations to legal and reputational liability (Gretzel, 2021).

Transparency is a cornerstone of ethical AI, enhancing trust and enabling accountability for decisions made by AI systems (Papagiannidis et al., 2025). Transparency operates at multiple levels: disclosure to users that AI systems are in use, clarity about what data is collected and how it is utilized, and explainability regarding how specific decisions or recommendations are generated (Diakopoulos, 2020). In tourism, where users interact with AI across booking platforms, recommendation engines, chatbots, and dynamic pricing systems, transparency becomes essential for informed consent and meaningful user agency (Tussyadiah & Miller, 2019). However, transparency must be implemented thoughtfully to avoid overwhelming users with technical details that obscure rather than clarify; effective transparency provides accessible, contextually relevant information that empowers users to make informed choices about their engagement with AI systems (Rader & Gray, 2015). Accountability complements transparency by establishing clear lines of responsibility for AI system outcomes, ensuring that when systems cause harm or operate in ways inconsistent with stated ethical commitments, there are mechanisms for redress and continuous improvement (Wieringa, 2020). This requires moving beyond vague commitments to ethical principles toward concrete governance structures, including human oversight of high-stakes AI decisions, regular ethical audits, and clearly communicated channels for user feedback and complaint resolution (Rakova et al., 2021).

Sustainability in AI deployment emphasizes the long-term societal, environmental, and economic impacts of AI systems, ensuring that technology supports inclusive and responsible tourism development (Leimanis & Palkova, 2021). The environmental dimension of sustainability addresses the significant energy consumption associated with training and operating large-scale AI models, a concern that becomes amplified as tourism increasingly adopts computationally intensive applications such as real-time personalization and computer vision for destination management (Strubell, Ganesh, & McCallum, 2019). Environmentally sustainable AI requires organizations to consider not only the efficiency of their algorithms but also the broader carbon footprint of their technological infrastructure, aligning with tourism industry commitments to climate action and responsible resource management (Gössling & Hall, 2019). The social dimension of sustainability demands attention to how AI deployment affects tourism workers, local communities, and cultural practices. Automation may displace certain categories of employment while creating demand for new skills, necessitating proactive workforce development and just transition strategies (Brougham & Haar, 2018). In destinations where AI-powered platforms shape visitor flows and spending patterns, ensuring that economic benefits are distributed equitably across local communities becomes a critical ethical consideration, preventing the concentration of

benefits among already-privileged actors while exacerbating pressures such as overtourism in vulnerable destinations (Mason & Stasi, 2020). Economic sustainability, meanwhile, requires that AI investments contribute to long-term value creation rather than short-term optimization that externalizes costs onto users, communities, or the environment (Hilty & Aebischer, 2015). Explainability is crucial for fostering understanding and trust, allowing stakeholders to comprehend how AI-driven decisions are made and ensuring that these systems can be effectively scrutinized and improved. The demand for explainability arises from the fundamental tension between the complexity of modern AI systems and the human need for understandable justifications for decisions that affect one's interests (Miller, 2019). In tourism, explainability takes on particular importance across scenarios ranging from dynamic pricing and personalized recommendations to credit-based booking decisions and automated customer service interactions (Tussyadiah, 2020). Users who receive an unexpected price increase or an unexplained recommendation decline may develop lasting negative attitudes toward the platform if they cannot understand the reasoning behind the decision, whereas clear explanations can mitigate frustration and preserve trust even when outcomes are unfavorable (Gillespie, 2020). For developers and auditors, explainability enables debugging of problematic model behavior, identification of bias, and assessment of whether systems are operating as intended (Lipton, 2018). However, the pursuit of explainability must navigate the aforementioned trade-off with performance, as the most accurate models are not always the most interpretable. Organizations must therefore make deliberate, context-sensitive choices about the level of explainability required for different applications, recognizing that in high-stakes contexts—such as safety-related recommendations or accommodations for travelers with disabilities—interpretability may justifiably take precedence over marginal gains in predictive accuracy (Doshi-Velez & Kim, 2017). Integrating these ethical principles supports continuous improvement and the responsible use of AI, ultimately striking a balance between technical performance, user preferences, and moral responsibility in tourism. This integration cannot be achieved through checklist-based compliance or the mere publication of ethical principles; it requires embedding ethical considerations into organizational culture, governance structures, and technical practices from the earliest stages of system design through ongoing operation and refinement (Mittelstadt, 2019). Continuous improvement in AI ethics demands mechanisms for monitoring systems post-deployment to detect emergent issues that were not apparent during development, including fairness violations that arise from shifting data distributions or novel use cases (Raji et al., 2020). It also requires creating feedback loops that enable user experiences and concerns to inform system evo-

lution, recognizing that ethical AI is not a static achievement but an ongoing process of learning and adaptation (Whittlestone et al., 2019). The balance between technical performance and moral responsibility represents a fundamental challenge that cannot be resolved through technical means alone; it demands value-based judgments about what trade-offs are acceptable and who should have the authority to make such determinations (Rahwan, 2018). In tourism, where AI systems mediate experiences that are deeply personal and culturally significant, these judgments must reflect not only organizational priorities but also the diverse values and preferences of the users and communities whose lives are affected by AI deployment (Buhalis & Sinarta, 2019). Identifying potential threats and developing mitigation strategies is essential for fostering a safe and ethically aligned tourism environment. Among the most pressing threats are algorithmic discrimination, which can systematically disadvantage travelers based on protected characteristics such as race, gender, age, or disability, often without the knowledge of either users or platform operators (Obermeyer et al., 2019). Mitigation requires ongoing fairness auditing using both quantitative metrics and qualitative assessment methods that capture the lived experiences of affected users (Holstein et al., 2019). Privacy violations constitute another critical threat, particularly as tourism AI systems increasingly integrate data across multiple touchpoints—from search behavior and booking history to in-destination mobility patterns and biometric data—creating comprehensive surveillance profiles that users may not fully understand or consent to (Zuboff, 2019). Mitigation strategies include implementing privacy-by-design approaches, minimizing data collection to what is strictly necessary, providing users with meaningful control over their information, and adopting privacy-enhancing technologies such as differential privacy and federated learning (Acquisti et al., 2015). The dissemination of misinformation through AI systems—whether through hallucinating chatbots, manipulated visual content, or algorithmic amplification of unverified user-generated content—represents an emerging threat with particular significance for tourism, where misinformation can lead to unsafe travel decisions, economic harm to destinations, and erosion of trust in information ecosystems (Buchanan, 2020). Mitigation requires robust content moderation systems, transparent labeling of AI-generated content, and investment in digital literacy education that empowers users to critically evaluate AI-mediated information (European Commission, 2021). Finally, the concentration of market power among a small number of AI-enabled tourism platforms raises structural concerns about consumer choice, fair competition, and the capacity of destinations and local businesses to maintain autonomy in the face of algorithmic intermediation (Kenney & Zysman, 2020). Mitigation strategies may include regulatory interventions, support for open and

interoperable systems, and development of public-interest alternatives that prioritize community benefit over profit maximization.

The key discussion points emerging from this analysis underscore that stakeholder awareness and engagement are fundamental for ethical AI implementation, requiring a departure from technocentric approaches that treat ethics as a secondary consideration or compliance requirement. Education and training must be role-specific, practical, and continuously updated, recognizing that the ethical challenges of AI evolve alongside technological capabilities and deployment contexts, demanding ongoing learning rather than one-time training interventions. Ethical principles should extend beyond security, privacy, and trust to include fairness, explainability, accountability, and sustainability, forming a comprehensive framework that addresses the full scope of moral

6. CONCLUSIONS AND FUTURE DIRECTIONS

This paper examined the fundamental ethical principles of artificial intelligence (AI) in tourism organizations, focusing on security, privacy, and trust, and their role in enhancing strategic decision-making. The study emphasizes that the ethical development and application of AI require a proactive and comprehensive approach that integrates robust governance structures, regulatory compliance, and continuous education and training.

Since AI itself is not a moral agent, responsibility and accountability remain with human stakeholders. Embedding ethical considerations from the outset—rather than responding reactively to crises—is crucial for ensuring secure, reliable, and trustworthy AI deployment. Active participation of all stakeholders throughout the development and implementation process is essential to maintaining a human-centered approach, ensuring that AI augments rather than replaces human capabilities.

The study highlights that ethical AI deployment in tourism necessitates examining both technological and educational frameworks through a moral lens. Human oversight is vital to ensure that AI operates ethically, enabling audits, interventions, and continuous monitoring of AI-driven decision-making. Such oversight mitigates unforeseen risks, aligns AI behavior with human ethical values, and ensures sustainable and socially responsible outcomes.

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considerations raised by AI in tourism. Finally, balancing AI technical efficiency with ethical and social responsibility is essential for long-term trust and adoption in tourism, requiring organizations to recognize that ethical AI is not merely a risk management exercise but a foundational condition for sustainable value creation in an increasingly algorithmically mediated industry. As AI systems continue to advance in capability and pervasiveness within tourism, the organizations that succeed in building and maintaining user trust will be those that demonstrate not only technical excellence but also genuine commitment to ethical principles, operationalized through robust governance, meaningful stakeholder engagement, and unwavering accountability for the systems they deploy.

Furthermore, this research underscores the importance of additional ethical principles, including fairness, bias prevention, accuracy, accountability, explainability, and inclusivity. These principles warrant more in-depth investigation to develop robust AI systems that foster user trust, ensure equitable treatment, and enhance transparency in decision-making processes.

Finally, this study proposes several directions for future research, including:

- Developing methodologies for embedding ethical AI principles throughout the AI lifecycle in tourism;
- Investigating human–AI collaboration models that ensure ethical oversight without compromising operational efficiency;
- Evaluating the long-term societal and environmental impacts of AI adoption in tourism systems;
- Exploring explainable AI (XAI) frameworks to enhance transparency, trust, and informed user engagement.

Overall, the responsible and ethical use of AI in tourism is essential for promoting sustainable development, protecting user preferences, and safeguarding the common good.

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MEASURING MACRO-ECONOMIC RESILIENCE: A SIMPLE COMPOSITE INDICATOR FOR THE WESTERN BALKANS

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Abstract

Many economic phenomena in economics and social sciences are measured using composite indicators that are weighted averages of single time-series variables. In a decade of complex changes in national economic systems owing to various shocks, developing an indicator that provides a more nuanced and accurate representation of the country's resistance to economic shocks is pivotal. Using data from six Western Balkan economies (Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, and UNMIK Kosovo*) over the period 2000-2023, we construct a simple composite indicator of macroeconomic resilience to evaluate its temporal evolution empirically. Our index captures three unique dimensions: absorptive, adaptive, and transformative.

Our findings reveal that even though all countries have become more resilient to economic, social, and political shocks, the pace of improvement varies, widening the performance gap between the top and bottom countries in this region. In particular, Montenegro and Serbia are presented as the regional leaders in building macroeconomic resilience. In contrast, UNMIK Kosovo^{27,*} encounter the most notable challenges in the region.

Additionally, future research should examine the data structure used in the present study. In particular, it should underscore the use of multiway Principal Component Analysis (PCA), where we have three dimensions: countries, years, and variables, because the standard PCA approach is typically applied cross-sectional datasets and does not fully exploit the multidimensional structure of panel data. Ultimately, the relevance of a composite indicator of macroeconomic resilience extends beyond the academic domain to encompass practical implications for policymakers in their decision-making.

Keywords: economic resilience, shocks, composite indicator, Western Balkans

1. INTRODUCTION

The concept of economic resilience has gained considerable attention over the past two decades, considering various shocks: financial, energy, health, geopolitical, and climate that countries experienced. Some economies recover quickly and return to their pre-shock growth trajectories. Understanding this phenomenon has been one of the most challenging questions in macroeconomics. Even though vulnerability to such shocks is often unavoidable, the capacity to withstand, absorb, adapt to, and recover from disruptions determines whether an economy merely survives or undergoes a successful transformation in the aftermath.

Two recent global shocks can vividly illustrate the importance of macroeconomic resilience. The 2008 Global Financial Crisis revealed major structural vulnerabilities in many advanced and emerging economies. The 2008 crisis unearthed the fragility of highly leveraged financial systems; resilience measurement after this crisis shifted attention to stress testing banks, systemic risk indicators, and capital adequacy (see Haldane and May, 2011; Rose and Liao, 2005). Some economies — Germany, Poland, and the Nordic countries — absorbed the blow and progressed relatively quickly. Others, particu-

larly in Southern Europe, spent most of the decade trying to recover, with unemployment rates that remained socially and politically damaging long after GDP had technically stabilised (Rose, 2009; Martin, 2012). This evidence suggests that resilience largely reflects pre-existing structural characteristics rather than short-term crisis responses. Likewise, the COVID-19 pandemic provided a new stress test for worldwide economic systems. The pandemic was extraordinary as an economic shock because it hit supply, demand, and public institutions simultaneously. Even though the initial shock caused a historic contraction in real output and employment, recovery paths varied substantially across countries. Countries with stronger institutions, digital infrastructures, and practical policy responses, including rapid fiscal and monetary support, demonstrated greater adaptive capacity and resilience (OECD, 2021; IMF, 2021). Estonia and Finland are two countries that, thanks to strong digital economies and effective public health responses, were able to cushion economic shocks and sustain business continuity more effectively than those with weak institutions.

²⁷ This designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo* declaration of independence.

*Added by the Editorial Board and applies throughout the document.

The Western Balkan economies are particularly exposed to external shocks due to their structural characteristics and ongoing institutional transitions. These countries have economies that several major external shocks have hit in a relatively brief interval — the European sovereign debt crisis, COVID-19, and then the energy price surge that followed Russia's invasion of Ukraine — while they simultaneously strive to reform their formal institutions to meet EU accession requirements (European Commission, 2023). That last part is critical and frequently underappreciated: these countries do not simply react to shocks; they are also in the middle of, partly externally driven, a structural transformation. Standard macroeconomic indicators do not adequately capture the interaction between the two processes. A country can display a reasonable GDP growth and still accumulate fragilities; it can appear stable in theory, but be deeply exposed in reality. That gap has motivated our empirical analysis.

Most formal studies are typically descriptive or policy-oriented rather than composite-index studies, reflecting

data limitations and the region's research focus. We fill this gap in the formal literature by constructing a composite indicator of economic resilience based on three dimensions for six Western Balkan countries from 1996 to 2023. To our knowledge, no empirical study has constructed a longitudinal composite indicator to evaluate the evolution of resilience over time and to emphasise the resilience's variability, in particular its stability. In other words, an economy can perform satisfactorily in the overall resilience score while remaining structurally subjected to future deterioration precisely because the foundations of that performance are unstable.

We organise the remainder of this paper as follows. The next section addresses the concept of economic resilience and its measurement. Section 3 presents the data and outlines the statistical methodology. Section 4 illustrates the main findings. Section 5 encompasses the discussion of results, and concludes with some future extensions of the work.

2. LITERATURE REVIEW: CONCEPT AND MEASUREMENT

2.1. What is Economic Resilience?

Economic resilience is a multidimensional concept and methodologically difficult to implement. Etymologically, it derives from the Latin *resilire* ('to spring back'), and the idea first matured in ecology and systems theory before gaining prominence within economics, most notably in regional studies (Holling, 1973; Carpenter et al., 2001; Folke, 2006). In economics, resilience is described as an economy's capacity to withstand, absorb, adapt to, and recover from adverse shocks while sustaining or realigning core functions (Briguglio et al., 2009; Rose, 2004; Wink, 2012; Martin, 2012; Martin and Sunley, 2015). This view spans multiple layers: (i) engineering resilience (speed of return to pre-shock trend), (ii) ecological/system resilience (ability to absorb disturbances without regime shift), and (iii) adaptive/transformative resilience (capacity to reorganise and evolve in response to structural change) (for instance, Simmie and Martin, 2010; Pendall et al., 2010; Folke, 2006). Empirically, macroeconomic stability (fiscal/monetary buffers), structural features (diversification and openness), institutional quality (governance and the rule of law), and innovation capacity/human capital shape resilience (Hallegatte, 2014; Modica & Reggiani, 2015; Sensier et al., 2016). Small open economies and peripheral regions — including those in the Western Balkans — are more vulnerable to potential exogenous shocks. Accordingly, resilience depends critically on policy credibility, financial depth, and the ability to upgrade in the global value chains (Briguglio et al., 2009; Martin et al., 2016).

2.2. Determinants of economic resilience at the macro level

Some scholars have collected empirical evidence on the factors that elucidate why certain countries avoid recessions when hit by adverse shocks, and why others recover more rapidly and thoroughly. In a seminal paper by Abiad et al. (2009), medium-term output losses (associated with adaptive resilience) were shown to follow financial crises in advanced countries and emerging markets. They indicated that short- and medium-term output losses depend on initial conditions. Eichengreen et al. (2024) identify that stronger recoveries follow deeper recessions. Conversely, more prolonged recessions hurt resilience: protracted downturns erode human capital and yield lasting hysteresis effects, debilitating recovery. Other major determinants with a positive effect on resilience encompass trade and exchange rate flexibility.

However, private credit growth and financial openness undermine economic resilience, with the impact differing amongst emerging vs advanced economies. Giannakis et al. (2024), using a production function framework, analyse the factors that drive regional resilience across a sample of 202 European regions and examine the 2008 global financial crisis. Their main findings suggest that pre-crisis sectoral interconnectedness matters considerably. Specifically, the degree to which agriculture, construction, and manufacturing were structurally integrated within a regional economy shaped how well that region absorbed the negative shock.

Conversely, economies heavily dependent on concentrated export structures are more vulnerable, rendering high export concentration a notable detractor. A recent systematic literature review by Capoani et al. (2025) addresses the primary macroeconomic factors that impact resilience, including human capital (education and

skills), SMEs, FDI, labor market dynamics (e.g., unemployment), and workforce stability. Moreover, Hundt and Holtermann (2000) demonstrate that strong national institutions (good governance) improve regional economic resilience for a sample of 249 regions from 1990 to 2014. More recently, Lissona and Ruiz (2025) investigated the economic growth vulnerability of the four largest EU economies (Germany, Spain, France, and Italy) using a multilevel dynamic factor model and concluded that under stress, financial factors are likely to exacerbate the macroeconomic effects of adverse shocks.

2.3. How do we measure economic resilience?

When handling measuring economic resilience, we must address multiple questions. What kind of resilience do we want to measure? (Engineering, ecological, evolutionary, or transformative)? What indicators should be included? Is it regional resilience, organizational, or country-level resilience? Furthermore, we may encompass many other challenging questions (see Sensier et al., 2016; Sutton et al., 2023).

Multiple approaches are available for measuring economic resilience. Common examples cover case studies, composite indices, statistical time-series models, and causal structural models (see Sutton et al., 2023). The formal literature has two strands: one uses unidimensional measures, while the other uses composite indicators, contending that a multidimensional approach is more appropriate for capturing the concept of resilience. Single indicators commonly used as proxies for resilience encompass GDP growth volatility, output loss following a shock, employment levels, fiscal balance/debt ratios, foreign exchange reserves, sectoral shares (e.g.,

the tourism share), and trade/exports concentration. Certain examples are provided in the literature (Briguglio et al., 2006; Bristow & Healy, 2018; Simmie & Martin, 2010; Martínez et al., 2019). These single indicators might offer several advantages in interpretation. However, they neglect the multidimensional nature of economic resilience.

Another approach involves developing composite indicators that capture the multidimensional nature of the resilience concept. This methodology allows us to incorporate short- and long-term structural changes into a single framework (for instance, Stanickova and Melecký, 2018; Pontarollo and Serpieri, 2018). Other examples of composite indicators are sourced from international organisations, including the OECD and the EU Joint Research Centre.

Additionally, this approach offers several disadvantages, including the choice of indicators, the aggregation method, and poor-quality input data (for an additional discussion, see Nardo et al., 2005a, 2005b). In the latter report, the OECD evaluates the Western Balkans' performance relative to the EU across six clusters: infrastructure, connectivity, skills, business environment, digital transformation, and green transition. For instance, regional R&D investment accounts for only 17% of the EU average, indicating broader deficits in innovation ecosystems and human capital formation. Furthermore, only 34% of adults possess digital skills, much less than the EU's 56%. In the remaining areas, Western Balkans is also behind the EU countries.

Finally, Table 1 presents the main economic resilience indicators developed to date.

Table 1: Economic Resilience Indices

Year	Economic resilience index	Authors	Indicators
2009	Economic resilience index	Briguglio et al. (2009)	Macroeconomic stability, microeconomic market efficiency, social development, and good governance
2015	County economic resilience index	Kahsai et al. (2015)	Industrial diversity, entrepreneurial activity and business dynamics, human and social capital, scale and proximity, and infrastructure
2015	Resilience index	FM Global (2015)	Economic, risk quality, and supply chain
2018	Regional resilience to economic shocks	Bruneckiene et al. (2018)	Insight capacity, regional governance, knowledge and innovation, learning capacity, networking capacity, and regional infrastructure
2023	The economic resilience index	Hafele et al. (2023)	Economic independence, education and skills, financial resilience, governance, production capacity, social progress, and cohesion

Source: Author's elaboration

Our study aligns with the earlier efforts to quantify economic resilience by Briguglio et al. (2009), who underscored broad macroeconomic and governance dimensions, including stability, market efficiency, and social

development. Our article grounds the composite indicator of resilience in a theoretically consistent set of dimensions, rather than maximising coverage (by including a plethora of indicators) at the expense of coherence.

3. METHODOLOGY AND DATA

3.1. Methodology

Macroeconomic resilience is the ability of countries to reduce their potential vulnerability to adverse exogenous shocks and to recover quickly (Briguglio et al., 2006; Hallegatte, 2014; Sensier et al., 2016; Martin and Sunley, 2015). Our resilience index (henceforth, CRI) uses macroeconomic data and captures three key dimensions: The first dimension, the absorptive capacity, demonstrates macroeconomic stability- the economy's ability to sustain stable conditions under external pressure (Briguglio et al. 2009). We proxy this dimension through real

GDP growth, which reflects short-run macroeconomic performance and the economy's ability to sustain output during periods of stress, and inflation, which captures price stability. The second dimension, adaptive capacity, denotes the ability to adjust and reorganise in response to changing conditions. Proxy variables, including labour market flexibility, trade openness and economic diversification, measure this dimension. Together, these variables substantiate the rapid reallocation of resources during recession periods. The third dimension, the transformative capacity, signifies the potential structural changes and long-term growth and is proxied by investment in human capital, innovation inputs, and quality of governance.

We follow Rojas-Suarez's (2023) methodological approach to build a simple indicator of macroeconomic resilience for emerging economies. The steps include the following: data normalisation, measurement, and aggregation.

1. Normalisation: All variables are normalised using the min-max approach, and scales are reversed (for instance, unemployment rates and inflation levels) where necessary. Hence, higher values consistently indicate higher macroeconomic resilience. In particular, the transformation scales the data to the range 0 to 1.

$$X_{it}^* = \frac{x_{it} - \min(x)}{\max(x) - \min(x)}$$

Where:

- X_{it} = value of indicator i for country and year t

- $\min(x)$ = minimum observed value of indicator i across countries and years
- $\max(x)$ = maximum observed value of indicator i across countries and years
- X_{it}^* = normalised indicator between 0 and 1

2. Measurement: Each economic resilience dimension (absorptive, adaptive, and transformative) is measured through various indicators. Inflation stability and GDP growth measure the absorptive capacity. The higher GDP value is associated with higher resilience.

However, as the inflation rate increases, resilience decreases. Adaptive capacity is proxied by export performance, unemployment rates, and private and domestic credit. Ultimately, the transformative capacity is captured through education spending, R&D expenditures, and the rule of law as a governance indicator, where higher values across all three indicate greater transformative potential. These components are averaged to form a composite index, with higher values indicating greater economic resilience.

3. Aggregation: The Composite Resilience Index (henceforth, CRI) is then calculated as follows:

$$CRI_{it} = 1/3(Absorptive_{it} + Adaptive_{it} + Transformative_{it})$$

The sub-index i represents country and t the year. The CRI ranges from 0 (vulnerable economy) to 1 (highly resilient economy). The index enables cross-country comparisons of macroeconomic resilience in our sample of six Western Balkan countries. Additionally, this indicator can reflect the short run, the capacity to resist; the short and medium term, the capacity to adapt; and the long-run, the capacity to transform (Martin, 2012; Folke, 2006).

3.2. Data

We used RStudio v. 3.0 for statistical analysis, data extraction, and data visualisation. We developed a simple resilience index for the six Western Balkan countries for the 2000-2023 period. Our sample emerged from the available data. However, some indicators, countries, and years have missing values. Table 2 displays the specific indicators used as proxy variables for the three dimensions of resilience.

Table 2: Variables and data sources

Dimension	Indicator	Definition	Source
Absorptive	Real GDP growth	This variable denotes the annual percentage change in GDP growth (US dollars, constant prices).	World Bank's World Development Indicators (WDI)
Absorptive	Inflation (%)	This dimension measures the annual percentage	World Bank's World Development Indicators (WDI)

		change in the cost of a basket of goods via Consumer Price Index (CPI).	
Adaptive	Exports (% GDP)	It demonstrates exports of goods and services as a percentage of GDP.	World Bank's World Development Indicators (WDI)
Adaptive	Unemployment rates (%)	Unemployment rate (15–74) refers to the percentage of the population in the labour force.	World Bank's World Development Indicators (WDI)
Adaptive	Domestic credit to private sector (%)	It denotes domestic credit to the private sector by banks.	World Bank's World Development Indicators (WDI)
Adaptive	Domestic credit (% GDP)	It depicts credit to households and non-profit institutions, local governments, social security funds, and nonfinancial corporations.	World Bank's World Development Indicators (WDI)
Transformative	Education expenditure (%)	It shows the percentage of GDP dedicated to education spending.	World Bank's World Development Indicators (WDI)
Transformative	R&D expenditure (%)	Research and Development expenditure	World Bank's World Development Indicators (WDI)
Transformative	Rule of Law	The Rule of Law reflects the confidence in the judicial system, contract enforcement, property rights, law enforcement against violent and organized crime, and judicial independence. It is a proxy for the overall quality of the legal system.	World Bank's World Development Indicators (WDI)

Source: Author's elaboration

Table 3 displays summary statistics for the variables used in the empirical analysis. The total number of observations is 144. The sample average for real GDP growth is 3.35. The credit-to-private-sector variable has the highest standard deviation. The mean value of the rule of law is around -0.35, with minimum and maximum being values -1.29 and 0.32, respectively. Education expenditure and R&D have the highest rates of missing values, at 30% and 60%, respectively. To check robustness, we computed the transformative sub-index, excluding education and R&D expenditures entirely. The Spearman rank correlation with the baseline CRI is 0.97, confirming that imputing missing values does not drive our results.

Table 3: Summary Statistics

Variable	Number of observations	Mean	St. Dev.	Min	Max
Real GDP growth (%)	135	3.35	3.42	-15.31	13.04
Inflation (%)	129	4.81	10.78	-2.41	95.01
Exports (% GDP)	136	34.96	11.67	8.24	72.79
Unemployment rate (%)	120	20.63	7.50	8.27	37.32
Education expenditure (% GDP)	43	3.52	0.43	2.74	4.48
R&D (% GDP)	82	0.44	0.30	0.02	1.23
Credit to the Private Sector (% GDP)	107	44.76	13.49	8.05	86.52
Domestic Credit (% GDP)	61	48.94	10.58	33.10	70.19
Rule of Law (RL)	138	-0.35	0.26	-1.28	0.32

Source: Author's elaboration

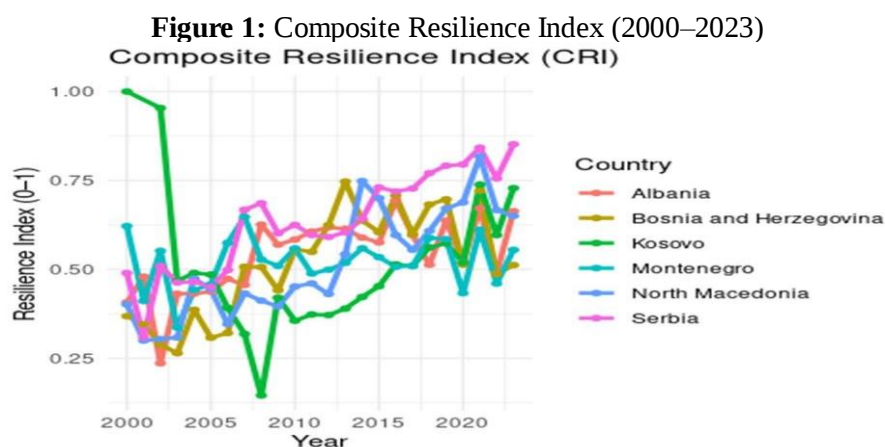
In the next section, we describe the main results of our resilience composite indicator across countries and over time.

4. RESULTS

Figure 1 illustrates trends in the CRI for the six Western Balkan countries over the period 2000–2023. Economic resilience shows a clear upward trend for almost every country between 2000 and 2023. Simply inspecting Figure 1, we can easily identify three groups of countries:

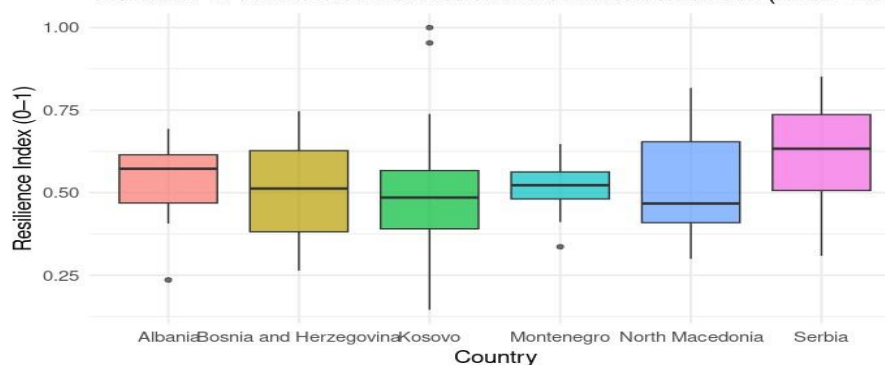
1. Highest Performers, whose scores lie between 0.65 and 0.70 in 2020. Montenegro and Serbia consistently rank amongst the most resilient countries. This finding may be attributed to stronger institutions, a more stable economy or a better adaptive capacity than do their counterparts.
2. Middle Performers, whose scores range from 0.50 to 0.60 in 2020. This group comprises Albania, North Macedonia, and Bosnia and Herzegovina. This cluster shows improvement in economic resilience but still lags behind the highest performers. Furthermore, Bosnia and Herzegovina remained comparatively stagnant between 2010 and 2015, which might be associated with periods of political instability or the aftermath of the 2008 global financial crisis

3. Lowest Performers, whose scores are between 0.25 and 0.40 in 2020. In this group, we find Kosovo, which started substantially lower and, despite improvement, remains behind the other countries in the region. Kosovo has unique challenges as a newer, partially recognised state recovering from the armed conflict. Our descriptive results align with the FM Global Resilience Index (see, for instance, FM, 2025), which ranks countries based on their economic strength, risk quality, and supply chain resilience. Within the Western Balkans, Serbia and Montenegro consistently rank higher -a similar pattern observed in our cluster High group. Albania, North Macedonia, and Bosnia and Herzegovina rank in the mid-tier of the index, which aligns with our intermediate cluster. Kosovo, while absent from the FM rankings due to its partially recognised status, would be assigned to the lowest category, considering the challenges surrounding its infrastructure and institutional development.



Source: Author's illustration.

Figure 2: Variation in the Resilience Index across Western Balkan countries. (2000–2023)
Variation in Resilience Index across Western Balkans (2000–2023)



Source: Author's illustration.

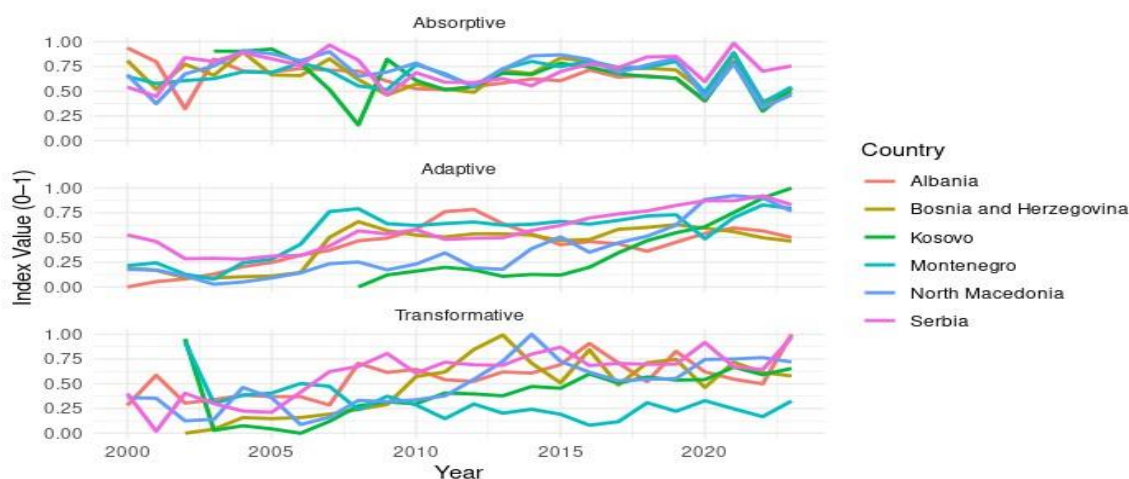
Figure 2 summarises and depicts the numerical distribution of the CRI across countries. A preliminary analysis indicates that the CRI distribution is uneven across the Western Balkan countries, with median values and variability differing across countries. This finding suggests persistent structural and national economic policy differences in these countries' ability to endure external and domestic disturbances. Moreover, we identify points outside the boxplots for Albania, Kosovo, and Montenegro that may be potential outliers. Countries with narrower interquartile ranges exhibit lower variability in resilience scores.

In our sample, Bosnia and Herzegovina has the highest median CRI of 0.50. In contrast, North Macedonia has the lowest median CRI of 0.46. The highest spread is found in North Macedonia, whereas the lowest is observed for Montenegro.

We break down the CRI's total score into three dimensions: absorptive, adaptive, and transformative. Figure 3 illustrates the scores of the resilience sub-Indices (CRI) by dimension for the Western Balkans over the period 2000–2023. Regarding the absorptive dimension, all countries exhibit comparably stable, high absorptive scores ranging from 0.5 to 0.9 over time, with minor fluctuations. This finding implies that the Western Balkans typically have the capacity to absorb external shocks (e.g., through macroeconomic stabilisation

and inflation control). Periodic declines in this dimension are associated with major external shocks, notably the 2008–2009 global financial crisis, and the 2020 COVID-19 shock. This pattern indicates macroeconomic buffering capacity across the region. However, it remains uneven and, in several countries, relatively sparse. The adaptive dimension exhibits a clear upward trend across all countries, particularly after 2010, with values ranging from 0.3 to 0.8. This trend might mirror improvements in trade openness, financial depth, entrepreneurship (as measured by Doing Business indicators), and labour markets. Certain divergence is evident, for example, with Serbia and North Macedonia leading the way, indicating more substantial progress in building adaptive capacity. Simultaneously, Bosnia and Herzegovina lags relatively behind. The transformative dimension begins at markedly low values (0.1–0.3 in the early 2000s). It then steadily increases in most countries, albeit with some variability. Education, research and development expenditures (R&D), and the quality of governance drive this dimension. Nevertheless, Montenegro is the weakest-performing country in this dimension due to potential institutional bottlenecks. This transformative dimension is the weakest and most unequally distributed across the region, with more volatility than the other resilience dimensions. Nonetheless, it is pivotal for long-term economic resilience and convergence with EU economies.

Figure 3: Composite Resilience Index: Sub-Indices by dimension (2000–2023)
Resilience Sub-Indices by Dimension



Source: Author's illustration.

5. DISCUSSION AND CONCLUSIONS

Our research suggests that, even though all countries have become more resilient to economic, social, and political shocks, the pace of improvement has varied, resulting in a growing performance gap between the top and bottom countries in the region. The CRI's temporal evolution reveals important asymmetries: Montenegro and Serbia are presented as the regional leaders in building macroeconomic resilience. Concurrently, Kosovo confronts the most notable challenges. In addition, the distribution of macroeconomic resilience across dimen-

sions indicates substantial heterogeneity amongst Western Balkan countries, with the capacity dimension showing the highest scores.

Productivity-enhancing FDI and relatively more stable political environments lead to high CRI Scores, as in Serbia and Montenegro, which enable structural reforms. Conversely, high dependency on consumption-oriented remittances (rather than investment) and political systems that perpetuate instability and block reform lead to low CRI Scores, as observed in the cases of Kosovo and Bosnia and Herzegovina. The variation in the

CRI indicates that Serbia consistently attains the highest CRI scores, even though its resilience index values across periods show pronounced volatility. This finding aligns with the economic growth literature, which finds that this intertemporal variability is associated with national economic systems whose adaptive capacity relies on external conditions (for instance, Ramey and Ramey, 1995). Albania and Montenegro exhibit a relatively stable profile of economic resilience indices. However, they face deficits in transformative capacity for human capital formation, low R&D investment, and weak formal institutions. North Macedonia demonstrates a positive trajectory in the resilience index data. However, North Macedonia's institutional development remains characterised by certain vulnerabilities that may reverse this positive path. The EU Commission lists the main drawbacks as follows: the independence and efficiency of the judicial system and the Rule of Law (see EU 2023). Kosovo displays moderate resilience, but political cycles and governance discontinuity lead to high inter-temporal volatility. Serious concerns about corruption, judicial independence, and property rights enforcement are present, which directly influence the institutional sub-dimension of the resilience index (see, for instance, EU, 2023). Finally, Bosnia and Herzegovina is a special case in the Western Balkans, where political economy constraints do not hinder macroeconomic fundamentals from functioning as the primary obstacle to

improvements in economic resilience (see, for instance, Kmezic, 2016).

Future research should examine the nature of the data used to establish the resilience index for six Western Balkan countries. In particular, creating an index across countries and over time using a Principal Component Analysis (PCA) approach with multiway data (countries, years, and indicators) may provide additional methodological insights. The standard approach does not allow for the incorporation of intra-unit correlations. This new methodological approach, developed by Ouyang and Yuan (2025), demonstrates substantially higher efficiency than the traditional approach. Other measures of resilience using similar techniques should be developed at the regional level, aligning with previous studies. We should note that national averages frequently mask regional disparities. Hence, recent approaches have implemented REI at the regional level using PCA (Ilenau and Pana, 2024).

On top of that, other dimensions, such as business operations, should be incorporated into our composite index to reflect transformative resilience fully. In closing, another future extension of this work may involve applying simple imputation methods to address the high prevalence of missing values in variables, including R&D and education expenditures. Moreover, scholars should conduct robustness analysis to test the adequacy of the weighting.

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THE APPLICATION OF RENEWABLE ENERGY SOURCES IN THE OIL INDUSTRY: A STRUCTURED REVIEW AND STRATEGIC IMPLICATIONS FOR BOSNIA AND HERZEGOVINA

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Abstract

The energy transition represents an inevitable technological advancement, posing significant challenges for the oil industry. This paper analyzes the challenges and opportunities faced by the oil sector within the context of the global energy transition and the principles of sustainable development. The research is based on the assumption that, due to the depletion of fossil fuels and increasing environmental pressures, the oil industry must undergo transformation to ensure long-term economic sustainability. By examining key concepts such as the green economy and sustainable development, the paper explores the impact of international regulatory frameworks, including the CBAM mechanism, on business operations. It provides a detailed assessment of the economic justification and environmental benefits of integrating renewable energy sources into the business models of oil companies. The practical implementation of solar energy and other renewable sources is considered a strategic imperative for reducing operational costs and enhancing competitiveness. It was analyzed how the existing infrastructure of the oil company can be used in the area of Bosnia and Herzegovina and Republic of Srpska to diversify its business model. The transformation from traditional oil companies into modern energy enterprises is presented not only as an environmental obligation but also as a key economic strategy for achieving efficiency and profitability.

Keywords: oil industry, renewable energy sources, sustainable development, alternative fuels, sustainability.

1. INTRODUCTION

The oil industry has been one of the fundamental pillars of global economic development since the industrial revolution, enabling large-scale industrialization, mass transportation, and sustained economic growth throughout the twentieth and early twenty-first centuries. Despite its continued importance, the industry is increasingly confronted with profound structural challenges arising from climate change, environmental degradation, regulatory pressure, and accelerating technological change. The growing recognition of the negative externalities associated with the intensive use of fossil fuels particularly greenhouse gas emissions and their contribution to global warming has placed the oil industry at the center of the global energy transition.

In response to these challenges, the concept of sustainable development has emerged as a dominant framework for reconciling economic growth with environmental protection and social responsibility. International climate agreements, such as the Paris Agreement, alongside policy instruments including the European Union's Carbon Border Adjustment Mechanism (CBAM), have intensified pressure on energy-intensive industries to reduce carbon emissions and adopt cleaner technologies. Within this evolving regulatory and market environment, oil companies face not only environmental obligations but also strategic risks related to long-term competitiveness, cost structures, and market relevance.

At the same time, renewable energy sources particularly solar energy, wind energy, biomass, and energy storage

technologies have experienced rapid technological progress and significant cost reductions. These developments have transformed renewable energy from a purely environmental consideration into a viable economic and strategic option. For oil companies, the integration of renewable energy sources represents an opportunity to reduce operational costs, diversify energy portfolios, enhance energy security, and improve corporate sustainability profiles, while simultaneously responding to regulatory and societal expectations.

In smaller and developing economies, such as Bosnia and Herzegovina, the challenges of the energy transition are compounded by structural constraints, regulatory alignment with the European Union, and limited domestic energy diversification. Oil companies operating in this context must navigate global transition trends while adapting solutions to local market conditions, infrastructure, and policy frameworks. The existing infrastructure, logistical networks, and market presence of oil companies create both opportunities and constraints for integrating renewable energy solutions into their business models.

The aim of this paper is to provide a structured review of the application of renewable energy sources in the oil industry and to synthesize strategic implications for oil companies operating in Bosnia and Herzegovina. Rather than presenting original empirical research, the paper adopts a review-based approach that integrates existing literature, international practices, and policy

frameworks to develop a coherent analytical perspective. A particular focus is placed on identifying renewable energy solutions that are economically and strategically relevant for oil companies, with a contextual application to the case of Optima Group.

The contribution of this paper lies in its systematic synthesis of renewable energy applications within the oil

industry and its structured strategic assessment of opportunities and constraints in a specific national context. By combining a comparative review with a SWOT-based application, the paper seeks to bridge the gap between global energy transition discourse and practical decision-making at the company level.

2. LITERATURE REVIEW

The global energy sector is currently navigating an unavoidable and profound transition, catalyzed by both aggressive technological advancements and rapidly escalating ecological pressures. While the oil industry has been central to industrial progress for over a century, its traditional business model is now unsustainable. The literature overwhelmingly argues that the industry must undertake a fundamental transformation to maintain long-term economic viability, driven primarily by the finite nature of fossil fuels and the intensifying threat of global warming.

2.1. Sustainable Development, Planetary Boundaries, and Resource Constraints

The contemporary literature on energy and economic development is increasingly framed by the principles of sustainable development and the green economy. Sustainable development emphasizes the need to balance economic growth with environmental protection and social responsibility, ensuring that current development does not compromise the ability of future generations to meet their needs (Saks, 2014). Within this framework, economic activity is constrained by ecological “planetary boundaries,” beyond which environmental degradation becomes irreversible and economically destabilizing.

A central concern highlighted in the literature is the role of greenhouse gas emissions, particularly carbon dioxide (CO₂), in driving climate change. Empirical analyses indicate that atmospheric CO₂ concentrations have reached historically unprecedented levels, intensifying the greenhouse effect and contributing to rising global average temperatures (Radovanović, 2021; Our World in Data, 2024). These developments are associated with increasingly frequent extreme weather events, ecosystem disruption, and rising economic costs across multiple sectors. As a result, environmental degradation is no longer treated as an externality but as a systemic risk to long-term economic stability.

In parallel, the literature emphasizes the structural limitation of fossil fuel dependence. Geological assessments confirm that fossil fuel resources are finite, with remaining reserves of oil, natural gas, and coal constrained by both physical availability and rising extraction costs (Rajković Milić, 2009). This combination of environmental pressure and resource depletion has intensified calls for energy diversification and accelerated the transition toward low-carbon energy systems. Within this context, the oil industry is increasingly positioned as

both a contributor to the problem and a necessary participant in the solution.

2.2. Regulatory and Technological Drivers of Transformation in the Oil Industry

The literature identifies regulatory and technological forces as the primary external drivers accelerating the transformation of the oil industry. International climate agreements and policy instruments have introduced binding constraints that directly affect the cost structures and strategic positioning of energy-intensive industries. Among these, the European Union’s Carbon Border Adjustment Mechanism (CBAM) is frequently cited as a policy instrument that internalizes carbon costs and increases financial pressure on companies with carbon-intensive production and supply chains (Chamber of Commerce and Industry of the Republic of Srpska, n.d.). For oil companies operating in or trading with the European market, CBAM represents a significant incentive to reduce emissions and invest in low-carbon solutions.

Technological change further amplifies these regulatory pressures. The literature consistently highlights electrification as a disruptive force reshaping energy demand, particularly in the transport sector. Rapid technological progress, combined with supportive policy measures, has accelerated the adoption of electric vehicles (EVs), fundamentally challenging the long-term demand outlook for petroleum-based fuels (Our World in Data, 2024). This shift is interpreted not as a short-term fluctuation but as a structural transition with profound implications for oil company business models.

Together, regulatory constraints and technological disruption are portrayed in the literature as mutually reinforcing forces. While regulation increases the cost of maintaining carbon-intensive operations, technological innovation simultaneously lowers the barriers to adopting alternative energy solutions. As a result, the oil industry faces a narrowing strategic space in which inaction increasingly represents the highest risk option. The literature therefore frames adaptation not as a discretionary strategy, but as a prerequisite for long-term survival and competitiveness.

2.3. The Strategic Imperative: Integration of Renewable Energy Sources in the Oil Industry

A growing body of literature converges on the conclusion that oil companies must actively integrate renewable energy sources into their operational and strategic frameworks to respond effectively to the pressures of the energy transition. This integration is consistently

framed as a strategic imperative rather than a purely environmental response, with authors emphasizing its role in preserving competitiveness, improving efficiency, and reducing long-term risk exposure (Spasić, 2022).

One of the most frequently cited advantages of renewable energy integration is its potential to generate immediate operational and financial benefits. Studies highlight that investments in renewable energy technologies reduce dependence on volatile electricity markets, lower operational expenditures, and improve corporate environmental performance (International Renewable Energy Agency [IRENA], 2025). These benefits are particularly relevant for downstream oil operations, where electricity consumption represents a significant component of operating costs. Consequently, renewable energy adoption is increasingly viewed as a mechanism for cost optimization and risk management.

Among renewable technologies, solar photovoltaic systems are most consistently identified as the preferred entry point for oil companies. The literature emphasizes the high compatibility of photovoltaic installations with existing oil infrastructure, including petrol stations, administrative facilities, warehouses, and refineries (Spasić, 2022; Kovač & Palkova, 2015). Declining technology costs, long system lifespans, and low maintenance requirements further enhance the attractiveness of solar energy as a scalable and economically justified solution for achieving partial energy self-sufficiency.

In addition to solar energy, the literature discusses diversification into alternative energy carriers such as biofuels and hydrogen. Biofuels are highlighted for their potential integration into existing refinery infrastructure, allowing oil companies to utilize established assets while reducing lifecycle emissions (SERBIO, 2013). Hydrogen, particularly when produced through renewable-powered electrolysis, is identified as a long-term strategic option, albeit one associated with higher investment requirements and technological uncertainty (Spasić, 2022). These technologies are generally positioned as complementary rather than immediate substitutes, forming part of a gradual transition toward diversified energy portfolios.

3. METHODOLOGY

3.1. Research design

This study adopts a qualitative research design based on a structured literature review and conceptual synthesis. The methodological approach is intended to integrate existing academic research, institutional reports, and policy documents related to energy transition, sustainable development, and the oil industry. Rather than generating primary empirical data, the study aims to synthesize established knowledge and identify dominant patterns, strategic drivers, and constraints relevant to the integration of renewable energy sources in oil company operations.

Beyond technological adoption, the literature points to a broader transformation in the identity of oil companies. Successful adaptation is increasingly associated with a shift from traditional fuel retailing toward integrated energy service provision, encompassing electricity generation, energy trading, and alternative fuels (Spasić, 2022). In this context, renewable energy integration is interpreted as a catalyst for business model innovation rather than as an isolated technical intervention.

2.4. Research Gaps and Contribution of the Study

Despite extensive research on renewable energy integration in the oil industry, a significant gap persists in the existing literature. Most studies focus on large multinational oil companies operating in developed markets characterized by regulatory stability, strong capital availability, and mature energy infrastructures (IRENA, 2025). Consequently, limited attention has been devoted to oil companies operating in smaller or developing economies, where regulatory uncertainty, constrained investment capacity, and market size impose additional strategic challenges.

In particular, the literature provides insufficient guidance on how renewable energy solutions should be prioritized and adapted within specific national and regional contexts. Questions related to the economic feasibility, operational integration, and strategic sequencing of renewable energy investments remain underexplored for oil companies operating in transitional economies such as Bosnia and Herzegovina and the Republic of Srpska.

This study addresses these gaps by synthesizing existing literature on renewable energy integration and applying it within a localized strategic context. By linking global and regional transition insights to a company-level SWOT-based assessment, the paper contributes to bridging the divide between abstract transition discourse and practical strategic decision-making in smaller energy markets.

The review focuses on peer-reviewed academic publications, international agency reports, and industry-related analyses that address renewable energy technologies, regulatory frameworks, and strategic transformation within the oil sector. Through thematic categorization and comparative analysis, the reviewed literature is organized into coherent analytical themes that inform the subsequent strategic assessment.

3.2. Analytical framework and levels of analysis

To ensure coherence and avoid analytical fragmentation, the study is structured across three interconnected analytical levels.

The global level provides a benchmark perspective by examining international trends in energy transition, regulatory pressures, and strategic responses of oil companies. This level establishes the broader context within which renewable energy integration is discussed, without implying direct comparability to local conditions.

The regional level focuses on oil companies operating in Southeast Europe and comparable transitional economies. This level enables a more realistic assessment of structural constraints, regulatory alignment with European energy policy, and investment capacities that resemble those of Bosnia and Herzegovina.

The local level applies insights from the global and regional review to the specific context of Bosnia and Herzegovina, with particular reference to Optima Group. At this level, the study evaluates how renewable energy integration strategies can be adapted to local infrastructural, regulatory, and market conditions.

This multi-level analytical framework allows global transition dynamics to be systematically linked to company-level strategic considerations, thereby strengthening internal coherence.

3.3. Strategic synthesis method: SWOT analysis

As a synthesis and application tool, the study employs a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis to structure the strategic implications of renewable energy integration for Optima Group. The SWOT

analysis is derived exclusively from insights developed in earlier sections of the paper, including infrastructure characteristics, market positioning, regulatory exposure, and renewable energy potential.

The purpose of the SWOT analysis is not to provide a predictive or quantitative evaluation, but to translate the reviewed literature into a structured strategic assessment relevant to company-level decision-making. This approach enables the identification of internal capabilities and external pressures that shape the feasibility and prioritization of renewable energy investments.

3.4. Limitations of the methodological approach

Several limitations of the adopted methodology should be acknowledged. First, the study does not rely on primary data collection or quantitative modeling, which limits the ability to assess project-specific financial performance or environmental impacts. Second, the SWOT analysis represents a qualitative and conceptual assessment rather than a formal optimization or forecasting model.

Despite these limitations, the chosen methodology is appropriate for the objectives of a review-based study, providing a coherent analytical framework that connects global energy transition literature with strategic considerations in a localized context.

4. RESULTS

4.1. A strategic framework for sustainable transformation in the oil industry

The results of the structured literature review indicate that the integration of renewable energy sources within the oil industry represents a central strategic response to the combined pressures of energy transition, regulatory constraints, and market transformation. Across the reviewed literature, renewable energy integration consistently emerges as a mechanism for improving operational efficiency, reducing exposure to energy price volatility, and enhancing long-term strategic resilience (Spasić, 2022; International Renewable Energy Agency [IRENA], 2025).

A key result of the analysis is the identification of solar photovoltaic systems as the most immediately applicable renewable energy technology for oil companies. The literature consistently highlights solar energy as particularly suitable due to its compatibility with existing oil industry infrastructure, scalability, and declining investment costs (Kovač & Palkova, 2015; Spasić, 2022). These characteristics position solar energy as a low-risk entry point for renewable energy adoption, enabling oil companies to achieve partial energy self-sufficiency while maintaining operational continuity (IRENA, 2025).

The results further indicate that other renewable energy options, such as biofuels and hydrogen, play a complementary but longer-term role in the transformation of oil company energy portfolios. Biofuels are primarily associated with the repurposing of existing refinery infrastructure and gradual reductions in lifecycle greenhouse gas emissions (SERBIO, 2013). Hydrogen, particularly when produced through renewable-powered electrolysis, is identified in the literature as a future-oriented energy carrier with significant strategic relevance but higher technological and investment uncertainty (Spasić, 2022). Collectively, these findings suggest that renewable energy integration within the oil industry is most effectively approached as a phased and differentiated process, rather than as a single technological substitution.

Beyond technological considerations, the results highlight a broader structural transformation in oil company business models. The literature consistently associates successful adaptation with a shift from traditional fuel retailing toward integrated energy service provision, encompassing electricity generation, alternative fuels, and energy-related services (Spasić, 2022). This transformation is framed as a strategic necessity for maintaining market relevance in the context of declining long-term demand for fossil fuels and increasing electrification of the transport sector (Our World in Data, 2024).

Table 1: SWOT analysis of Optima Group in the context of the energy transition

Strengths	Weaknesses
Established position in the oil products market of Bosnia and Herzegovina and the Republic of Srpska, with a recognizable brand and developed retail network. Existing infrastructure, including petrol stations, storage facilities, administrative buildings, and logistics assets, suitable for the integration of renewable energy technologies, particularly solar photovoltaic systems. Vertical integration and operational experience in energy supply chains, providing organizational capacity for managing large-scale infrastructure projects. Strong financial performance and profitability in recent years, enabling potential internal financing of gradual renewable energy investments.	High dependence on fossil fuel sales, exposing the company to long-term demand decline driven by decarbonization and electrification trends. Limited diversification of the energy portfolio beyond traditional oil derivatives, compared to more diversified regional competitors. Exposure to regulatory uncertainty and increasing compliance costs related to climate and energy policy alignment with the European Union. Lack of prior large-scale experience in renewable energy project development and electricity market operations.
Opportunities	Threats
Integration of solar photovoltaic systems at petrol stations, warehouses, and administrative facilities to reduce electricity costs and increase energy self-sufficiency. Diversification into new energy services, such as electricity supply, EV charging infrastructure, and energy-related services, leveraging the existing retail network. Utilization of renewable energy investments to improve environmental performance, corporate reputation, and alignment with sustainable development objectives. Strategic repositioning from a traditional oil company toward an integrated energy company, improving long-term resilience and market relevance.	Implementation of the Carbon Border Adjustment Mechanism (CBAM), which may increase costs and reduce competitiveness for companies reliant on carbon-intensive energy sources. Rapid growth of electric vehicles and alternative fuels, which threatens long-term demand for petroleum-based transport fuels. Increasing competition from regional and domestic oil companies that are actively diversifying into renewable energy and electricity markets. Risk of delayed adaptation, leading to missed investment cycles and loss of strategic position in the emerging low-carbon energy market.

Note: This table presents a qualitative SWOT analysis of Optima Group based on the structured literature review and contextual analysis conducted in this study. Strengths and weaknesses reflect internal organizational factors, while opportunities and threats represent external regulatory, technological, and market influences relevant to renewable energy integration.

4.2. Results of the SWOT analysis: Optima group

The SWOT analysis presented in Table 1 synthesizes internal organizational characteristics and external environmental factors affecting Optima Group in the context of the energy transition. The results highlight a combination of strong structural assets and emerging strategic vulnerabilities derived from the reviewed literature and contextual analysis.

On the internal dimension, the analysis identifies Optima Group's extensive retail network, existing infrastructure, and established market position as key strengths. The literature emphasizes that such infrastructural assets provide favorable conditions for integrating renewable energy technologies, particularly solar photovoltaic systems, across petrol stations, storage facilities, and administrative buildings (Kovač & Palkova, 2015; Spasić, 2022). In addition, recent financial performance discussed in the literature suggests that internally generated resources may support gradual renewable energy investments without immediate reliance on external financing.

At the same time, the results reveal significant internal weaknesses. The most prominent weakness is the company's high dependence on fossil fuel sales, which increases exposure to long-term demand decline driven by electrification and decarbonization trends (Our World in Data, 2024). Furthermore, limited prior experience in renewable energy project development and electricity market operations represents an organizational constraint that may slow diversification efforts, a challenge frequently identified in the literature on traditional oil companies entering renewable energy markets (IRENA, 2025).

The external dimension of the SWOT analysis identifies several opportunities associated with renewable energy integration. These include the potential to reduce operational electricity costs through on-site renewable generation, diversify revenue streams through new energy services such as EV charging infrastructure, and improve alignment with sustainable development objectives (Spasić, 2022). The literature also emphasizes that regulatory alignment with European climate policy can create incentives for early movers in renewable energy

adoption (Chamber of Commerce and Industry of the Republic of Srpska, n.d.).

Conversely, the analysis highlights substantial external threats. Regulatory instruments such as the Carbon Border Adjustment Mechanism are identified as increasing cost pressures on carbon-intensive business models, thereby directly affecting competitiveness in regional and European markets (Chamber of Commerce and Industry of the Republic of Srpska, n.d.). In parallel, the rapid growth of electric vehicle adoption poses a structural threat to long-term demand for petroleum-based transport fuels (Our World in Data, 2024). The literature further notes that increasing competition from regional oil companies actively diversifying into renewable energy and electricity markets intensifies the risk of strategic lag for companies that delay adaptation (IRENA, 2025).

4.3. Synthesis of results

5. DISCUSSION

The findings of this study provide further support for the growing body of literature that frames renewable energy integration as a strategic rather than purely environmental issue for the oil industry. The results indicate that renewable energy adoption contributes simultaneously to operational efficiency, risk mitigation, and long-term strategic resilience. This interpretation reinforces existing research emphasizing that the energy transition fundamentally reshapes competitive dynamics within the oil sector (Spasić, 2022; International Renewable Energy Agency [IRENA], 2025).

The identification of solar photovoltaic systems as the most immediately applicable renewable energy option for oil companies aligns with previous studies highlighting their modularity, declining costs, and infrastructural compatibility (Kovač & Palkova, 2015). The results extend this literature by demonstrating that solar energy is not only technically feasible but also strategically suitable for gradual integration within existing oil company operations. This supports the view that early-stage renewable investments can serve as a learning platform for broader diversification, rather than requiring disruptive organizational transformation at the outset.

The SWOT-based results for Optima Group illustrate how global transition dynamics manifest within a localized context. Consistent with international studies, the analysis confirms that infrastructural assets and market presence constitute significant strategic strengths for oil companies entering renewable energy markets (IRENA, 2025). At the same time, the findings highlight that dependence on fossil fuel revenues and limited experience in renewable energy project development represent structural vulnerabilities that may constrain adaptation.

6. CONCLUSION

Taken together, the results indicate that Optima Group occupies a strategic transition position characterized by strong infrastructural and market foundations alongside increasing exposure to regulatory, technological, and market risks. The combination of internal strengths and external pressures suggests that renewable energy integration represents both an opportunity for operational efficiency gains and a necessary response to structural change within the energy sector (Spasić, 2022; IRENA, 2025).

Importantly, the results do not imply the need for abrupt or disruptive transformation. Instead, they support a gradual and phased transition logic, in which solar energy serves as an initial and scalable entry point, followed by broader diversification into alternative energy services as market and regulatory conditions evolve. This synthesis provides a structured empirical basis for the discussion of strategic and managerial implications presented in the subsequent section.

This observation corresponds with broader literature on transitional economies, where institutional and market constraints shape the pace and form of energy transition (Our World in Data, 2024).

Regulatory instruments such as the Carbon Border Adjustment Mechanism emerge in the discussion as critical external drivers influencing strategic decision-making. The results suggest that regulatory pressure interacts with technological change by amplifying the costs of inaction, particularly for companies exposed to European markets (Chamber of Commerce and Industry of the Republic of Srpska, n.d.). In this regard, the findings support the argument that early alignment with low-carbon strategies may reduce long-term regulatory and market risks.

Importantly, the discussion does not imply that renewable energy integration represents a uniform or immediate solution for all oil companies. Instead, the findings suggest that a phased and context-sensitive approach is more consistent with both the literature and the realities of smaller energy markets. For companies such as Optima Group, renewable energy integration appears most viable when aligned with existing infrastructure, financial capacity, and gradual business model adaptation. Finally, the discussion highlights the limitations of the study's review-based approach. While the synthesis provides valuable strategic insights, it does not replace the need for detailed techno-economic or project-specific analyses. Future research could build on these findings by incorporating quantitative modeling, scenario analysis, or empirical case studies to further assess the financial and environmental performance of renewable energy investments in the oil industry.

This paper examined the role of renewable energy integration in the oil industry through a structured review of the literature and a contextual strategic application to Bosnia and Herzegovina. By synthesizing existing research on energy transition, sustainable development, and renewable energy technologies, the study sought to clarify the strategic relevance of renewable energy adoption for oil companies operating under increasing regulatory, technological, and market pressures. The findings of the literature review indicate that renewable energy integration has evolved from a predominantly environmental consideration into a strategic instrument for enhancing operational efficiency, managing risk, and maintaining long-term competitiveness. Among the available renewable energy options, solar photovoltaic systems emerge as the most immediately applicable solution for oil companies due to their technological maturity, declining costs, and compatibility with existing infrastructure. Other renewable energy pathways, including biofuels and hydrogen, are identified as complementary options with longer-term strategic relevance. The SWOT-based application to Optima Group demonstrates how these general findings translate into a specific national and company-level context. The analysis highlights that Optima Group's existing infrastructure and market position represent significant strengths that can facilitate renewable energy integration. At the same time, high dependence on fossil fuel revenues and increasing exposure to regulatory and technological change underscore the strategic vulnerability associated with delayed adaptation. External pressures, particularly those related to European climate policy and mar-

ket transformation in the transport sector, further reinforce the importance of gradual diversification toward renewable energy sources and new energy services.

The contribution of this paper lies in bridging global energy transition literature with localized strategic assessment. By combining a structured review with a qualitative SWOT analysis, the study provides a coherent analytical framework that supports understanding of how renewable energy integration can be approached by oil companies in smaller and developing energy markets. Rather than proposing universal solutions, the paper emphasizes the importance of context-sensitive and phased transition strategies aligned with existing infrastructural and organizational capacities.

Several limitations of the study should be acknowledged. The analysis is based on secondary sources and does not include primary data collection or quantitative evaluation of specific renewable energy projects. As a result, the findings should be interpreted as strategic and conceptual insights rather than predictive or prescriptive conclusions. Future research could extend this work by incorporating techno-economic modeling, empirical case studies, or scenario analysis to assess the financial and environmental impacts of renewable energy investments within the oil industry.

In conclusion, renewable energy integration represents a critical component of the strategic adaptation of oil companies in the context of the global energy transition. For companies such as Optima Group, the ability to align renewable energy initiatives with existing assets, regulatory requirements, and market conditions will play an important role in shaping long-term resilience and competitiveness.

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