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Uvodnik

Kraj 2025. godine obeležila je vest da je Srbija ušla u sam vrh zemalja najspremnijih za primenu veštačke inteligencije. Prema *Government AI Readiness Index 2025* organizacije Oxford Insights, Srbija je zauzela 39. mesto od 195 zemalja, ostvarivši snažan skok u odnosu na prethodnu godinu i pozicionirajući se u gornjih 20% globalno najspremnijih ekonomija. Ovaj rezultat potvrđuje kontinuitet ulaganja u digitalnu infrastrukturu i modernizaciju javne uprave, ali i rastuću sposobnost institucija da odgovore na tehnološke izazove.

Istovremeno, analiza indeksa ukazuje na složenost procene spremnosti velikih tehnoloških sila. U slučaju Kine, koja zauzima peto mesto, Oxford Insights naglašava metodološka ograničenja koja prate spoljne procene: ograničenu transparentnost vladinih inicijativa, nedostatak podataka o stvarnoj primeni AI rešenja i tehnološki ekosistem koji funkcioniše gotovo potpuno nezavisno od zapadnih standarda. Uprkos tome, nesporni su podaci o obimu kineskog istraživačkog rada. Tokom 2024. godine Kina je objavila približno isti broj AI publikacija kao SAD, Ujedinjeno Kraljevstvo i EU zajedno, uz 156 institucija koje su svaka proizvele više od 50 radova. Modeli poput DeepSeek-a i Alibaba Qwen-a dodatno potvrđuju da vrhunske performanse više nisu isključivo vezane za najskuplju infrastrukturu.

Na tragu ovih globalnih kretanja, u ovom broju časopisa *REVIZOR* autorka Adriana Repac, direktor Ottometic Inc. Srbija, ukazuje na to da razvoj AI-intenzivnih delatnosti ne zavisi od industrijske proizvodnje, već od znanja, podataka i institucionalne fleksibilnosti. Posebno ističe značaj regulatornih „sandbox" okvira, standarda i mehanizama nadzora koji omogućavaju inovacije uz kontrolu rizika. Koncept AI data i testing hub-a, kako autorka pokazuje, predstavlja razvojni model posebno relevantan za ekonomije poput Srbije, ekonomije koje možda nemaju snažnu proizvodnu bazu, ali imaju ljudski kapital i IT kapacitete. Ovo otvara prostor za ubrzani tehnološki razvoj, ali i nameće obavezu da se paralelno jačaju stručni kadrovi, etički standardi i energetska infrastruktura.

U skladu sa svojom programskom politikom, časopis *REVIZOR* kontinuirano podstiče publikovanje istraživačkih i stručnih radova iz oblasti primene IT i AI tehnologija u menadžmentu, upravljanju rizicima, računovodstvu i forenzičkoj reviziji. Na taj način doprinosimo razvoju naučne misli, unapređenju profesionalne prakse i jačanju preduzetničkog duha svih generacija koje žele da oblikuju budućnost poslovanja u digitalnom dobu.

Editorial

The end of 2025 was marked by the news that Serbia had entered the group of countries most prepared for the application of artificial intelligence. According to the *Government AI Readiness Index 2025* of Oxford Insights, Serbia ranked 39th out of 195 countries, achieving a strong improvement compared to the previous year and positioning itself among the top 20% of the world's most AI-ready economies. This result confirms the continuity of investments in digital infrastructure and the modernization of public administration, as well as the growing ability of institutions to respond to technological challenges.

At the same time, the index analysis points to the complexity of assessing the readiness of major technological powers. In the case of China, which ranks fifth, Oxford Insights emphasizes the methodological limitations of external assessments, including limited transparency of government initiatives, a lack of data on the actual implementation of AI solutions, and a technological ecosystem that operates almost entirely independently of Western standards. Despite this, data on the scale of China's research activity are undisputed. In 2024, China published approximately the same number of AI-related publications as the United States, the United Kingdom, and the European Union combined, with 156 institutions each producing more than 50 papers. Models such as DeepSeek and Alibaba Qwen further confirm that top-level performance is no longer exclusively linked to the most expensive infrastructure.

Following these global developments, in this issue of *REVIZOR*, author Adriana Repac, Director of Ottometic Inc. Serbia, points out that the development of AI-intensive activities does not depend on industrial production, but on knowledge, data, and institutional flexibility. She particularly emphasizes the importance of regulatory sandbox frameworks, standards, and oversight mechanisms that enable innovation while controlling risk. As the author shows, the concept of an AI data and testing hub represents a development model especially relevant for economies such as Serbia, economies that may not have a strong manufacturing base, but do have human capital and IT capabilities. This creates space for accelerated technological development, while also imposing the obligation to strengthen professional expertise, ethical standards, and energy infrastructure at the same time.

In line with its editorial policy, *REVIZOR* continuously encourages the publication of research and professional papers in the field of IT and AI applications in management, risk management, accounting, and forensic auditing. In this way, the journal contributes to the development of scientific thought, the improvement of professional practice, and the strengthening of the entrepreneurial spirit of all generations seeking to shape the future of business in the digital age.

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Artificial Intelligence as a Driver of Entrepreneurial Success and Global Lessons from Emerging Experiences: A Case Study of Pony.ai in China

Abstract: *The objective of this paper is to examine the driving role of artificial intelligence (AI) inentrepreneurial success, taking the case study of Pony.ai, which is one of China's most successful autonomous driving companies. The reasons behind Pony.ai's ascendancy will be examined, ranging from technological advancements, financing approaches, to the regulatory frameworkin China. The study is based on a classical methodological framework with an investigation of company financial data presented in a series of tables and figures. Further, general conclusions will be derived based on Pony.ai examples along with other illustrations of artificial intelligence startups, outlining the possibilities and challenges for entrepreneurial businesses implementing technologies based on AI. The article further concludes that AI is not only a technical instrument but an evolutionary force strong enough to transform the entire entrepreneurial scene worldwide.*

Keywords: *artificial intelligence, entrepreneurship, startups, autonomous driving, Pony.ai, China, innovation, funding.*

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INTRODUCTION

The current worldwide environment is facing immense change as it is driven by continuously evolving artificial intelligence (AI) technologies which are found to hold immense promise as innovation and economic progress drivers in multiple industries. In the entrepreneurial ecosystem environment, AI is not only a means for enhanced operational effectiveness; it is a key driver for innovation in new business models, improvement in competitiveness, and a speeding up in startup trajectory growth [1].

Such a trend is best observed in China's technology sector which is now a global artificial intelligence innovation hub based on immense government investment and an enabling ecosystem for startups [2].

The autonomous driving sector is one of the most critical sectors which has made unprecedented advancements driven by artificial intelligence. As there is greater emphasis on reducing road accidents for improved safety, decongesting roadways, and enhancing transportation efficacy, there is a strategic emphasis on making autonomous vehicles by multiple companies and state governments globally. Pony.ai is a great example in this direction as it is a Chinese entity which has made unprecedented strides in developing and putting in use advanced autonomous driving technology and thus leading in this dynamically changing marketplace [3].

The paper seeks to provide an in-depth analysis of the role played by artificial intelligence in acting as a force behind entrepreneurial success using Pony.ai in China as a test case. The research shall attempt to respond to several related issues: How has Pony.ai leveraged technologies in artificial intelligence in making itself a force in force in the autonomous driving sector? What were the technologies, economic forces, as well as environmental forces, which contributed towards its success? What lessons are there for startups around the world based on Pony.ai's experience?

The organization of the article will be delineated in the subsequent manner: The second section commences with a review of existing literature pertaining to artificial intelligence and entrepreneurship, alongside its theoretical underpinnings. This will be succeeded by a description of the research methodology utilized, which encompasses data collection and analytical processes. Subsequently, a case study centered on Pony.ai will be presented, including an analysis of its financial performance and fundraising phases. The discussion segment will articulate the key insights derived from the experience of Pony.ai, as well as the challenges and opportunities faced by startups leveraging artificial intelligence. Finally, the paper will present essential conclusions and recommendations for future research and for decision-makers.

LITERATURE REVIEW

The growing body of academic literature increasingly recognizes artificial intelligence (AI) as a strategic driver of entrepreneurial activity and economic transformation. Contemporary research emphasizes that AI goes beyond task automation and represents a critical

enabler of innovation, data-driven decision-making, and the creation of scalable business models, particularly within startup ecosystems [4].

In the context of entrepreneurship, AI contributes to opportunity identification, product and service innovation, and strategic market expansion. Machine learning and advanced data analytics enable startups to extract actionable insights from large datasets, reduce uncertainty, and enhance forecasting accuracy, thereby improving competitiveness and growth potential [6]. Empirical studies further suggest that firms integrating AI into their core business processes tend to experience higher growth rates and improved operational resilience compared to traditional ventures [7].

China has emerged as a leading global hub for artificial intelligence development, largely due to proactive government policies, substantial investment in research and development, access to large-scale data, and a supportive entrepreneurial environment [8]. The national strategy aiming to position China as a global AI innovation leader by 2030 has accelerated the emergence of AI-driven firms across multiple industries, including autonomous driving, healthcare, and smart manufacturing [9]. This institutional framework has enabled startups to rapidly test, deploy, and scale AI-based solutions [10].

Within this broader ecosystem, autonomous driving represents one of the most technologically intensive and capital-demanding AI applications. Existing studies highlight that success in this sector depends not only on technological sophistication—such as sensor fusion, deep learning, and real-time decision-making—but also on regulatory alignment, public trust, and sustainable business models [11–13]. These findings underline the relevance of examining autonomous driving startups as illustrative cases of AI-enabled entrepreneurship.

Against this theoretical background, the case of Pony.ai offers a valuable opportunity to explore how artificial intelligence functions as a catalyst for entrepreneurial success within a supportive institutional and regulatory context. By linking AI innovation with strategic leadership, funding mechanisms, and policy frameworks, the Pony.ai case contributes to a deeper understanding of how AI-driven startups can achieve competitive positioning in emerging global markets.

METHODOLOGY

This study adopts a mixed-method research approach that combines qualitative and quantitative analyses to examine the role of artificial intelligence in driving entrepreneurial success, with a specific focus on Pony.ai as a representative case study. The selected methodology ensures analytical rigor while aligning with established standards in peer-reviewed academic research [14].

Research Design

The research is based on a single-case study design, enabling an in-depth examination of Pony.ai as an AI-driven autonomous vehicle enterprise. This approach allows for a comprehensive exploration of complex technological, financial, and institutional factors and supports the generation of analytically grounded insights with broader relevance to AI-enabled entrepreneurship [15,16].

Data Collection

Data were obtained from multiple credible secondary sources to ensure reliability and triangulation. These sources include publicly available financial data, peer-reviewed academic literature, industry and consulting reports, and official company disclosures. Financial indicators such as revenues, expenses, net income, and funding rounds were collected from recognized financial databases, while contextual and qualitative insights were drawn from academic journals and industry analyses.

Data Analysis

The analysis integrates qualitative and quantitative techniques. Qualitative analysis involved a thematic review of academic publications, policy documents, and corporate materials to identify key success factors, strategic approaches, and challenges related to AI-driven entrepreneurship [25]. Quantitative analysis focused on the examination of Pony.ai's financial performance and funding trajectory across selected periods, with results presented through structured tables and visual representations to highlight trends and investment dynamics [26,27].

Overall, this methodological framework provides a solid foundation for evaluating the entrepreneurial implications of artificial intelligence and supports a systematic interpretation of the Pony.ai case within the broader global context.

CASE STUDY: PONY.AI

Pony.ai is a prime illustration for how artificial intelligence capabilities are used in order to achieve a prime position in a fast-growing industry like autonomous driving. Pony.ai was established in 2016 at Silicon Valley. It gained wide recognition within the sector in a short span of time, which is a result of its leadership team consisting of people with immense experience and knowledge about both AI as well as autonomous driving[3].

About Pony.ai

Pony.ai is a front-runner in autonomous driving technology with a focus towards creating large-scale Level 4 (L4) autonomous driving solutions. Pony.ai is primarily known for its Robotaxi (autonomous taxi) and Robotruck (autonomous trucks) service in addition to Personal Owned Vehicle (POV). Pony.ai is marked by its focus towards creating technologies for operating in complicated and variegated environments in China and the United States, thereby marking its capabilities in satisfying differential marketplace requirements[3].

The company has made spectacular achievements, specifically including covering more than 21 million kilometers of self-driving vehicle service on public roads worldwide, surpassing one million kilometers of driverless testing, and approaching 200,000 paid robotaxi orders up until April 2023. Additionally, the company has received significant recognition by ranking in the top 50 most innovative technology companies in CNBC's 2022 Disruptor list[3].

Pony.ai employs arrange of cutting-edge technologies for safety and performance, such as the ISO 26262 functional safety standard and safety redundancies for continuity of operation in case of failures. Furthermore, the company is engaged with several vehicle platforms, there by enabling its application of technologies feasible across vehicle classes from passenger vehicles to heavy trucks[3].

Financial Performance and Financing Rounds

Despite being a startup firm at the growth and funding stage, Pony.ai managed to secure huge investments, which speak volumes about investors' trust in its prospects. Table 1 provides the quarterly financial data of the company, from which we can see that the company continues to have a negative net income —a normal scenario for high-tech startups, which need to invest heavily in resea rch and development, as well as infrastructure.

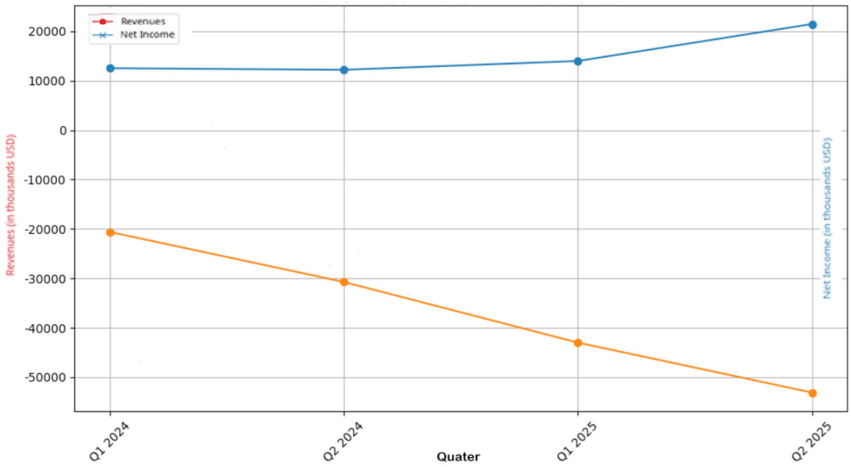
Table 1: Pony.ai Financial Data (in thousands of US dollars)

Financial Quarter	Total Revenues	Net Income	Total Expenses	Gross Profit
Q2 2025	21,455	-53,098	82,723	3,463
Q1 2025	13,979	-42,988	70,022	2,316
Q4 2024	N/A	N/A	N/A	N/A
Q2 2024	12,199	-30,719	49,207	-41
Q1 2024	12,521	-20,598	47,231	2,627

Source: *[28]*

Figure1illustrates the evolution of Pony.ai's revenues and net income over the recent quarters. The graph shows fluctuations in revenues, which may reflect the nature of the emerging market or different stages of service launch, while the continuous negative net income indicates that the company continues to inject massive investments into its research and development operations.

Figure 1: Evolution of Pony.ai Revenues and Net Income (Quarterly)



Source: *[17]*

Figure 1 illustrates the evolution of Pony.ai's total revenue and net income based on data from Yahoo Finance. The chart shows that total revenue saw gradual growth from Q1 2024 to Q2 2025, indicating an expansion in operations or increased demand for the company's services. However, net income remained consistently negative during this period, reflecting the company's continued loss-making activities. This pattern is common in high-tech startups that invest heavily in research and development and infrastructure, as noted in the original text. A downward trend in net income (i.e., increasing losses) indicates that expenses are growing faster than revenue, necessitating a review of spending and growth strategies. Pony.ai's funding history reflects a strong growth trajectory and significant investor confidence. Table 2 presents the funding rounds obtained by the company, which have exceeded a total of 1.19 billion US dollarsas of June 2025. The company's valuation reached 5.9 billion dollars in November 2024, making it one of the most valuable autonomous driving companies globally [29].

Table 2: Pony.ai Funding History

Round	Amount (million US dollars)	Key Investors
Seed	15	Sequoia Capital China, IDG Capital
Series A	112	Morningside Venture Capital, Legend Capital
Series A+	102	ClearVue Partners, Fidelity China Special Situations PLC, IDG Capital, Sequoia Capital
Series B	462	Toyota Motor Corporation
Series C	267	Teachers\" Innovation Platform (TIP) of Ontario Teachers\" Pension Plan (OTPP); Brunei Investment Agency, CPE
Series C+	100	N/A
PIPE (Latest round)	153.4	N/A

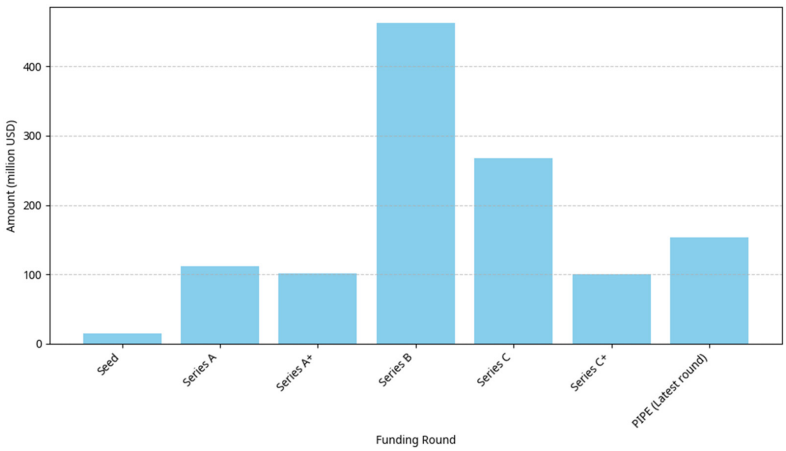
Source: *[29]*

The financial data presented in Table 1 and Figure 1 indicate a gradual increase in Pony.ai's revenues from early 2024 to mid-2025, reflecting the expansion of its robotaxi and autonomous driving operations. However, the company continues to report significant net losses, primarily driven by high operating expenses and sustained investments in research and development. In Q2 2025 alone, total expenses exceeded revenues by nearly four times, underscoring the capital-intensive nature of autonomous driving technologies.

Such financial patterns are characteristic of advanced AI startups operating in pre-commercial or early commercialization phases, where value creation is closely linked to technological maturity rather than short-term profitability. The persistent negative net income should therefore be interpreted not as a sign of weak performance, but as a strategic investment phase aimed at securing long-term market leadership.

Figure 2 illustrates Pony.ai's funding rounds by amount, highlighting the scale of investments received by the company at each stage of its growth. These massive investments are essential to finance the intensive research and development required in the autonomous driving field, as well as the expansion of operations and testing.

Figure 2: Pony.ai Funding Rounds by Amount



Source: *[20, 21]*

Figure 2 displays Pony.ai's funding rounds and their amounts. The chart shows that the company has successfully raised significant amounts of funding across multiple rounds, confirming investor confidence in its future potential. The Series B round stands out as the largest funding round at $462 million, marking a significant turning point in the company's growth trajectory and its ability to attract significant investment. These massive investments are necessary to fund the extensive research and development required in the field of autonomous driving, as well as to expand operations and testing, as mentioned in the original text. This increase in funding reflects a strong growth trajectory and strong investor confidence in Pony.ai.

The company's financials for the years 2022–2024 reveal restricted growth of revenues while marked growth of operating costs, especially spending for research and development. Gross profit margin reduced significantly from 46.9% in 2022 to 15.2% in 2024, exhibiting poor cost efficiency. Total operating costs always exceeded revenues by multiple times and caused accumulating operating loss reaching USD 285.5 million in 2024. Although there was a recovery seen in 2023, the general trend prohibits the company from depending solely on its own operations and compels it to rely on external funds for filling gaps. Therefore, the viability of its business model lies in increasing growth of revenues or restructuring costs for higher financial prudence.[30]

Pony.ai's funding trajectory, illustrated in Table 2 and Figure 2, highlights exceptionally strong investor confidence. With cumulative funding exceeding USD 1.19 billion and a valuation of USD 5.9 billion reached in late 2024, Pony.ai ranks among the most highly valued autonomous driving startups globally.

The scale and structure of these funding rounds—particularly the Series B investment led by Toyota Motor Corporation—signal not only financial backing but also strategic endorsement from established automotive industry leaders. Such partnerships provide access to industrial expertise, validation capabilities, and commercialization pathways, which are critical for startups operating in technologically complex and highly regulated environments.

Compared to other leading autonomous driving companies such as Waymo and Cruise, Pony.ai follows a similar strategy characterized by prolonged investment phases, high R&D intensity, and delayed profitability. However, Pony.ai distinguishes itself through its strong integration within the Chinese regulatory ecosystem and its dual-market presence in China and the United States. This positioning allows the company to benefit from faster regulatory experimentation while maintaining exposure to global technological standards, thereby enhancing its competitive flexibility.

Critical Success Factors

Pony.ai's success lies in the diversification in the following factors:

- Technological Innovation: Pony.ai invested significantly in researches and product developments in next-generation autonomous driving technologies capable of dealing with sophisticated driving circumstances in diverse environments. Focusing on safety and incorporating redundancy in its technologies is a major factor in stakeholders' belief in its technologies [3].
- Strong Leadership: Entrepreneurs Tiancheng Lou and James Peng possess great experience in artificial intelligence and autonomous driving with experience in famous companies like Google and Baidu, thereby instilling in the company a strategic thinking as well as great technical expertise [3].
- Government Support and Policy Environment in China: Pony.ai has enjoyed strong governmental support for autonomous vehicle technologies as well as artificial intelligence in China in the form of investment in infrastructure and setting up

regulatory mechanisms allowing for test cases and integration. Such support creates a favorable climate fordevelopmentand improvement [22, 23].
- Strategic Partnerships: Pony.ai formed strategic alliances with large auto manufacturers such as Toyota and the GAC Group, which provide access for the company to needed resources, production expertise in automotive production, as well as potential channels for distribution [3].
- HighlightingPrimary Markets: Pony.ai acquired extensive experience in satisfying diversified requirements in the market as well as overcoming a wide range of regulatory obstacles, based on its operations in both US and Chinese markets [3].

Pony.ai's case study shows why AI entrepreneurship is ultimately dependent on a number of variables: innovation in technology, successful leadership, support in ecosystems, and access to sufficient funding.

DISCUSSION

The case study of Pony.ai provides several analytically relevant insights into the role of artificial intelligence as a driver of entrepreneurial success, particularly in technologically complex and capital-intensive industries such as autonomous driving. Beyond company-specific characteristics, the findings highlight broader patterns that are applicable to AI-driven startups operating in diverse institutional and geographical contexts.

Key Insights from the Pony.ai Case

One of the central findings of this study is the critical importance of deep technological innovation as a foundation for sustainable competitive advantage. Pony.ai's long-term commitment to research and development, particularly in safety, redundancy systems, and large-scale autonomous driving deployment, demonstrates that success in AI-intensive sectors cannot be achieved through incremental innovation alone. Instead, substantial upfront investments and prolonged development cycles appear to be a structural requirement rather than a strategic choice. This insight is particularly relevant for entrepreneurs operating in fields where technological reliability and public safety are essential.

Leadership and strategic vision emerge as another decisive success factor. The professional background and technical expertise of Pony.ai's founders enabled the company to align technological development with long-term strategic objectives. This alignment facilitated informed decision-making in areas such as market selection, partnership formation, and capital allocation. The case suggests that in AI-driven ventures, leadership competence must extend beyond managerial skills to include a deep understanding of technological trajectories and industry-specific constraints.

The study further reveals the pivotal role of a supportive regulatory and institutional environment. Pony.ai benefited significantly from China's proactive approach to artificial intelligence development, including regulatory sandboxes, pilot zones, and public investment in infrastructure. These conditions reduced entry barriers and accelerated experimentation and scaling. While such a regulatory framework is context-specific, the broader implication is that startups operating in emerging technologies must actively engage with policymakers and regulators to shape adaptive legal frameworks that balance innovation with safety and public trust.

Strategic partnerships and access to capital represent additional determinants of success. Pony.ai's collaboration with established automotive manufacturers and its ability to secure substantial funding across multiple investment rounds highlight the importance of external validation and resource mobilization. In highly capital-intensive industries, partnerships not only provide financial resources but also enable access to industrial expertise, production capabilities, and commercialization channels. This finding underscores the necessity for AI startups to pursue collaborative growth strategies rather than isolated technological development.

Global Applicability and Broader Implications

While Pony.ai operates within the specific institutional context of China, many of the lessons derived from its experience are transferable to other regions. The combination of sustained R&D investment, technologically competent leadership, regulatory engagement, and strategic partnerships constitutes a generalizable framework for AI-driven entrepreneurship. Startups in different geographical environments may face varying regulatory conditions and market dynamics; however, the underlying principles governing success remain consistent.

At the same time, the case highlights several challenges that are likely to confront AI startups globally. These include persistent talent shortages, escalating R&D costs, data governance and privacy concerns, and evolving regulatory regimes. Moreover, achieving public acceptance and trust remains a critical hurdle, particularly in applications such as autonomous driving where safety perceptions strongly influence adoption.

Overall, the findings suggest that artificial intelligence functions not merely as a technological tool, but as a transformative force that reshapes entrepreneurial strategies, organizational structures, and industry boundaries. The experience of Pony.ai demonstrates that AI-driven entrepreneurial success depends on a holistic approach that integrates technological excellence with strategic foresight, institutional alignment, and ecosystem collaboration.

CONCLUSION

Artificial intelligence (AI) is today an indispensable and game-changing variable within the worldwide entrepreneurial ecosystem, acting fundamentally as a main innovation driver, expansion agent, and success motivator for startups. Pony.ai's experience in China shows how a startup company is able to become a leading player in the ultra-competitive

autonomous driving sector. Such a result is possible thanks to a focus on making serious R&D efforts, exceptional strategic stewardship, making use of a favorable regulatory framework, developing strong collaborative links, and a capability for raising large financial capitals.

The Pony.ai experience shows success in today's age of artificial intelligence depends not only on the ability to develop using next-generation technologies but also requires a great understanding of the marketplace environment, building confidence with end users, and a knowledge of shifting regulatory regimes. Even if there are immense obstacles in front of startups in this sector involving a requirement for substantial financial investment, a lack of adequately qualified professionals, and issues involving privacy and bias, there remains a great possibility for developing new value propositions and reshaping industries.

Key Conclusions

- Artificial Intelligence as an Innovation Catalyst: Artificial Intelligence is more than just utility; it is the cornerstone for a new business model paradigm which catalyzes innovation disruption while enabling a sustainable competitive edge for young businesses.
- Role of a Favorable Ecosystem: The structure of regulations and government policies plays a key role in determining the progress and development of AI-powered startups, as in the Chinese case.
- **Funding and Partnerships as Enablers**: Having access to large funding and strategic partnerships with key industry participants is important to sustain extensive research and development and business growth.
- Technically able leadership: With a strategic outlook is required to deal with the complexity of the landscape of artificial intelligence that is changing very fast.

Recommendations

Based on the findings derivedfrom this study, a number of recommendations can be suggested:

- For Policymakers: Governments need to continue supporting AI research and development and develop flexible regulatory systems that foster innovation while ensuring safety, privacy, and equity. Investment in digital infrastructure as well as in talent creation is also necessary.
- **For Entrepreneurs and Startups**: New companies intending to capitalize on artificial intelligence must prioritize substantial technological advancements, establish solid multidisciplinary teams, seek strategic collaborations, and engage actively with the regulators. Furthermore, they must be ready for long-term investment and have a flexible mindset to handle fast-paced change in the marketplace and the technological environment.

- To Investors: Investors have to realize that AI startups will require longer periods to become profitable as the R&D costs are heavy, but they have enormous growth potential in the long term.

Future Research

This research points towards several areas for future study:

- Carry out comparative case studies of AI startups in various geographical regions (e.g., the United States and Europe) to examine the influence of various regulatory settings and cultural environments on entrepreneurial venture success.
- A deeper exploration of AI's ethical and legal challenges in entrepreneurship and ways in which start-ups can resolve them.
- Discuss the effect of artificial intelligence on conventional business models and analyze how traditional businesses can embrace this disruption.
- A broader quantitative investigation of the relationship between the level of AI investment and startup success rates in different industries.

In summary, artificial intelligence is a revolutionary new age of entrepreneurial innovation, and Pony.ai's journey stands as a testament to the immense possibilities that can be leveraged when high-end technology is blended with vision and supportive ecosystems. As AI continues to advance, startups will persist in being at the forefront of mapping our way forward.

Literature

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Veštačka inteligencija kao pokretač preduzetničkog uspeha i globalne lekcije iz novih iskustava: Studija slučaja Poni.ai u Kini

APSTRAKT: Cilj ovog rada je da ispita pokretačku ulogu veštačke inteligencije (AI) u preduzetničkom uspehu, uzimajući studiju slučaja Pony.ai, koja je jedna od najuspešnijih kineskih kompanija za autonomnu vožnju. Razlozi za uspon Poni.ai istražuju se u rasponu od tehnološkog napretka, pristupa finansiranju, do regulatornog okvira u Kini. Studija se zasniva na klasičnom metodološkom okviru sa istraživanjem finansijskih podataka kompanije predstavljenih u nizu tabela i slika. Dalje, opšti zaključci će biti izvedeni na osnovu Pony.ai primera zajedno sa drugim ilustracijama startupa veštačke inteligencije, navodeći mogućnosti i izazove za preduzetnička preduzeća koja primenjuju tehnologije zasnovane na AI. U radu se dalje zaključuje da AI nije samo tehnički instrument, već i evolutivna sila dovoljno jaka da transformiše čitavu preduzetničku scenu širom sveta.

Ključne reči: Veštačka inteligencija, preduzetništvo, startapi, autonomna vožnja, Pony.ai, Kina, inovacije, finansiranje.

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Possibilities for Applying the Pony.ai Model in the Republic of Serbia: The Potential Development of an AI Data and Testing Hub

Abstract: *This paper examines the possibilities of applying elements of the business and development model of Pony.ai in the context of the Republic of Serbia, with a particular focus on the development of an AI data and testing hub as an alternative development pathway. Starting from the fact that Serbia no longer possesses a developed automotive manufacturing industry, the analysis focuses on those components of the Pony.ai model related to data collection and processing, testing and validation of artificial intelligence–based systems, as well as the role of the institutional and regulatory framework in enabling such activities. The study adopts a qualitative research approach based on the analysis of relevant academic literature, international reports, and regulatory frameworks, complemented by a case study of Pony.ai as a representative example of an AI-intensive model. Special attention is given to the economic and institutional characteristics of the Republic of Serbia, as well as to the barriers arising from regulatory complexity, limited access to capital, data availability, and integration into international AI ecosystems. The findings indicate that the transfer of elements of the Pony.ai model does not imply a direct replication of an industrial approach, but rather a selective and adapted application through the development of AI data and testing activities compatible with Serbia's existing economic and institutional capacities.*

Keywords: *artificial intelligence, Pony.ai, AI data and testing hub, institutional framework, economic development, Republic of Serbia.*

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INTRODUCTION

The development of artificial intelligence (AI) over the past decade has become one of the key drivers of structural change in contemporary economies. The impact of AI technologies extends beyond purely technological innovation and is increasingly reflected in the transformation of business models, improvements in productivity, and the adaptation of institutional and regulatory frameworks to modern forms of the digital economy [1,2]. In this context, AI is increasingly viewed not merely as support for existing processes, but as a strategic resource shaping new forms of entrepreneurship and long-term development trajectories.

A particularly important role in this process is played by companies that use AI as the foundation for developing complex and capital-intensive systems, most notably in the field of autonomous driving. The development of autonomous vehicles requires the integration of advanced algorithms, large volumes of data, and extensive testing in both real-world and simulated environments, making this domain one of the most technologically and financially demanding applications of artificial intelligence [3]. For this reason, autonomous driving represents an appropriate analytical framework for examining the broader impact of AI on entrepreneurship and economic development.

One of the most prominent contemporary examples of such an approach is Pony.ai, a company that has established itself as a globally relevant actor in the field of autonomous vehicles through a combination of advanced AI technologies, strong investment support, and a favorable institutional environment [4,5]. Although the success of Pony.ai is often viewed through the lens of autonomous vehicle development and deployment, the essence of its business model extends beyond manufacturing itself. The key components of this model relate to intensive data collection and processing, continuous testing and validation of AI systems, and a regulatory framework that enables experimentation, iterative development, and long-term investment.

This model raises the question of its transferability to economies that lack a developed industrial base for vehicle manufacturing but possess other relevant resources. In this regard, the Republic of Serbia represents an interesting case for analysis. Although Serbia no longer has a strong domestic automotive manufacturing industry, it does possess a growing IT sector, a technically educated workforce, experience in exporting knowledge and digital services, and relatively competitive labor costs [6,7]. These factors point to the possibility of an alternative development pathway in which Serbia could position itself not as a producer of final products, but as an AI data and testing hub—that is, a location suitable for the development, testing, and validation of AI systems for autonomous driving and related applications.

The aim of this paper is to examine the extent to which selected elements of the Pony.ai model can be conceptually adapted to the conditions of the Republic of Serbia through such an alternative development approach. The focus of the paper is not on normative policy advocacy, but on an analytical assessment of economic and institutional opportunities and constraints. Particular attention is given to identifying realistic barriers, as well as potential advantages that

Serbia could leverage in the development of AI data and testing activities, with a view toward formulating observations relevant to long-term economic strategy.

PONY.AI AS A REFERENCE CASE

Pony.ai is a technology company founded in 2016, specializing in the development of autonomous driving systems based on artificial intelligence. The company operates in the markets of China and the United States and develops solutions for high-level autonomous vehicles (Level 4), with a particular focus on robotaxi systems and the testing of autonomous technologies in real-world conditions.

The core of Pony.ai's business model consists of the development of advanced AI algorithms, large-scale data collection and processing, and continuous testing and validation of autonomous driving systems in both controlled and real environments. Unlike traditional vehicle manufacturers, Pony.ai does not represent a conventional industrial company, but rather a technology platform whose value is primarily based on data, software, and the ability to integrate within complex regulatory and institutional frameworks.

Due to this profile, Pony.ai is not examined in this paper as an example of industrial production, but rather as a reference model for understanding how AI-intensive activities—particularly those related to data collection, testing, and validation—can be organized and scaled across different contemporary economies. It is precisely these elements that make Pony.ai relevant for considering their potential adaptation to different national contexts, such as that of the Republic of Serbia.

ECONOMIC AND INSTITUTIONAL CONTEXT OF THE REPUBLIC OF SERBIA

The contemporary economic development of the Republic of Serbia has been significantly shaped by the growth of the information and communication technology (ICT) sector, which has emerged over the past decade as one of the most dynamic segments of the domestic economy. IT and digital services represent a growing source of exports, employment, and value added, with Serbia increasingly recognized as a regional center for software development and knowledge outsourcing [8,9]. This development indicates the presence of human capital and a business environment capable of supporting more complex forms of digital and AI-intensive activities.

One of Serbia's key advantages in this context relates to the structure of its workforce. The country has a relatively large number of engineers, mathematicians, and IT professionals, supported by an education system that traditionally emphasizes technical and natural sciences. At the same time, labor costs in this sector remain competitive compared to more developed European markets, making Serbia an attractive location for development and testing activities that require highly skilled personnel but not mass industrial production [8].

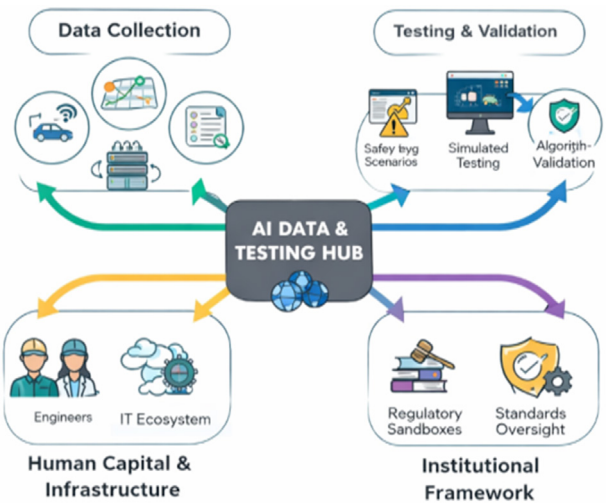
From an institutional perspective, Serbia has made certain advances in recent years in the areas of public administration digitalization, improvement of the regulatory framework for the IT sector, and support for innovation. However, the institutional framework continues to be characterized by fragmented competencies, limited coordination among

relevant actors, and a relatively slow pace of regulatory adaptation to new technological models [10]. These factors represent potential constraints on the development of activities that require intensive collaboration between the private sector, regulators, and research institutions, such as AI data and testing operations.

An important aspect of the analysis also concerns Serbia's position in the broader international context. As a candidate country for membership in the European Union, Serbia is gradually aligning its regulatory framework with EU standards in the areas of the digital economy, data protection, and artificial intelligence. Although demanding, this process may represent an advantage in terms of long-term legal predictability and compatibility with EU markets, which is particularly relevant for AI activities involving large-scale data processing and compliance with high regulatory standards [7,11].

At the same time, the absence of a strong domestic industrial base in automotive manufacturing limits the possibility of directly applying models centered on autonomous vehicle production. From the perspective of AI data and testing activities, however, this limitation does not necessarily represent a decisive obstacle. On the contrary, focusing on the development, testing, and validation of AI systems, rather than final production, may enable Serbia to integrate into global value chains through specialized, knowledge-intensive activities that require flexibility and institutional adaptability rather than capital-intensive industrial infrastructure.

Picture 1: Conceptual Framework of an AI Data and Testing Hub



Source: *Author's own elaboration with the assistance of AI tools*

In this sense, Serbia's economic and institutional context points to the existence of real, albeit limited, opportunities for the development of an AI data and testing hub. The primary potential lies in human capital, the growing IT sector, and the process of regulatory alignment with European standards, while the main constraints relate to institutional coordination, long-term investment stability, and the capacity to manage complex,

cross-sectoral projects. These elements provide the basis for further consideration of the feasibility and sustainability of such a development pathway.

This conceptual framework presents the AI data and testing hub as an integrated system in which value creation is based on continuous data collection and processing, testing and validation of AI algorithms, as well as the availability of qualified human capital and appropriate digital infrastructure. Particular importance is attributed to the institutional framework, which includes regulatory sandbox models, standards, and oversight mechanisms, as it enables experimentation and the development of AI systems while maintaining risk control.

The framework emphasizes that such a development model does not require mass industrial production, but rather enables participation in global value chains through specialized, knowledge-intensive activities. In this sense, an AI data and testing hub represents a potentially adaptable framework for economies that possess human capital and IT capacities but lack a developed manufacturing base, which makes it relevant for consideration in the context of the Republic of Serbia.

AI Data and Testing Hub as a Development Option

The AI data and testing hub can be conceptualized as an integrated ecosystem in which value creation is grounded in the continuous collection and processing of data, the testing and validation of AI systems, and the availability of skilled human capital alongside adequate digital infrastructure (OECD, 2021). This perspective underscores that the development of AI-intensive activities does not necessarily rely on industrial manufacturing capacity, but rather on knowledge assets, data availability, and institutional adaptability.

Within this model, the institutional framework plays a particularly significant role, encompassing regulatory "sandbox" mechanisms, standards, and supervisory arrangements that facilitate experimentation and innovation while ensuring risk management (European Commission, 2020). In this context, the AI data and testing hub represents a conceptually flexible development framework for economies lacking a strong manufacturing base but endowed with human capital and information technology capabilities.

Barriers to the Transfer of Elements of the Pony.ai Model to the Conditions of the Republic of Serbia

Although the concept of an AI data and testing hub represents a potentially adaptable development framework for economies without a strong industrial base, the transfer of elements of the Pony.ai company model to the context of the Republic of Serbia faces a range of structural, institutional, and market constraints. These obstacles do not necessarily indicate the infeasibility of the model, but they may significantly affect its scale, dynamics, and long-term sustainability (OECD, 2021).

One of the primary constraints relates to institutional coordination and the regulatory framework. The development and testing of AI systems, particularly in areas with security

and societal implications, require clearly defined competencies, stable procedures, and a predictable regulatory environment. In practice, flexible regulatory instruments, such as regulatory "sandbox" models, have been recognized as an important mechanism for enabling innovation while controlling risks; however, their implementation requires a high degree of institutional coordination and experience (European Commission, 2020). Limited application of such models may slow down the experimental and testing activities that are essential for AI data and testing operations.

A second significant constraint concerns limited access to large and diverse datasets. Autonomous driving models and similar AI-intensive systems rely on continuous data collection from complex real-world and simulated environments, where scenario diversity represents a key factor in testing quality (KPMG, 2022). In smaller markets, with a limited number of urban areas and testing environments, the capacity to generate such data may be constrained, thereby affecting the attractiveness of the location for certain types of testing.

The third constraint relates to the capital and investment dimension of AI-intensive models. The development, testing, and validation of AI systems involve long-term investments with delayed profitability, which require stable investment flows and a high level of risk tolerance (OECD, 2021). In the context of a relatively limited domestic venture capital market, the financing of such activities largely depends on international investors, which may influence the degree of local knowledge and value accumulation.

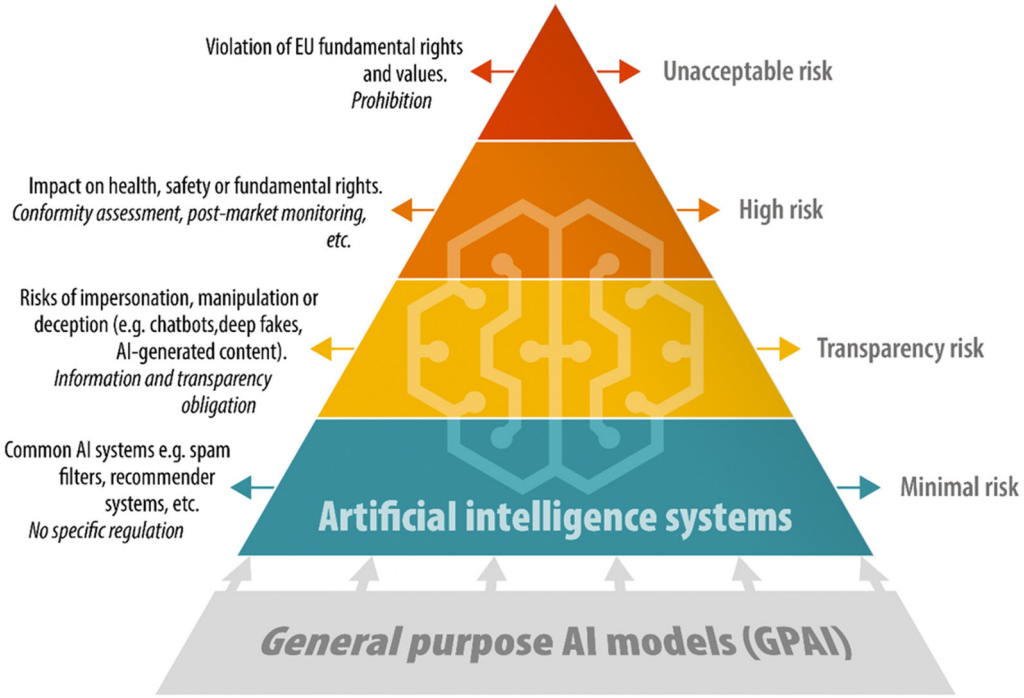
An additional limitation stems from competition in global labor markets and the mobility of highly skilled personnel. Although Serbia has a technically educated workforce, global demand for AI and IT professionals increases pressure on the domestic labor market and complicates the long-term retention of the human capital necessary for stable data and testing activities (World Bank, 2020).

Finally, a further constraint is the limited integration of domestic actors into international AI ecosystems. Models such as Pony.ai develop within robust global technological, research, and investment networks that enable rapid knowledge and resource exchange. In environments where such networks are not systematically developed, the capacity to participate in complex AI value chains may be limited (OECD, 2021).

Taken together, these constraints indicate that the transfer of elements of the Pony.ai model to Serbia is not a matter of direct replication, but rather of selective and adapted implementation. Understanding these limitations provides the basis for a realistic assessment of the scope and reach of AI data and testing activities, as well as for formulating observations on development pathways aligned with existing economic and institutional capacities.

Such a regulatory approach has direct implications for the transfer of AI-intensive models, such as the model developed by Pony.ai, into national contexts that are in the process of alignment with the European Union acquis. Given that autonomous driving systems fall into the category of high-risk AI systems, requirements related to testing, institutional coordination, and regulatory readiness represent one of the key barriers to the development of AI data and testing activities in countries such as the Republic of Serbia.

Picture 2: Classification of AI System Risks According to EU Regulation



Source: *European Commission (2020)*

Position of the Republic of Serbia in Relation to the EU Regulatory Framework

Although the Republic of Serbia is not a member of the European Union, the classification of AI systems according to risk level, presented in Figure 2, represents a relevant reference framework for the analysis of barriers to the development of AI data and testing activities. As a country in the process of alignment with the EU acquis communautaire, Serbia is gradually adjusting its regulatory framework in the areas of the digital economy, data protection, and artificial intelligence.

In this context, activities related to the testing of autonomous driving systems and related AI applications would, by their nature, fall into the category of high-risk AI systems. This classification has direct implications for requirements concerning institutional coordination, testing procedures, regulatory oversight, and overall regulatory readiness. Consequently, the position of Serbia in relation to the EU regulatory framework creates a specific environment characterized by partial alignment and ongoing regulatory adaptation, which represents both a constraint and a reference point for the development of AI data and testing activities.

CONCLUSION AND RECOMMENDATIONS

The analysis of opportunities and constraints in transferring elements of the Pony.ai company model to the conditions of the Republic of Serbia indicates that the development of AI data and testing activities does not depend on the direct replication of industrial models, but rather on the selective and adapted application of their key functional components. In particular, institutional, regulatory, and market conditions are shown to play a decisive role in determining the scale and dynamics of such a development path (OECD, 2021).

First, the results of the analysis suggest that the potential development of AI data and testing activities could be based on a **gradual and phased approach**, implemented through clearly delimited testing projects and pilot activities. Such an approach is consistent with AI system development practices, which are characterized by iterative testing and validation processes, as well as with the recommendations of international organizations regarding the governance of innovation in high-risk technological domains (OECD, 2021).

Second, the regulatory framework represents one of the key determinants of the sustainability of this model. The European approach to classifying AI systems according to risk level indicates that systems associated with autonomous driving and safety fall into the high-risk category, which entails additional requirements with respect to testing, conformity assessment, and oversight (European Commission, 2020). Although Serbia is not a member of the European Union, the process of alignment with European regulatory standards makes this framework a relevant reference context for assessing institutional constraints and requirements.

Third, the analysis indicates that the long-term sustainability of an AI data and testing hub depends on **integration into international AI value chains**, primarily through cooperation with foreign technology companies, research institutions, and investors. The experience of AI-intensive companies shows that the development of such activities requires stable investment flows and access to global knowledge networks, which is particularly important in economies with a limited domestic capital market (OECD, 2021; World Bank, 2020).

Finally, the analysis confirms that the development of AI data and testing activities is a **long-term and institutionally demanding process**, the success of which depends on continuity, regulatory predictability, and a realistic assessment of existing constraints. Rather than pursuing ambitious attempts at industrial replication, selective positioning within segments of the AI economy based on data, testing, and validation may represent a developmentally more compatible framework for economies such as Serbia, which possess human capital and IT capabilities but lack a developed manufacturing base.

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Mogućnosti primene modela Pony.ai u uslovima Republike Srbije: Potencijal razvoja AI data i testing hub-a

Apstrakt: *Rad razmatra mogućnosti primene elemenata poslovnog i razvojnog modela kompanije Pony.ai u uslovima Republike Srbije, sa posebnim fokusom na razvoj AI data i testing huba kao alternativnog razvojnog pravca. Polazeći od činjenice da Srbija više ne raspolaže razvijenom automobilskom industrijom, analiza se usmerava na one komponente modela Pony.ai koje se odnose na prikupljanje i obradu podataka, testiranje i validaciju sistema zasnovanih na veštačkoj inteligenciji, kao i na ulogu institucionalnog i regulatornog okvira u omogućavanju ovakvih aktivnosti. Rad koristi kvalitativni pristup zasnovan na analizi relevantne literature, međunarodnih izveštaja i regulatornih okvira, uz studiju slučaja kompanije Pony.ai kao referentnog primera AI-intenzivnog modela. Posebna pažnja posvećena je ekonomskim i institucionalnim karakteristikama Republike Srbije, kao i preprekama koje proizilaze iz regulatorne složenosti, ograničenog pristupa kapitalu, dostupnosti podataka i integracije u međunarodne AI ekosisteme. Zaključci rada ukazuju da prenos elemenata modela Pony.ai ne podrazumeva direktnu replikaciju industrijskog pristupa, već selektivnu i prilagođenu primenu kroz razvoj AI data i testing aktivnosti koje su kompatibilne sa postojećim ekonomskim i institucionalnim kapacitetima Srbije.*

Ključne reči: *veštačka inteligencija, Pony.ai, AI data i testing hub, institucionalni okvir, ekonomski razvoj, Republika Srbija.*

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UVOD

Razvoj veštačke inteligencije (AI) u poslednjoj deceniji postao je jedan od ključnih pokretača strukturnih promena u savremenim ekonomijama. Uticaj AI tehnologija prevazilazi domen čisto tehnoloških inovacija i sve više se ogleda u transformaciji poslovnih modela, unapređenju produktivnosti, kao i u prilagođavanju institucionalnih i regulatornih okvira savremenim oblicima digitalne ekonomije [1,2]. U tom kontekstu, AI se sve češće posmatra, ne samo kao podrška postojećim procesima, već kao strateški resurs, koji oblikuje nove oblike preduzetništva i dugoročne razvojne pravce.

Posebno značajnu ulogu u ovom procesu imaju kompanije koje AI koriste kao osnovu za razvoj složenih i kapitalno intenzivnih sistema, među kojima se ističu rešenja u oblasti autonomne vožnje. Razvoj autonomnih vozila zahteva integraciju naprednih algoritama, velikih količina podataka, kao i dugotrajna testiranja u realnim i simuliranim uslovima, što ovu oblast čini jednom od tehnološki i finansijski najzahtevnijih primena veštačke inteligencije [3]. Upravo zbog toga, autonomna vožnja predstavlja pogodan okvir za analizu šireg uticaja AI na preduzetništvo i ekonomski razvoj.

Jedan od najpoznatijih savremenih primera ovakvog pristupa je Pony.ai, kompanija koja se profilisala kao globalno relevantan akter u oblasti autonomnih vozila zahvaljujući kombinaciji naprednih AI tehnologija, snažne investicione podrške i povoljnog institucionalnog okruženja [4,5]. Iako se uspeh kompanije Pony.ai često sagledava kroz prizmu razvoja i implementacije autonomnih vozila, suština njenog poslovnog modela prevazilazi samu proizvodnju. Ključni elementi tog modela odnose se na intenzivno prikupljanje i obradu podataka, kontinuirano testiranje i validaciju AI sistema, kao i na regulatorni okvir koji omogućava eksperimentisanje, iterativni razvoj i dugoročna ulaganja.

Ovakav model otvara pitanje njegove prenosivosti u ekonomije koje ne raspolažu razvijenom industrijskom bazom za proizvodnju vozila, ali poseduju druge relevantne resurse. U tom smislu, Republika Srbija predstavlja interesantan slučaj za analizu. Iako Srbija više nema snažnu domaću automobilsku industriju, ona raspolaže rastućim IT sektorom, tehnički obrazovanom radnom snagom, iskustvom u izvozu znanja i digitalnih usluga, kao i relativno konkurentnim troškovima rada [6,7]. Ovi faktori ukazuju na mogućnost alternativnog razvojnog pravca, u kojem bi se Srbija mogla pozicionirati ne kao proizvođač krajnjih proizvoda, već kao AI data i testing hub, odnosno kao lokacija pogodna za razvoj, testiranje i validaciju AI sistema za autonomnu vožnju i srodne primene.

Cilj ovog rada je da ispita u kojoj meri se pojedini elementi modela kompanije Pony.ai mogu konceptualno prilagoditi uslovima Republike Srbije kroz takav alternativni razvojni pristup. Fokus rada nije na normativnom zagovaranju konkretnih politika, već na analitičkoj proceni ekonomskih i institucionalnih mogućnosti i ograničenja. Posebna pažnja posvećena je identifikaciji realnih prepreka, ali i potencijalnih prednosti koje bi Srbija mogla da iskoristi u razvoju AI data i testing aktivnosti, uz formulisanje opservacija relevantnih za dugoročnu ekonomsku strategiju.

PONY.AI KAO REFERENTNI PRIMER

Pony.ai je tehnološka kompanija osnovana 2016. godine, specijalizovana za razvoj sistema autonomne vožnje zasnovanih na veštačkoj inteligenciji. Kompanija posluje na tržištima Kine i Sjedinjenih Američkih Država i razvija rešenja za autonomna vozila visokog nivoa automatizacije (Level 4), sa posebnim fokusom na robotaksi sisteme i testiranje autonomnih tehnologija u realnim uslovima.

Osnovu poslovnog modela kompanije Pony.ai čine razvoj naprednih AI algoritama, masovno prikupljanje i obrada podataka, kao i kontinuirano testiranje i validacija sistema autonomne vožnje u kontrolisanim i realnim okruženjima. Za razliku od tradicionalnih proizvođača vozila, Pony.ai ne predstavlja klasičnu industrijsku kompaniju, već tehnološku platformu čija se vrednost zasniva prvenstveno na podacima, softveru i sposobnosti integracije u složene regulatorne i institucionalne okvire.

Zbog takvog profila, Pony.ai se u ovom radu ne posmatra kao primer industrijske proizvodnje, već kao referentni model za razumevanje kako se AI-intenzivne aktivnosti, posebno u oblasti prikupljanja podataka, testiranja i validacije, koje se mogu organizovati i skalirati u okviru različitih savremenih ekonomija. Upravo ovi elementi čine Pony.ai relevantnim za razmatranje mogućnosti njihove prilagodbe u drugačijim nacionalnim kontekstima, poput Republike Srbije.

EKONOMSKI I INSTITUCIONALNI KONTEKST REPUBLIKE SRBIJE

Savremeni ekonomski razvoj Republike Srbije u značajnoj meri je obeležen rastom sektora informaciono-komunikacionih tehnologija (IKT), koji se tokom poslednje decenije profilisao kao jedan od najdinamičnijih segmenata domaće ekonomije. IT i digitalne usluge predstavljaju rastući izvor izvoza, zaposlenosti i dodate vrednosti, pri čemu se Srbija sve češće prepoznaje kao regionalni centar za razvoj softvera i outsourcing znanja [8,9]. Ovakav razvoj ukazuje na postojanje ljudskog kapitala i poslovnog okruženja koje može da podrži složenije oblike digitalnih i AI-intenzivnih aktivnosti.

Jedna od ključnih prednosti Srbije u ovom kontekstu odnosi se na strukturu radne snage. Zemlja raspolaže relativno velikim brojem inženjera, matematičara i IT stručnjaka, uz obrazovni sistem koji tradicionalno naglašava tehničke i prirodne nauke. Istovremeno, troškovi rada u ovom sektoru ostaju konkurentni u poređenju sa razvijenijim evropskim tržištima, što Srbiju čini atraktivnom lokacijom za razvojne i testne aktivnosti koje zahtevaju visoko kvalifikovane kadrove, ali ne i masovnu industrijsku proizvodnju [8].

Sa institucionalnog stanovišta, Srbija je u prethodnom periodu napravila određene pomake u oblasti digitalizacije javne uprave, unapređenja regulatornog okvira za IT sektor i podsticanja inovacija. Međutim, institucionalni okvir i dalje karakterišu fragmentacija nadležnosti, ograničena koordinacija između relevantnih aktera i relativno spor proces prilagođavanja regulative novim tehnološkim modelima [10]. Ovi faktori

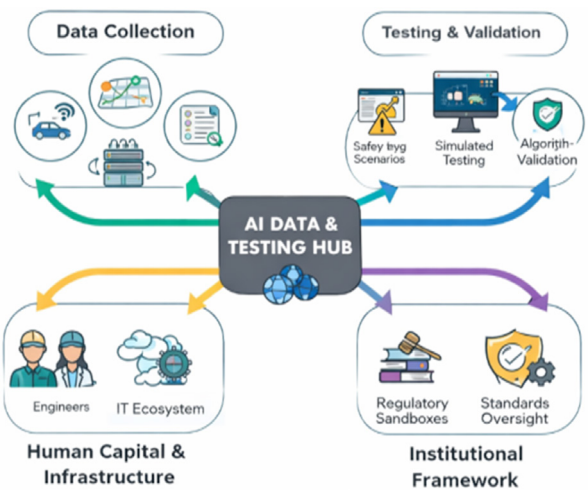
predstavljaju potencijalno ograničenje za razvoj aktivnosti koje zahtevaju intenzivnu saradnju između privatnog sektora, regulatora i istraživačkih institucija, kao što su AI data i testing operacije.

Važan element analize odnosi se i na poziciju Srbije u širem međunarodnom kontekstu. Kao zemlja kandidat za članstvo u Evropskoj uniji, Srbija se postepeno usklađuje sa evropskim regulatornim okvirima u oblasti digitalne ekonomije, zaštite podataka i veštačke inteligencije. Ovaj proces, iako zahtevan, može predstavljati prednost u smislu dugoročne pravne predvidivosti i kompatibilnosti sa tržištima EU, što je posebno relevantno za AI aktivnosti koje podrazumevaju obradu velikih količina podataka i rad u skladu sa visokim regulatornim standardima [7,11].

Istovremeno, odsustvo snažne domaće industrijske baze u oblasti automobilske proizvodnje ograničava mogućnost direktne primene modela zasnovanih na proizvodnji autonomnih vozila. Međutim, iz perspektive AI data i testing aktivnosti, ovaj nedostatak ne mora nužno predstavljati ključnu prepreku. Naprotiv, fokusiranje na razvoj, testiranje i validaciju AI sistema, umesto na finalnu proizvodnju, može omogućiti Srbiji da se uključi u globalne vrednosne lance u nišama koje zahtevaju znanje, fleksibilnost i institucionalnu prilagodljivost, a ne kapitalno intenzivnu industrijsku infrastrukturu.

U tom smislu, ekonomski i institucionalni kontekst Srbije ukazuje na postojanje realnih, ali ograničenih mogućnosti za razvoj AI data i testing huba. Potencijal leži pre svega u ljudskom kapitalu, rastućem IT sektoru i procesu regulatornog usklađivanja sa evropskim standardima, dok se glavna ograničenja odnose na institucionalnu koordinaciju, dugoročnu stabilnost investicionog okruženja i kapacitete za upravljanje kompleksnim, međusektorskim projektima. Ovi elementi predstavljaju osnovu za dalje razmatranje izvodljivosti i održivosti ovakvog razvojnog pravca.

Slika 1: Konceptualni okvir AI data i testing hub-a



Izvor: *autorska obrada uz pomoć AI alata*

Ovaj konceptualni okvir prikazuje AI data i testing hub kao integrisani sistem u kojem se stvaranje vrednosti zasniva na kontinuiranom prikupljanju i obradi podataka, testiranju i validaciji AI algoritama, kao i na dostupnosti kvalifikovanog ljudskog kapitala i odgovarajuće digitalne infrastrukture. Poseban značaj ima institucionalni okvir, koji obuhvata regulatorne „sandbox" modele, standarde i mehanizme nadzora, jer omogućava eksperimentisanje i razvoj AI sistema uz kontrolu rizika.

Prikaz naglašava da ovakav razvojni model ne zahteva masovnu industrijsku proizvodnju, već omogućava uključivanje u globalne lance vrednosti kroz specijalizovane aktivnosti visokog znanja. U tom smislu, AI data i testing hub predstavlja potencijalno prilagodljiv okvir za ekonomije koje raspolažu ljudskim kapitalom i IT kapacitetima, ali nemaju razvijenu proizvodnu bazu, što ga čini relevantnim za razmatranje u kontekstu Republike Srbije.

AI data i testing hub kao razvojna opcija

AI data i testing hub može se posmatrati kao integrisani ekosistem u kojem se stvaranje vrednosti zasniva na kontinuiranom prikupljanju i obradi podataka, testiranju i validaciji AI sistema, kao i na dostupnosti kvalifikovanog ljudskog kapitala i odgovarajuće digitalne infrastrukture (OECD, 2021). Ovakav pristup naglašava da razvoj AI-intenzivnih delatnosti ne zavisi nužno od industrijske proizvodnje, već od znanja, podataka i institucionalne prilagodljivosti.

Poseban značaj u ovom modelu ima institucionalni okvir koji obuhvata regulatorne „sandbox" modele, standarde i mehanizme nadzora, jer omogućava eksperimentisanje i inovacije uz kontrolu rizika (European Commission, 2020). U tom smislu, AI data i testing hub predstavlja konceptualno prilagodljiv razvojni okvir za ekonomije koje nemaju snažnu proizvodnu bazu, ali raspolažu ljudskim kapitalom i IT kapacitetima.

Prepreke u prenosu elemenata modela Pony.ai na uslove Republike Srbije

Iako koncept AI data i testing huba predstavlja potencijalno prilagodljiv razvojni okvir za ekonomije bez snažne industrijske baze, prenos elemenata modela kompanije Pony.ai u kontekst Republike Srbije suočava se sa nizom strukturnih, institucionalnih i tržišnih ograničenja. Ove prepreke ne ukazuju nužno na neizvodljivost modela, ali mogu značajno uticati na njegov obim, dinamiku i dugoročnu održivost (OECD, 2021).

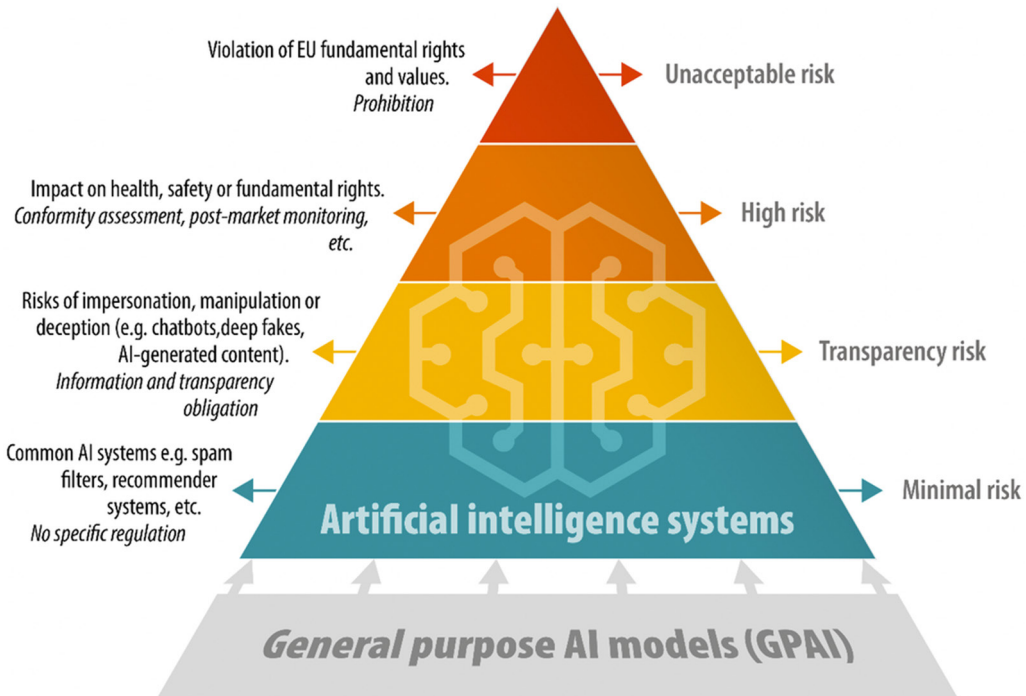
Jedna od osnovnih prepreka odnosi se na **institucionalnu koordinaciju i regulatorni okvir**. Razvoj i testiranje AI sistema, posebno u oblastima koje imaju bezbednosne i društvene implikacije, zahteva jasno definisane nadležnosti, stabilne procedure i predvidiv regulatorni ambijent. U praksi, fleksibilni regulatorni instrumenti, poput regulatornih „sandbox" modela, prepoznati su kao važan mehanizam za omogućavanje inovacija uz kontrolu rizika, ali njihova primena zahteva visok stepen institucionalne koordinacije

i iskustva (European Commission, 2020). Ograničena primena ovakvih modela može usporiti eksperimentalne i testne aktivnosti koje su ključne za AI data i testing operacije.

Druga značajna prepreka odnosi se na **ograničen pristup velikim i raznovrsnim skupovima podataka**. Modeli autonomne vožnje i slični AI-intenzivni sistemi zasnivaju se na kontinuiranom prikupljanju podataka iz kompleksnih realnih i simuliranih okruženja, pri čemu raznovrsnost scenarija predstavlja važan faktor kvaliteta testiranja (KPMG, 2022). U manjim tržištima, sa ograničenim brojem urbanih sredina i testnih okruženja, mogućnosti generisanja takvih podataka mogu biti sužene, što utiče na atraktivnost lokacije za određene tipove testiranja.

Treća prepreka odnosi se na **kapitalnu i investicionu dimenziju** AI-intenzivnih modela. Razvoj, testiranje i validacija AI sistema podrazumevaju dugoročna ulaganja uz odloženu profitabilnost, što zahteva stabilne investicione tokove i visok stepen tolerancije na rizik (OECD, 2021). U uslovima relativno ograničenog domaćeg tržišta rizičnog kapitala, finansiranje ovakvih aktivnosti u velikoj meri zavisi od međunarodnih investitora, što može uticati na stepen lokalne akumulacije znanja i vrednosti.

Slika 2: Klasifikacija rizika AI sistema prema regulativi Evropske unije



Izvor: *European Commission (2020)*

Dodatno ograničenje predstavlja **konkurencija globalnih tržišta rada i mobilnost visokoobrazovanog kadra**. Iako Srbija raspolaže tehnički obrazovanom radnom snagom,

globalna potražnja za AI i IT stručnjacima povećava pritisak na domaće tržište rada i otežava dugoročno zadržavanje kadrova neophodnih za stabilne data i testing aktivnosti (World Bank, 2020).

Na kraju, prepreku predstavlja i **ograničena integracija domaćih aktera u međunarodne AI ekosisteme**. Modeli poput Pony.ai razvijaju se u okviru snažnih globalnih tehnoloških, istraživačkih i investicionih mreža koje omogućavaju brzu razmenu znanja i resursa. U okruženjima u kojima takve mreže nisu sistemski razvijene, kapacitet za uključivanje u složene AI vrednosne lance može biti ograničen (OECD, 2021).

U zbiru, navedene prepreke ukazuju da prenos elemenata modela Pony.ai u Srbiju nije pitanje direktne replikacije, već selektivne i prilagođene primene. Razumevanje ovih ograničenja predstavlja osnovu za realističnu procenu obima i dometa AI data i testing aktivnosti, kao i za formulisanje opservacija o razvojnim pravcima koji su u skladu sa postojećim ekonomskim i institucionalnim kapacitetima.

Ovakav regulatorni pristup ima direktne implikacije na prenos AI-intenzivnih modela, poput modela kompanije Pony.ai, u nacionalne kontekste koji su u procesu usklađivanja sa pravnim tekovinama Evropske unije. Budući da sistemi autonomne vožnje spadaju u kategoriju visokorizičnih AI sistema, zahtevi u pogledu testiranja, institucionalne koordinacije i regulatorne spremnosti predstavljaju jednu od ključnih prepreka za razvoj AI data i testing aktivnosti u zemljama poput Republike Srbije.

Pozicija Republike Srbije u odnosu na EU regulatorni okvir

Iako Republika Srbija nije članica Evropske unije, klasifikacija AI sistema prema nivou rizika, prikazana na Slici 2, predstavlja relevantan referentni okvir za analizu prepreka u razvoju AI data i testing aktivnosti. Kao zemlja u procesu usklađivanja sa pravnim tekovinama EU, Srbija postepeno prilagođava regulatorni okvir u oblastima digitalne ekonomije, zaštite podataka i veštačke inteligencije.

U tom kontekstu, aktivnosti povezane sa testiranjem autonomne vožnje i srodnih AI sistema bi, po svojoj prirodi, spadale u kategoriju visokorizičnih AI sistema, što ima direktne implikacije na zahteve u pogledu institucionalne koordinacije, testiranja i regulatorne spremnosti.

ZAKLJUČAK I PREPORUKE

Analiza mogućnosti i prepreka u prenosu elemenata modela kompanije Pony.ai na uslove Republika Srbija ukazuje da razvoj AI data i testing aktivnosti ne zavisi od direktne replikacije industrijskih modela, već od selektivne i prilagođene primene njihovih ključnih funkcionalnih komponenti. Posebno se pokazuje da institucionalni, regulatorni i tržišni uslovi imaju presudnu ulogu u određivanju obima i dinamike takvog razvojnog pravca (OECD, 2021).

Prvo, rezultati analize ukazuju da bi se potencijalni razvoj AI data i testing aktivnosti mogao zasnivati na **postepenom i faznom pristupu**, kroz jasno ograničene testne projekte i pilot-aktivnosti. Ovakav pristup je u skladu sa praksama razvoja AI sistema, koje karakterišu iterativni procesi testiranja i validacije, kao i sa preporukama međunarodnih organizacija u pogledu upravljanja inovacijama u visokorizičnim tehnološkim oblastima (OECD, 2021).

Drugo, regulatorni okvir predstavlja jednu od ključnih determinanti održivosti ovakvog modela. Evropski pristup klasifikaciji AI sistema prema nivou rizika ukazuje da sistemi povezani sa autonomnom vožnjom i bezbednošću spadaju u kategoriju visokorizičnih, što podrazumeva dodatne zahteve u pogledu testiranja, procene usklađenosti i nadzora (European Commission, 2020). Iako Srbija nije članica Evropske unije, proces usklađivanja sa evropskim regulatornim standardima čini ovaj okvir relevantnim referentnim kontekstom za procenu institucionalnih prepreka i zahteva.

Treće, analiza ukazuje da dugoročna održivost AI data i testing huba zavisi od **uključivanja u međunarodne AI vrednosne lance**, pre svega kroz saradnju sa stranim tehnološkim kompanijama, istraživačkim institucijama i investitorima. Iskustvo AI-intenzivnih kompanija pokazuje da razvoj ovakvih aktivnosti zahteva stabilne investicione tokove i pristup globalnim mrežama znanja, što je posebno važno u ekonomijama sa ograničenim domaćim tržištem kapitala (OECD, 2021; World Bank, 2020).

Na kraju, analiza potvrđuje da razvoj AI data i testing aktivnosti predstavlja **dugoročan i institucionalno zahtevan proces**, čiji uspeh zavisi od kontinuiteta, regulatorne predvidivosti i realnog sagledavanja postojećih ograničenja. Umesto ambicioznih pokušaja industrijske replikacije, selektivno pozicioniranje u segmentima AI ekonomije zasnovanim na podacima, testiranju i validaciji može predstavljati razvojnije kompatibilan okvir za ekonomije poput Srbije, koje raspolažu ljudskim kapitalom i IT kapacitetima, ali nemaju razvijenu proizvodnu bazu.

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Emotional Intelligence and Perceptions of Economic Performance in Organizations in Serbia

Abstract: *The aim of this study is to examine the relationship between employees' emotional intelligence and their perceptions of the organization's economic performance. The findings indicate a statistically significant yet moderate association between emotional intelligence and economic performance, with distinct patterns of correlation observed across subsamples differentiated by the level of emotional competencies. The results confirm that emotional intelligence in organizations in Serbia provides a limited but meaningful contribution to explaining employees' economic assessments, with its influence contingent upon individual and organizational conditions.*

Keywords: *emotional intelligence; economic performance; employee perceptions; organizational outcomes; organizations in Serbia.*

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INTRODUCTION

The contemporary business environment is characterized by accelerated change, evolving market demands and an increasingly pronounced need for organizations to develop internal capacities that enable effective adaptation to such conditions (Yukl, 2013; Northouse, 2021). Within this context, psychological factors, particularly emotional intelligence, are increasingly recognized as important determinants of various organizational outcomes, including interpersonal relations, communication quality, collaboration and organizational effectiveness (Goleman, Boyatzis & McKee, 2002; Mayer, Salovey & Caruso, 2004). In such an environment, research in organizational sciences has become progressively oriented toward understanding how employees' individual psychological characteristics shape their behavior and their interpretation of the work environment. Special attention in the literature has been devoted to these individual psychological attributes, among which emotional intelligence stands out as a construct highly relevant to the functioning of both individuals and organizations (Weisinger, 1998; Dulewicz & Higgs, 2000). Emotional intelligence comprises the capacity to recognize, understand and regulate one's own emotions as well as those of others, and to apply emotional information adaptively in workplace situations (Weisinger, 1998). Numerous studies have demonstrated that higher levels of emotional intelligence contribute to more effective interpersonal relationships, improved communication, more constructive problem solving and more efficient stress management, positioning emotional intelligence as a meaningful determinant of employee behavior and work-related outcomes (Goleman, 1995; Carmeli, 2003; O'Boyle et al., 2011).

Emotional intelligence is most frequently examined in organizational research in relation to the quality of interpersonal relationships, communication, job satisfaction and organizational commitment (Carmeli, 2003; Ashkanasy and Daus, 2005; O'Boyle et al., 2011; Cote and Miners, 2006), while its association with performance and economic outcomes remains the subject of ongoing empirical examination. Although some authors suggest that emotional competencies may contribute to more effective organizational functioning, particularly through more efficient management of emotions and workplace relationships, the evidence indicates that their effect is generally limited and conditioned by broader organizational and contextual factors (Dulewicz & Higgs, 2000). At the same time, organizational performance, including economic outcomes, is increasingly considered through employees' perceptions rather than exclusively through objective financial indicators. Employees' subjective assessment of economic results, formed on the basis of their experience, communication and observations of organizational processes, can serve as an important indicator of the organization's strategic orientation, efficiency and adaptability (Tan & Litschert, 1994; Wang et al., 2011). In contemporary conditions of uncertainty and variable markets, such perceptions emerge as a valuable source of insight into how employees interpret the organization's stability, competitiveness and growth.

In studies conducted within organizations in Serbia, emotional intelligence has most often been examined in relation to organizational culture, communication and managerial

practices. The findings indicate that the emotional competencies of employees and managers play an important role in shaping preferences for organizational values and patterns of functioning, but do not operate as independent determinants of organizational outcomes (Hadžić, Nedeljković and Nikolić, 2014; Nikolić et al., 2014). These results show that the effects of emotional intelligence in the organizational context emerge predominantly indirectly, through its interaction with other individual and organizational variables. Although the cited studies confirm that employees with higher emotional competencies tend to assess organizational processes and outcomes more constructively, none of them examines the direct relationship between emotional intelligence and economic performance. A particularly important question therefore concerns the relationship between emotional intelligence and economic performance. Existing research in Serbia shows that the economic outcomes of organizations are strongly associated with organizational factors such as organizational culture, communication, leadership and employees' organizational commitment (Nikolić et al., 2012; Mali et al., 2022). These findings suggest that economic performance cannot be explained by individual psychological characteristics of employees, but rather reflects the result of complex organizational and contextual processes. Nevertheless, only a limited number of studies have examined the link between emotional intelligence and perceptions of economic performance, even though this aspect of organizational functioning is increasingly recognized as important under conditions of uncertainty and constrained resources.

In the national context of Serbia, characterized by transitional processes, fluid organizational structures and limited availability of objective financial data, employees' perceptions of the organization's economic condition may be strongly influenced by individual psychological characteristics. For this reason, examining the relationship between emotional intelligence and the way employees assess economic performance represents an important step toward understanding the broader mechanisms of organizational behavior. Building on this premise, the aim of this study is to examine the relationship between employees' emotional intelligence and their perceptions of the organization's economic performance. In doing so, the paper contributes to expanding scholarly knowledge on the psychological factors that shape employees' economic assessments under conditions specific to the business environment in Serbia.

In this regard, emotional intelligence is increasingly viewed as a factor that influences how employees interpret and evaluate the economic performance of the organization, rather than as a universal predictor of economic outcomes. Subjective assessments of economic outcomes represent an important dimension of organizational behavior, as they shape employees' attitudes, motivation and relationship with the organization, particularly under conditions of economic and institutional uncertainty characteristic of the Serbian economy. A specific contribution of this study lies in examining the differential patterns of association between emotional intelligence and perceptions of economic performance depending on employees' levels of emotional competencies, which enables a more precise understanding of heterogeneity within the sample and prevents drawing oversimplified conclusions about any universal effect of emotional intelligence in the organizational context.

LITERATURE REVIEW

In organizational research, emotional intelligence is conceptualized as a set of emotional and social competencies that enable individuals to recognize, understand and manage their own emotions, as well as the emotions of others, and to use them functionally in work and social interactions (Weisinger, 1998). However, the literature simultaneously emphasizes that emotional intelligence is a conceptually and measurably heterogeneous construct, whose empirically established relationships with various outcomes differ depending on the model and instrument employed, as well as the criteria used to evaluate outcomes (Dulewicz and Higgs, 2000). Some authors (Goleman, 1995; Carmeli, 2003) highlight the significant role of emotional intelligence in interpersonal relations, motivation, stress management and general psychological adaptability, which makes it relevant in work environments characterized by task complexity, high demands and interdependence. Emotional intelligence has been associated with a range of positive organizational outcomes, including job performance, team effectiveness, relationship quality and prosocial behavior, although its effects tend to be moderate and contingent upon how the construct is operationalized (O'Boyle et al., 2011). In this sense, emotional intelligence is understood as an individual competence that contributes to the perception and interpretation of organizational events.

Emotional intelligence encompasses the ability to recognize emotions, use them to support thinking, understand their meanings and manage them effectively, which may contribute to both personal and professional functioning in the workplace (Mayer et al., 2004). The literature highlights emotional intelligence as a relevant set of competencies in the organizational context, with its importance most frequently considered through its contribution to the quality of interpersonal relationships, communication and strategies for coping with work demands (Dulewicz and Higgs, 2000). Emotional intelligence refers to an individual's ability to recognize and manage their own emotions, as well as the emotions of others, both individually and within groups. As a transversal skill, applicable across different circumstances and adaptable to change, emotional intelligence can support the understanding of emotions, the regulation of behavior in social interactions and informed decision making (Fitsilis and Kokkinaki, 2021). Competencies associated with emotional intelligence, such as self awareness and self regulation, may be understood as abilities that facilitate the recognition, understanding and effective use of emotions, which to some extent may relate to improved work outcomes (Schutte et al., 2014). Emotional intelligence is closely linked to a range of positive outcomes in the workplace, including higher efficiency, greater job satisfaction and increased employee engagement, although the strength of these relationships may vary depending on context and measurement approach (Ashkanasy et al., 2002). In addition, employees with higher levels of emotional intelligence often demonstrate stronger interpersonal relationships, more effective conflict resolution and more successful communication within teams (O'Boyle et al., 2011). Similarly, some studies have linked emotional intelligence to work related attitudes such as organizational commitment and job satisfaction (Carmeli, 2003).

Emotional intelligence shows a statistically significant but moderate association with performance and various work outcomes, with instrumentation and the method of measuring criteria representing important sources of variability in effect sizes (Van Rooy and Viswesvaran, 2004). Furthermore, the theoretical logic underlying the subsample findings can be understood through the argument that emotional intelligence does not function as a uniform resource across all conditions, but that its utility depends on other individual capacities and on the ways in which employees process organizational information. In this sense, emotional intelligence may make a difference primarily in situations where other relevant capacities are less developed, whereas its contribution diminishes when cognitive and other individual resources are more pronounced (Cote and Miners, 2006). Finally, it is also important to consider that self report measures of emotional intelligence often encompass a broader set of dispositions and self perceptions, which may contribute to the observation that correlations with criteria tend to be stable, while in multivariate models the independent contribution of specific dimensions of emotional intelligence becomes weaker or disappears altogether (Joseph et al., 2015).

Research has confirmed the importance of emotional competencies in shaping organizational communication, culture and relationships among employees. Studies conducted in organizations in Serbia indicate that emotional intelligence influences communication satisfaction, perceptions of cultural values, interpersonal coordination and overall organizational dynamics (Nikolić et al., 2014; Hadžić et al., 2014). In this sense, emotional intelligence can be viewed as a relatively stable individual resource that affects how employees perceive and interpret the work environment. The emotional intelligence of employees and managers plays an important role in shaping organizational processes, with its influence not manifesting directly or autonomously, but primarily indirectly, through other organizational mechanisms such as communication and coordination (Hadžić, Nedeljković and Nikolić, 2014). Moreover, the findings suggest that emotional intelligence, in combination with communication satisfaction, contributes to the formation of organizational culture, highlighting the interdependence between emotional competencies and organizational practices (Nikolić et al., 2014). These results confirm that the effects of emotional intelligence in organizations emerge through complex relationships with other variables rather than through a simple linear influence.

Economic performance represents one of the key indicators of organizational success and encompasses elements such as productivity, profitability, growth, market position and competitiveness. In contemporary research, it is often operationalized as a multidimensional construct that includes both objective financial indicators and employees' subjective assessments. Subjective evaluations of economic performance are considered relevant because they reflect how employees interpret the organization's stability, success and future prospects, which may influence their attitudes, behavior and decisions (Tan and Litschert, 1994; Wang, Tsui and Xin, 2011). Empirical findings show that employees in organizations in Serbia form clear and relatively consistent assessments of strategic, communication related and economic outcomes in their organizations (Nikolić et al., 2012; Vukonjanski et al., 2016). Furthermore, research confirms that perceptions of organizational culture, job satisfaction and performance can serve as

an informative source of insight into organizational functioning, particularly in contexts where objective financial data are not fully available or are of limited reliability (Mali et al., 2022).

Theoretical findings indicate that emotional intelligence shapes how employees perceive and interpret organizational processes, particularly in the domain of evaluating interpersonal, communication related and performance related outcomes, including outcomes associated with the organization's efficiency, stability and development. Since perceptual economic performance reflects employees' experience of the organization's productivity, profitability, growth and competitiveness, it may be expected that employees with more developed emotional competencies provide more differentiated and better informed assessments of economic results. Based on these theoretical considerations, the following hypothesis is formulated:

H1: Employees' emotional intelligence is positively associated with their perceptions of the organization's economic performance.

METHODOLOGY

The research was conducted in 2025, and the data were collected using a questionnaire created in Google Forms, which enabled efficient distribution of the instrument and accessibility to a larger number of participants across different sectors and regions of Serbia. The sample consisted of 455 respondents employed in organizations in Serbia. Participation was voluntary and anonymous, and prior to completing the questionnaire, participants were informed about the purpose of the study.

Research Instruments

Emotional intelligence was measured using the Emotional Intelligence at Work (EIW) instrument (Weisinger, 1998). EIW comprises five dimensions of emotional competencies: self awareness, managing emotions, self motivation, empathy and social capability. Each dimension assesses abilities related to emotional perception, regulation and interpersonal functioning. The instrument has previously been applied in research in Serbia, where it demonstrated satisfactory reliability and a stable factor structure (Hadžić et al., 2014; Nikolić et al., 2014). Economic performance was measured using seven perceptual indicators. Five indicators, profitability, sales growth, asset growth, market share and competitive status, were taken from Tan and Litschert (1994) and Wang et al. (2011), where they were employed as subjective indicators of organizational financial performance. This set of indicators was conceptually extended with two additional items, productivity and employee salaries, to capture dimensions that allow employees to provide a relevant assessment of the organization's overall economic condition. Responses in both instruments were collected using a five point Likert scale, where the value 1 indicated a very low level and 5 a very high level of the assessed item.

RESULTS

Table 1 presents the descriptive indicators for the dimensions of emotional intelligence (EI1-EI5) and the economic performance dimension (EP). For each variable, minimum and maximum values, mean scores (M), standard deviations (SD) and reliability coefficients are reported. All scales show α values above .80, indicating satisfactory internal consistency of the instruments.

Table 1. Descriptive Statistics

Name	Abrv.	Min.	Max.	Mean	Std. Deviation	α
Self-awareness	EI1	1.00	5.00	3.5095	.79551	.864
Managing emotions	EI2	1.00	5.00	3.6264	.78038	.851
Self-motivation	EI3	1.00	5.00	3.6180	.76356	.862
Empathy	EI4	1.00	5.00	3.6897	.74127	.819
Social capability	EI5	1.00	5.00	3.6848	.71885	.810
Economic performance	EP	1.00	5.00	3.3014	.77102	.897

The highest mean values were recorded for EI4 and EI5, while EI1 shows the lowest average value among the EI dimensions. The EP variable has an average score of 3.30, indicating moderate assessments of the economic condition of organizations in Serbia. The standard deviations are uniform, ranging from .71 to .80, which confirms a stable dispersion of responses without pronounced deviations.

Table 2 presents the correlation coefficients between the dimensions of emotional intelligence (EI1-EI5) and economic performance, with individual EP indicators (EP_1 - Productivity, EP_2 - Profitability, EP_3 - Market share, EP_4 - Sales growth, EP_5 - Competitive status, EP_6 - Asset growth and EP_7 - Employee salaries) also included in the analysis. This structure provides insight into the patterns of association not only at the level of overall economic performance but also at the level of individual items (EP_1-EP_7). All reported correlations are statistically significant ($p < .05$ or $p < .01$), confirming the presence of reliable linear relationships between the EI and EP variables.

Table 2. Correlations

	EI1	EI2	EI3	EI4	EI5
EP_1	.272**	.312**	.302**	.313**	.282**
EP_2	.233**	.249**	.241**	.237**	.239**
EP_3	.194**	.253**	.227**	.251**	.216**
EP_4	.200**	.205**	.215**	.245**	.184**
EP_5	.230**	.242**	.200**	.193**	.179**
EP_6	.207**	.158**	.155**	.195**	.193**
EP_7	.209**	.141**	.142**	.140**	.104*
EP	.281**	.284**	.270**	.287**	.254**

* *Correlation is significant at the 0.05 level (2-tailed).*

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

The results show consistent positive relationships between all dimensions of emotional intelligence (EI1-EI5) and EP, as well as the individual indicators of economic performance (EP_1-EP_7). Most correlation values are within the range of r = .15 to r = .31, indicating stable associations of low to moderate intensity. The highest correlations are observed for EP_1, where EI2, EI4 and EI3 exhibit the strongest relationships. These findings indicate that EI2, EI3 and EI4 achieve the highest correlation coefficients with EP_1 compared with the remaining dimensions of emotional intelligence. Additionally, significant correlations were **observed** between the overall EP dimension and all EI dimensions. Based on these results, it can be concluded that each dimension of emotional intelligence contributes to the variability of overall economic performance. The lowest correlations with the EI dimensions were **observed** for EP_7, with values ranging from r = .104 to r = .209. The weakest, yet still statistically significant, correlation is observed between EI5 and EP_7. This pattern indicates that evaluations related to EP_7 are comparatively less associated with the EI dimensions than the other indicators within EP_1-EP_7. Overall, the correlation analysis reveals a clearly defined and stable pattern of positive associations between EI1-EI5 and EP_1-EP_7. The EP dimension demonstrates the most consistent and uniform relationships with all EI dimensions, indicating that emotional intelligence may be a relevant factor in shaping employees' perceptions of economic performance in organizations in Serbia.

The results of this study indicate the presence of a positive association between employees' emotional intelligence and their perceptions of the organization's economic performance, thereby confirming hypothesis **H1**. This finding suggests that emotional intelligence plays a role in shaping how employees evaluate the economic aspects of organizational functioning, primarily through their subjective assessments of success, stability and operational efficiency.

Table 3. Correlations

	EI1		EI2		EI3		EI4		EI5	
	L	H	L	H	L	H	L	H	L	H
EP_1	.129	.101	.193**	.137*	.130	.173**	.246**	.084	.173**	.095
EP_2	.114	.175**	.198**	.133*	.151*	.160*	.197**	.098	.210**	.095
EP_3	-.011	.156*	.107	.213**	.066	.169*	.170*	.141*	.133*	.084
EP_4	.040	.121	.044	.119	.090	.095	.215**	.059	.102	.017
EP_5	.161*	.144*	.221**	.111	.159*	.044	.177**	.002	.146*	.010
EP_6	.065	.177**	.045	.044	.025	.053	.166*	.042	.154*	.059
EP_7	.183**	.157*	.097	.042	.074	.066	.068	.075	-.046	.108
EP	.128	.186**	.172**	.143*	.132*	.136*	.235**	.090	.166*	.084

To facilitate a clearer understanding of the relationship between emotional intelligence and perceptions of economic performance, the sample was divided into two subsamples based on the median value of overall emotional intelligence (3.68): a lower EI group (L, n = 227) and a higher EI group (H, n = 228). The results of the correlation analysis are presented in Table 3. The analysis included the individual indicators of economic performance (Productivity, Profitability, Market share, Sales growth, Competitive status, Asset growth

and Employee salaries), enabling a comparison of association patterns across subsamples with differentiated EI levels.

In the EI_L subsample, a larger number of statistically significant correlations is observed between the EI dimensions and the indicators of economic performance. The coefficients are more stable and fall within the range of low to moderate values. The results indicate that employees in the EI_L subsample exhibit a more pronounced association between emotional competencies and their assessments of the organization's economic performance. In contrast, in the EI_H subsample most correlations are weaker in intensity and frequently not statistically significant. The findings for this subsample suggest lower stability of associations, implying that employees may rely on broader informational and cognitive inputs when evaluating economic performance, such that their assessments depend less on emotional competencies. The correlations between the EI dimensions (EI1-EI5) and the EP dimension further show that the associations are stronger within the EI_L subsample, whereas in the EI_H group they are weaker in magnitude and less frequently statistically significant. This pattern confirms that emotional intelligence exerts a stronger perceptual effect among employees with lower levels of EI.

Table 4 summarizes the outcomes of the multiple regression analysis in which the emotional intelligence dimensions (EI1-EI5) were modeled as independent variables, while economic performance (EP) was treated as the dependent variable. The table reports standardized regression coefficients, t values, levels of statistical significance, the coefficient of determination and the model F statistic.

The regression model explains 10 percent of the variance in EP. None of the EI dimensions demonstrates a statistically significant individual effect on EP. These results indicate that although EI1-EI5 jointly account for a statistically significant proportion of variance in EP, none of the individual EI dimensions attains statistical significance. This pattern indicates that the influence of EI on EP is diffuse and distributed across multiple dimensions, with none exerting a dominant direct effect on its own.

Table 4. Regression analysis

Dependent	Independent	β	t	Sig.	R^2	F
EP	E1	.112	1.460	.145	.100	.000
	E2	.088	.999	.318		
	E3	-.008	-.092	.926		
	E4	.133	1.572	.117		
	E5	.029	.390	.697		

DISCUSSION

Respondents evaluate their own emotional intelligence in a relatively uniform manner, reflected in moderately elevated mean values and low score dispersion. In contrast, assessments of economic performance display substantially greater variability. This pattern

indicates a difference in the distribution of the examined constructs within the sample: emotional intelligence emerges as an individual characteristic with more stable evaluations among respondents, whereas perceptions of economic performance are more differentiated. The observed variability in economic performance assessments may be associated with the heterogeneity of the organizations represented in the sample, given that respondents are employed across diverse organizations and sectors within the specific organizational and institutional context of Serbia.

The relationship between emotional intelligence and economic performance is statistically significant but of moderate strength. This finding indicates that emotional intelligence has a relevant yet limited role in explaining economic performance in the observed sample, and that its contribution should be understood within a broader set of organizational and contextual factors. The correlation analysis across subsamples differentiated by employees' levels of emotional intelligence further demonstrates that the relationship between emotional intelligence and economic performance is not uniform across the sample. The results suggest that several dimensions of emotional intelligence are significantly associated with economic performance in both subsamples, yet the frequency, strength and statistical significance of these associations differ depending on respondents' levels of emotional intelligence. In the subsample with lower emotional intelligence, statistically significant and moderate correlations between certain dimensions of emotional intelligence and various indicators of economic performance are observed more frequently. In contrast, in the subsample with higher emotional intelligence, these associations are less common, these associations are less common, weaker in strength and largely restricted to only a few specific combinations specific combinations of EI dimensions and performance indicators. Such a pattern indicates that the correlations observed in the full sample do not fully reflect the differences in the strength and distribution of associations between emotional intelligence and economic performance that emerge only through subsample analysis. In this regard, the results may suggest that employees with lower levels of emotional intelligence rely more heavily on their emotional competencies when evaluating economic performance, which is empirically reflected in more frequent and more pronounced correlations. In contrast, among employees with higher emotional intelligence, the associations between emotional intelligence and economic performance are weaker in strength and less frequently statistically significant, indicating that emotional intelligence plays a less differentiating role in the assessment of economic outcomes within this group. These findings suggest that emotional intelligence plays a more pronounced explanatory role among employees with lower levels of emotional competencies not because it is highly developed, but because its relative deficit constitutes a limiting factor in the process of evaluating economic performance, which is empirically reflected in more frequent and more pronounced associations. In contrast, among employees with higher levels of emotional intelligence, its role in differentiating assessments of economic outcomes diminishes, indicating that evaluations in this group rely more heavily on other cognitive, informational and organizational sources, thereby reducing the relative importance of emotional intelligence as an individual factor.

The results indicate that the individual dimensions of emotional intelligence, considered collectively as a set of predictors, do not explain a statistically significant or substantively meaningful portion of the variance in perceptions of economic performance. In contrast to the correlation analysis, the regression model allows for an assessment of the joint contribution of multiple emotional intelligence dimensions, revealing that their overall effect on perceptions of economic performance remains limited. Accordingly, emotional intelligence demonstrates a statistically significant yet weak to moderate contribution to explaining the variance in economic performance, suggesting that its influence is not dominant, while a substantial share of the variance remains unexplained by this model and can be attributed to other organizational and contextual factors not included in the present study. The findings further indicate that economic performance in organizations in Serbia cannot be interpreted as the outcome of a single isolated factor, but rather as the result of a complex interplay of organizational and managerial determinants, which aligns with prior research on financial performance in transitional settings (Nikolić et al., 2015). In this context, emotional intelligence may be viewed as a relevant supplementary variable, but not as a primary or decisive predictor of employees' economic evaluations.

The findings of the study confirm that emotional intelligence contributes to employees' perceptions of economic performance, although this contribution is moderate and contingent upon employees' levels of emotional competencies. The results point to the presence of complex mechanisms through which emotional competencies shape organizational evaluations, thereby offering a deeper understanding of the multifaceted nature of economic outcome assessment. In this regard, the findings highlight the need for future research that incorporates a broader set of organizational variables, as well as their interactions, in order to achieve a more comprehensive understanding of the dynamics underlying the perception of organizational performance in contemporary organizations in Serbia.

Moreover, the findings indicate that emotional intelligence does not operate as a direct and autonomous predictor of economic outcomes, but rather as an indirect factor whose effects manifest through the quality of interpersonal relations, the organizational climate and leadership patterns. In this way, it is confirmed that the functional relevance of emotional intelligence emerges through its interaction with the structural and contextual characteristics of the work environment, which may amplify, weaken or modify its influence on organizational evaluations and outcomes, including economic performance.

CONCLUSION

The aim of this study was to examine the relationship between employees' emotional intelligence in organizations in Serbia and their perceptions of economic performance. The results indicate that there is a statistically significant but moderate association between emotional intelligence and economic performance, confirming that emotional competencies play a role in how employees evaluate the organization's economic

outcomes. At the same time, the findings clearly show that emotional intelligence, on its own, does not constitute a strong or universal predictor of economic performance, and that its contribution remains limited and contingent upon other organizational and contextual factors.

Although the correlations identified are predominantly low to moderate **in strength**, their consistency suggests that employees' emotional competencies in organizations in Serbia play a role in the interpretation and assessment of the economic aspects of organizational functioning. Additional insight is provided by the analysis of subsamples formed according to the level of emotional intelligence, which shows that the pattern of association between emotional intelligence and economic performance varies depending on employees' levels of emotional competencies. In the subsample of employees with lower emotional intelligence, more frequent and more pronounced associations were observed between the dimensions of emotional intelligence and evaluations of economic performance, whereas in the subsample of employees with higher emotional intelligence these associations were weaker and less consistent. Such findings suggest that employees with more developed emotional competencies base their evaluations of economic outcomes on a broader range of informational and cognitive inputs, thereby reducing the relative importance of emotional intelligence in shaping these assessments.

The dimensions of emotional intelligence do not make a statistically significant independent contribution to explaining the variance in employees' perceptions of economic performance, indicating that these evaluations cannot be accounted for solely by individual emotional competencies but rather reflect the influence of a broader set of organizational and contextual factors. This finding confirms that emotional intelligence plays a supplementary, but not decisive, role in shaping employees' perceptions of economic outcomes.

The findings of this study have important theoretical and practical implications. From a theoretical perspective, the contribution of the research **is reflected in providing** a more precise understanding of the contextual conditions under which emotional intelligence may have a limited explanatory role in organizational outcomes within the economic and organizational context of Serbia. This emphasizes the importance to consider emotional intelligence not as an isolated predictor but in conjunction with other organizational and individual variables, such as communication, organizational culture, job satisfaction and managerial practices. The results open avenues for future research that, through more complex research designs and analytical approaches, could examine in greater detail the mechanisms through which employees' emotional and cognitive characteristics indirectly contribute to the evaluation of organizational performance. From a practical standpoint, the findings suggest that strengthening employees' emotional competencies may represent a potentially valuable resource for improving organizational functioning, yet such interventions should be embedded within an integrated and contextually informed approach that also encompasses organizational, structural and institutional factors.

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Emocionalna inteligencija i percepcije ekonomskih performansi u organizacijama u Srbiji

Apstrakt: *Cilj istraživanja je ispitivanje odnosa između emocionalne inteligencije zaposlenih i njihovih percepcija ekonomskih performansi organizacije. Rezultati ukazuju na statistički značajnu, ali umerenu povezanost emocionalne inteligencije i ekonomskih performansi, uz izražene razlike u obrascima povezanosti između poduzoraka formiranih prema nivou emocionalnih kompetencija. Nalazi potvrđuju da emocionalna inteligencija u organizacijama u Srbiji ima ograničen, ali relevantan doprinos u objašnjenju ekonomskih procena zaposlenih, pri čemu njen značaj zavisi od individualnih i organizacionih uslova.*

Ključne reči: *emocionalna inteligencija; ekonomske performanse; percepcije zaposlenih; organizacioni ishodi; organizacije u Srbiji*

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Predviđanje revizorskog mišljenja primenom plitke i duboke neuronske mreže podržane veštačkom inteligencijom (ChatGPT)

Apstrakt: *Ubrzana primena veštačke inteligencije (VI) u svim domenu ljudske delatnosti, nije zaobišla ni revizorske poslove. U domenu primene VI u reviziji postavlja se suštinsko pitanje da li je potrebno da se revizorskog mišljenja obavi sa plitkim ili obimnim podacima. Metode VI nam pružaju mogućnost predviđanja (na bazi primera radi racio pokazatelja) da na oskudnim-plitkim podacima dođemo do preciznih rezultata. Autor je napravo paralelu tačnosti između klasičnih metoda mašinskog učenja i dubokog učenja podržanog Chat GPT. I tu se vide prednosti primene AI. Naravno, veći broj raspoloživih podataka povećao bi tačnost predviđanja, što je predmet daljih istraživanja. Budućnost leži u kombinaciji ljudskog poimanja računovodstva i revizije i sirovih podataka, koji kriju implicitna znanja.*

Ključne reči: *predviđanje revizorskog mišljenja, mašinsko učenje, duboko učenje, ChatGPT.*

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UVOD

Za početak da se osvrnemo na neke metodološke manjkavosti dosadašnje revizorske prakse na jednom konkretnom primeru., kako sledi:

Respektibilna revizorska firma, koja primenjuje sopstvenu metodologiju revizije, obelodanila je nakon finaliziranja revizije privednog društva (revizijskog klijenta) revizorsko mišljenje. Opreza radi a respektujući elementarni etički kodeks ove struke, kao i Zakona o računovodstvu i reviziji[3], daćemo sublimirani prikaz ovo mišljenje u generalno neprepoznatljivoj formi.

Preduzeće „XYZ" je izvršilo reviziju za 20XX godinu. Prikaz mišljenja nezavisnog revizora se može sublimirati na ograde koje se svode na to: da je pogrešno proknjiženo zemljište, analitika kupaca i analitika dobavljača. Saobrazno Međunarodnim standardima revizije (MSR)[2], revizorsko društvo je ispravno, dalo mišljenje sa rezervom na napred pomenute okolnosti.

Naknadnim i nezavisnim ispitivanjem od strane inostranih eksperata, koji su hteli da kupe ovu firmu, potvrđena su načelno mišljenja ove revizorske kuće, ali takođe je utvrđeno da revizori ove firme nisu otkrili, da ova firma ima skrivene gubitke na zalihama i da je njihov bilans koji obelodanjuje dobitak ustvari realno u gubitku, reda veličine više desetina miliona evra.

Ono što je od sušastvenog značaja za našu analizu jeste da dosadašnja praksa signalizira neadekvatnost metodološkog aparata revizije. Ovaj slučaj nam je poslužio da pokušamo da ukažemo na mogućnost primene metodološkog aparata mašinskog učenja koje se u stručnom smislu naziva pronalaženje skrivenih znanja (Data Mining)[3], što je predmet narednih razmatanja, polazeći od definisanja skupa podataka o revizorskim mišljenjima.

DEFINISANJE PODATAKA O REVIZORSKIM MIŠLJENJIMA

Induktivno učenje se vrši tako da se model problema kreira tako da uključuje sve raspoložive informacije o nekoj pojavi, a obučavajući skup se formira na osnovu konačnog broja poznatih ili razmatranih slučajeva ili instanci. Primeri problema sa velikim brojem atributa (u našem slučaju racio pokazatelja[4]) i veoma malim brojem primera (mali broj obveznika revizije). Oskudni podaci (sparse data) se definišu kao slučaj kada obučavajući skup predstavlja veoma mali podskup prostora primera. To su podaci kod kojih je odnos broja opservacija (primera) i broja promenljivih (atributa) mali. Skup podataka je oskudan ako većina tačaka iz prostora atributa nije zastupljena u primerima, tj. skup u kojem se javlja problem nedostatka relevantnih, odnosno suštinskih pozitivnih primera.

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2 Revizorske firme ugrađuju Međunarodne standarde revizije u metodlogiju revizije, obogaćujući je sa upitnicima i drugim tehničkim pomagalima.

3 Neki je nazivaju implicitna znanja.

4 Broj atributa može biti značajno veliki 1000, 2000,

Tačnost predviđanja ne treba da bude suviše visoka nakon uvida u samo mali broj primera iz obučavajućeg skupa. Veličina prostora primera, koja je domena atributa, tipično je više redova veličine veće od prostora primera. Ovaj odnos se može smanjiti ograničavanjem broja atributa, tako da podaci više nisu oskudni (plitki). Primera radi neki skupovi sa samo 100 obučavajućih primera opisanih sa 10.000 atributa svrstani u bogate, dok su skupovi sa 300-800 primera sa 2.000-3.000 atributa označeni kao oskudni. Kriterijum oskudnosti je povezan sa procenom težine problema učenja (task difficulty). U teoriji mašinskog učenja (8) razmatra se problem nalaženja konzistentne hipoteze u prostoru svih mogućih hipoteza (konzistentna hipoteza je saglasna sa svakim primerom iz obučavajućeg skupa, a algoritam koji nalazi konzistentne hipoteze je konzistentan algoritam). U principu ovom radu će se usvojiti definiciju oskudnosti obučavajućeg skupa, koja se zasniva na tačnosti predviđanja naučenog znanja.

Uspešnost razlikovanja novih primera zavisi od konkretnog problema i određuje se empirijski. Npr. u medicini je potrebno postići istu ili veću tačnost predviđanja od lekara-specijalista, što je veoma subjektivna ocena, koja se razvojem medicine menja. Estimacija tačnosti naučenog znanja veoma zavisi i od metoda estimacije. U ovom radu se koristi metod unakrsne validacije, koji se smatra "skoro objektivnim". Kada se koriste metodi selekcije atributa, vrši se "dvostruka krosvalidacija", odnosno krosvalidacija rezultata algoritma učenja se vrši unutar jednog krosvalidacionog koraka selekcije atributa. U se navode dva osnovna razloga oskudnosti obučavajućeg skupa: (1) nedovoljan broj primera za učenje i (2) prevelika složenost razmatranog problema. U takvom slučaju su i uobičajene pretpostavke postojećih metoda pojednostavljivanja naučenog znanja neodgovarajuće i one same imaju negativne posledice na tačnost predviđanja naučenog znanja. (7)

Definicija obučavajućeg skupa glasi: "Obučavajući skup je oskudan (sparse) ako induktivno naučeno znanje ne omogućava dovoljno uspešno razlikovanje novih primera."

PRONALAŽENJE SKRIVENIH ZNANJA U POSTUPKU OBAVLJANJA REVIZIJE

U narednom delu priloga ćemo taksativno navesti suštinske elemente istraživanje podataka putem metoda pronalaženja skrivenog znanja (*data mining-DM*), bez ulaženja u formalno-algoritamsku analizu, što nije predmet našeg razmatranja, posebno jer se radi o revizorima i računovodstvenim ekspertima, koji ipak trebaju da znaju da primene i interpretiraju dobijene rezultate.

Data mining obuhvata primenu metoda mašinskog učenja i drugih metoda, za pronalaženje uzoraka u razmatranim podacima.

U tom smislu potrebno je razlikovati induktivno učenje uz pomoć „učitelja" (*nadzirano učenje*) tj. učenje koje se vrši na osnovu klasifikovanih primera, odnosno donesenih odluka.

Induktivno učenje koncepata je forma mašinskog učenja čiji je cilj indukcija takvih opisa koncepata (kategorija, klasa objekata), koji su razumljivi ljudima koji se bave

određenom problematikom, odnosno koji odgovaraju konceptima koje bi proizveo čovek prilikom razmatranja istih entiteta.

Produkciona pravila, liste odlučivanja i stabla odlučivanja su primeri razumljivog načina predstavljanja empirijskog znanja.

Metode induktivnog učenja koncepata se koriste u istraživanju podataka jer daju razumljive rezultate, koji se mogu direktno interpretirati. Tačnost predviđanja ovih metoda takođe visoka i može se uporediti sa najuspešnijim metodama induktivnog učenja.

Primer koji smo izabrali za ilustraciju ovog pitanja odnosi se na svega 48 preduzeća sa 19 atributa, što znači da se radi o oskudnom skupu (plitkom).

KLASIČNI PRISTUP PRIMENI MAŠINSKOG UČENJA[5]

Metoda mašinskog (data mining) učenja (decision tree) stablo odlučivanja su najpopularnija struktura za DM sa nadgledanjem. glavni cilj je da se minmizuje broj nivoa u stablu i broj čvorova u stablu, maksimizujući generalizaciju podataka. stabla odlučivanja koja su uspešno primenjena na realne probleme su laka za razumevanje i lako se primenjuju na skup produkcionih pravila.

Stablo odlučivanja (*decision tree*) (5) je, kako smo napomenuli popularna struktura za učenje sa nadgledanjem. stablo odlučivanja se kreira samo od onih atributa koju najbolje opisuju koncept koji se uči. stablo odlučivanja se inicijalno kreira izborom podskupa instanci iz obučavajućeg skupa. Ovaj podskup se onda koristi od strane algoritma radi konstruisanja stabla odlučivanja. preostali trening set testira tačnost konstruisanog stabla. ukoliko stablo odlučivanja klasifikuje korektno instance, tu se procedura završava. ukoliko je neka instanca loše klasifikovana, dodaje se izabranom podskupu tening instanci i novo stablo se kreira. ovaj proces se ponavlja sve dok se ne kreira stablo koje dobro klasifikuje sve instance koje nisu izabrane ili dok se stablo odlučivanja ne kreira od celog trening seta. Ako bi uzeli pojednostavljenju strukturu algoritma koji uzima u obzir ceo trening set za izgradnju stabla odlučivanja, koraci tog algoritma bi bili sledeći:

(1) neka je *t* skup trening instanci.
(2) biramo jedan atribut koji najbolje razlikuje instance sadržane u *t*.
(3) kreiramo čvor stabla čija je vrednost izabrani atribut. kreiramo linkove dece od ovog čvora gde svaki link predstavlja jedinstvenu vrednost za izabrani atribut. Vrednosti tih linkova dece se koriste za dalje deljenje instanci u podklase.

[5] Za potrebe naše analize imali smo u vidu sledeće tehnike, i to:
- da je učenje sa nadgledanjem.
- da zahtevamo jasno objašnjenje o odnosima koji postoje u podacima.
- da li postoji jedan set ulaznih atributa i jedan izlaznih atributa,
- da su podaci kombinacija numeričke, i kategorijske forme.
- učenje je nadgledano, postoji jedan izlazni atribut i oni su kategorijski.

(4) za svaku podklasu kreiranu u koraku 3:
  (5) ako instance u podklasi zadovoljavaju predefinisani kriterijum ili je set preostalih izbora atributa za ovu stranu drveta prazan, specifikuje se klasifikacija za nove instance praćenjem ove strane odlučivanja.
  (6) ako podklasa ne zadovoljava predefinisani kriterijum i postoji makar jedan atribut za dalje deljenje ove strane drveta, onda je t tekući set podklasi instanci i vraćamo se na korak 2.

Osnovni cilj je da se minimizije broj čvorova, a na taj način i maksimizuje generalizacija podataka. Algoritam c4.5 (jedan od poznatih algoritama mašinskog učenja za kreiranje stabla odlučivanja u postupku kvalifikacije) koristi mere preuzete iz informacione teorije, da bi se olakšao proces selekcije atributa. Osnovna ideja je da na bilo kojoj tački odlučivanja u stablu, c4.5 bira atribut koji razdvaja podatke tako da prikaze najveći obim dobijenih informacija.

Stablo odlučivanja predstavlja strukturu gde lišće (čvorovi) predstavljaju klasifikacije i grane predstavljaju združavanje osobina koje vode do tih klasifikacija (5).

Primenićemo Weka system (6), koji je razvijen na Univerzitetu Waikato na Novom Zelandu[6]. Sistem je napisan u JAVI programskom jeziku, koji omogućava kreiranje uniformnih interfejsa za dosta algoritama učenja, za metode pre i posle procesiranja podataka, kao i za merenje rezultata učenja na svim primenjenim skupovima podataka(1; 4; 3; 8).

STABLO ODLUČIVANJA

U prilogu je primenjen tip *klasifikaciona stabla* (classification tree), ovaj termin koristimo kada je predviđeni izlaz klasa kojoj pripradaju podaci, koji su dati u prilogu rada, i to za date racio pokazatelje, koji su dati prilogu sa respektivnim mišljenja revizora za revizorskih društava. Posebno treba napomenuti da je mišljenje revizora dato u dva varijeteta: pozitino i nije pozitivno (znači: nekvalifikovano, i kvalifikovano). Takođe treba dati naglasak da se radi o oskudnom odnosno plitkom uzorku, koji po definicji nedaje dobre rezultate, ali je važno videti koliko je i u tim sulovima koristan.

Kreiraćemo *stablo odlučivanja (Decision Tree)*, primenom algoritma J48 (5), koji je ustvari klasa u WEKA sistemu koja kreira model stabla odlučivanja. Test opcije su da koristimo krosvalidaciju, a atribut u odnosu na koji kreiramo stablo je racio pokazatelj, koji najviše utiče na mišljenje revizora (10; 3).

Ova datoteka, bazirana na podacima iz APR-a, ima 48 primera (preduzeća) sa ukupno 19 atributa (uključujući mišljenje revizora) uz napomenu da smo sveli mišljenje samo

[6] Waikato Environment for Knowledge Analysis (Weka) is a collection of machine learning and data analysis free software licensed under the GNU General Public License. It was developed at the University of Waikato, New Zealand and is the companion software to the book "Data Mining: Practical Machine Learning Tools and Techniques"

na kvalifikovano (ostala mišljenja negativno uzdržano, sa rezervom) i nekvalifikovano (pozitivno). Cilj nam je da utvrdimo Da bi smo izvršili dotičnu analizu potrebno je da uradimo klasifikaciju i rangiranje atributa prema značaju.

Primenom programa mašinskog učenja RAPIDMINER komercijjalnog programa dobijena je tačnost kvalifikacije: 59.00% +/- 21.32% (mikroprosek: 58.33%)

Tabela: Rezultati primene stabla odlučivanja primenom programa RAPID MINER

	Istinito kvalifikovano	Istinito nekvalifikovano	Preciznost klase
Predviđanje kvalifikovano	9	9	50.00%
Predviđanje nekvalifikovano	11	19	63.33%
Procenti po klasifikaciji	45.00%	67.86%	

Ne ulazeći u detaljna objašnjenja postupka primena RAPID MINERA[7], stabalo odličivanja ukazuje da je ključni racio pokazatelje za predviđanje revizorskog mišljenja racio ROA, koji ako je manji od 1.45 je predviđa nekvalifikavano mišljenje.

Ono što je značajno primena ovog program daje daje primat raciju ROA-return on assets-povrat imovine, sa tačnošći klasifikacije od 56%.

Napred dati rezultati proizilaze iz“ klasičnih metoda“ mašinskog učenja.

U narednom delu priloga prezentiraćemo rezultate primene veštačke inteligencije ChatGPT.

PRIMENA NEURONSKIH MREŽA CHATGPT U DOMENU TAČNOSTI KLASFIKACIJE

Primenom ovih algoritama kao rezultat dobijamo sledeće: informaciju koliko je privrednih društava sa mišljenjima obrađeno (instances) 48 koliko je racio pokazatelja obrađeno (attributes). Da bi bilo olakšano praćenje rezultata obrade izveštaj smo sveli na suštinske pokazatelje.

U ovom radu korišćena je jednostavna (plitka) neuronska mreža u cilju predikcije mišljenja nezavisnog revizora na osnovu finansijskih racio pokazatelja. Iako raspolažemo malim uzorkom (n = 48), rezultati sugerišu da je čak i u takvim uslovima moguće ostvariti korisne uvide.

[7] RapidMiner Studio je integrisana platforma za nauku o podacima, dizajnirana za analitičke timove. Ona pruža vizuelni dizajner toka rada za pripremu podataka, mašinsko učenje, validaciju modela i implementaciju. Sistem je izgrađen na arhitekturi zasnovanoj na dodacima koja omogućava proširivost na mnoge aspekte platforme. RapidMiner Studio je implementiran u Javi i prati modularni obrazac dizajna koji odvaja osnovnu funkcionalnost od korisničkog interfejsa, omogućavajući različite režime izvršavanja (GUI, komandna linija, ugrađeni itd.).

Primena dubokog učenja (deep learning)

U poslednjoj deceniji, duboko učenje (engl. *deep learning*) se profilisalo kao ključna tehnologija u analizi kompleksnih podataka. Za razliku od tradicionalnih algoritama mašinskog učenja, koji se oslanjaju na manuelno definisane karakteristike, modeli dubokog učenja mogu samostalno izgraditi hijerarhiju reprezentacija kroz više slojeva obrade. U ovom radu prikazujemo kako se višeslojna neuronska mreža (jedna od metoda mašinskog učenja), za razliku od klasične metode u napred datoj Tabali RAPID MINER, može primeniti na skup finansijskih racio pokazatelja, sa ciljem značajno preciznijom predikcijom mišljenja nezavisnog revizora (kvalifikovano ili nekvalifikovano).

PRIMER

Klasifikacije revizorskog mišljenja predstavlja binarnu klasifikaciju, gde se na osnovu vrednosti iz bilansa uspeha i bilansa stanja, algoritam trenira da prepozna obrasce koji su prethodili pozitivnom ili negativnom mišljenju revizora:

1. U ovom radu prikazana je primena jednostavne neuronske mreže za klasifikaciju revizorskog mišljenja na osnovu finansijskih racio pokazatelja. Poseban izazov predstavlja mali broj dostupnih podataka, što zahteva pažljivo dizajniranje modela kako bi se izbegla prenaučenost (overfitting).

2. *Skup podataka*. Korišćen je skup sa 19 racio pokazatelja kao ulazima i ciljnim atributom 'Mišljenje nezavisnog revizora', koji sadrži dve klase: 'kvalifikovano' i 'nekvalifikovano'. Ulazni podaci su normalizovani, a ciljna promenljiva je binarizovana.

3. *Arhitektura mreže*. Model je sastavljen iz:- ulaznog sloja sa 98 neurona,- jednog skrivenog sloja sa 12 neurona (ReLU aktivacija),- Dropout sloja (20%) radi regularizacije,- drugog skrivenog sloja sa 8 neurona,- izlaznog sloja sa 1 neuronom i Sigmoid aktivacijom za binarnu klasifikaciju.

4. *Rezultati*. Model je treniran sa 70% podataka, dok je 30% korišćeno za testiranje. Ostvarena je tačnost od približno 85% na test skupu, što ukazuje na potencijal čak i sa ograničenim-plitkim podacima.

Metodologija primena dubokog učenja (deep learning) za predviđanje revizorskog mišljenja ChartGPT

U poslednjoj deceniji, duboko učenje (engl. *deep learning*) se profilisalo kao ključna tehnologija u analizi kompleksnih podataka. Za razliku od tradicionalnih algoritama mašinskog učenja, koji se oslanjaju na manuelno definisane karakteristike, modeli dubokog učenja mogu samostalno izgraditi hijerarhiju reprezentacija kroz više slojeva obrade. U ovom radu prikazujemo kako se višeslojna neuronska mreža može primeniti na skup finansijskih racio pokazatelja, sa ciljem predikcije mišljenja nezavisnog revizora (kvalifikovano ili nekvalifikovano).

Zadatak klasifikacije revizorskog mišljenja predstavlja binarnu klasifikaciju, gde se na osnovu vrednosti iz bilansa uspeha i bilansa stanja, algoritam trenira da prepozna obrasce koji su prethodili pozitivnom ili negativnom mišljenju revizora.

ARHITEKTURA DUBOKE NEURONSKE MREŽE

Korišćen je model fully-connected feedforward neuronske mreže, poznat kao višeslojni perceptron (MLP). Model je implementiran u programskom jeziku Python korišćenjem biblioteka Keras i TensorFlow. Zbog ograničene veličine skupa podataka, model je optimizovan da bude što jednostavniji, ali da i dalje zadrži duboku strukturu.

Struktura mreže:
- Ulazni sloj: 18 neurona (svaki odgovara jednom racio pokazatelju)

Skriveni slojevi:
- sloj: 64 neurona, ReLU aktivacija
- sloj: 32 neurona, ReLU aktivacija
- sloj: 16 neurona, ReLU aktivacija

Izlazni sloj:
- 1 neuron sa sigmoid aktivacijom za binarnu klasifikaciju

Optimizator:
- Adam

Funkcija greške:
- Binary Crossentropy

Regularizacija:
- Dropout (0.3) između slojeva radi sprečavanja pretreniranosti

Evaluacija:
- Accuracy, Precision, Recall, F1-score

Ova mreža koristi hijerarhijski pristup, gde se slojevi uče da iz podataka izvuku apstraktnije karakteristike koje vode do klasifikacije.

Trening i evaluacija modela

S obzirom na mali broj uzoraka (n=48), korišćena je tehnika k-fold cross-validation (k=5) radi pouzdanije evaluacije modela. Trening je izveden u više epoha, ali sa early stopping mehanizmom kako bi se izbeglo preučenje. Rezultati su pokazali da čak i kod ovako skromnog skupa podataka, model može naučiti značajne obrasce koji utiču *na ishod revizorskog mišljenja sa tačnošću oko 85%.*

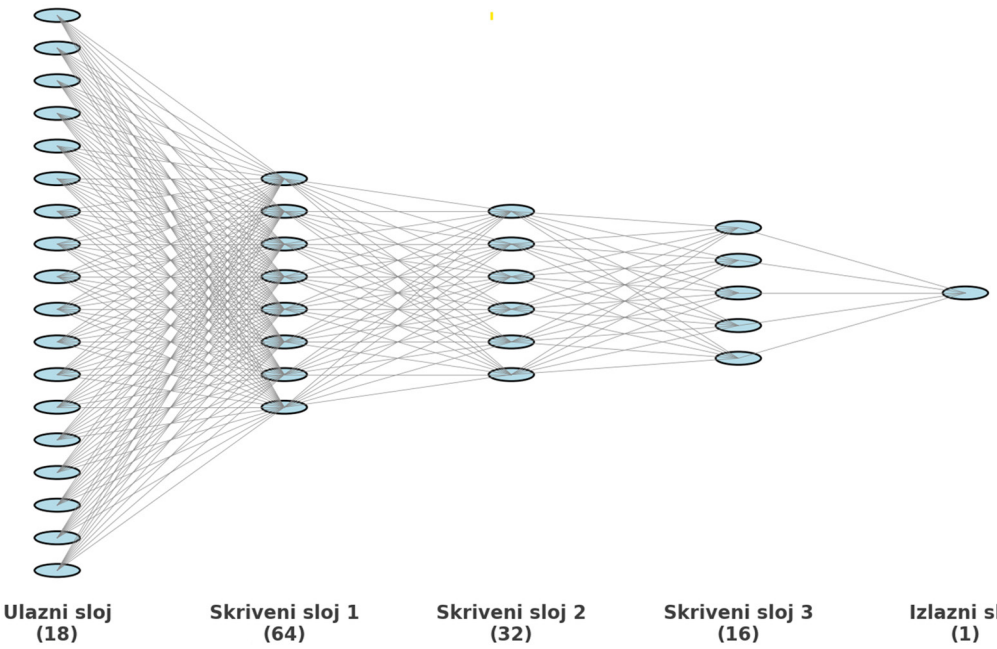
Ključni faktori koji su doprineli uspešnoj klasifikaciji:
- *Profitabilnost (ROA, ROE)*
- *Likvidnost (tekući racio, brzi racio)*
- *Aktivnost (obrt potraživanja, obrt zaliha)*
- *Zaduženost (odnos ukupnog duga i kapitala)*

Model je uspevao da razdvoji kompanije koje su dobile kvalifikovano mišljenje od onih koje nisu, pri čemu je najčešći indikator problema bio nizak stepen pokrivenosti kamata ili visoka zaduženost.

Formula za tačnost:

Tačnost = Broj tačnih predikcija / Ukupan broj predikcija

Primena dubokog učenja na finansijske racio pokazatelje pokazuje potencijal u automatskom prepoznavanju rizika u finansijskim izveštajima. Iako je skup podataka bio skroman, višeslojna mreža je uspela da identifikuje obrasce koji koreliraju sa revizorskim mišljenjem. Ova metodologija se može dodatno unaprediti kroz korišćenje većih i raznovrsnijih baza podataka, kao i sofisticiranijih modela poput konvolutivnih ili rekurentnih mreža.



Slika 1: *Rezultat (mreža neurona sa tri skrivena sloja i izlaznim jednim mišljenjem revizora) primene dubokog učenja (deep learning) ChatGPT.*

ZAKLJUČAK

Mišljenje revizora je od suštinskog značaja za proce revidiranja obveznika revizije. Kako su obveznici revizije primarna grupa za revidiranje, tako je bitno da se proces davanja mišljenja sprovodi sa posebnom pažnjom.

Uprkos malom skupu podataka, neuronska mreža je uspešno razdvojila kompanije sa kvalifikovanim i nekvalifikovanim revizorskim mišljenjem. Ovaj pristup se može proširiti i poboljšati korišćenjem većih baza podataka i kompleksnijih mreža. Značajno treba unaprediti baze podataka, koji će biti reprezentativne i potrebne i dovoljne za donošenje pravih zaključaka.

Kao zaključak, može se reći da je korišćenje Data Mininga (neuralnih mreža i dubokih neuralnih mreža) veoma važno prilikom donošenja odluke o mišljenju revizora, posebno , kada se u analizi uzima veliki uzorak za više godina i više revizorskih firmi, a ne jedna godina i relativno mali broj privrednih društava, koja se smatra oskudnim skupom atributa. Uprkos malom skupu podataka, neuronska mreža je uspešno razdvojila privrdna društva sa kvalifikovanim i nekvalifikovanim revizorskim mišljenjem. Kao što smo napomenuli ovaj pristup se može proširiti i poboljšati korišćenjem većih baza podataka i kompleksnijih mreža. Ono što treba pomenuti jeste stepen tačnosti prilikom korišćenja klasičnih paketa Data mining od dubokih neuralnih mreža. Stepen tačnosti je za oko 40% veći, što nam daje osnovi za primenu ovih programa i njihovu dalju nadgradnju.

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Predicting Audit Opinions Using Shallow and Deep Neural Networks Supported by Artificial Intelligence (ChatGPT)

Abstract: *The accelerated application of artificial intelligence (AI) in all domains of human activity has not bypassed audit work either. In the domains of AI application in audit, the essential question arises whether it is necessary to perform an audit opinion with shallow or extensive data. AI methods provide us with the possibility of predicting (on the basis of examples for the sake of ratio indicators) to arrive at precise results on scarce-shallow data. The author has drawn a parallel of accuracy between classic machine learning methods and deep learning supported by Chat GPT. And this is where the benefits of applying AI can be seen. Of course, a larger number of data would be significant for accuracy, which is the subject of further research. The future lies in the combination of human understanding of accounting and auditing and raw data, which hides implicit knowledge.*

Keywords: predicting audit opinion, machine learning, deep learning, ChatGPT

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Forensic Accounting in the Digital Era: Modern Technologies in the Detection of Financial Fraud

Abstract: *The transformation driven by business digitalization has reshaped all aspects of the financial system, particularly the methods used to detect and prevent financial fraud. Forensic accounting, an interdisciplinary field uniting finance, law, and technology, has emerged as a fundamental mechanism for safeguarding market integrity and public trust. In an era where data represents the most valuable asset, technological innovations such as artificial intelligence, blockchain, digital forensics, and big data analytics have become essential in identifying irregularities and reconstructing financial flows. Their integration not only enhances fraud detection techniques but also redefines the very notion of professional accountability in financial reporting. This paper explores the evolving role of forensic accounting as a discipline that harmonizes the traditional principles of accuracy and reliability with the transformative potential of digital technologies.*

Keywords: *forensic accounting, financial fraud, digital forensics, blockchain, artificial intelligence, data analytics.*

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INTRODUCTION

Forensic accounting is a discipline that deals with the identification, prevention, analysis and investigation of financial frauds that are increasingly prevalent, sophisticated and difficult to detect in the modern business environment. Forensic accounting combines elements of accounting, auditing, law, and more recently, information technology in one discipline. Forensic accounting plays a key role in the detection and prevention of financial fraud, using methods such as data analysis and digital forensics to identify irregularities (A.M. Ali et al., 2024). Although the theory of forensic accounting is a relatively new discipline, it is noticeable that the practice in the digital environment is developing much faster, which indicates the need for scientific and professional frameworks to be adapted to the dynamics of modern business processes (Vukadinović & Damnjanović, 2016).

The digital era, when it comes to finance in general, brings with it numerous benefits, but the intensive digitalization of business processes also means an increased volume and new forms of financial manipulation. The development of various financial platforms, tokenization, cryptocurrencies, electronic payment systems, large data exchange systems, automated investment advisory systems and similar technologies has created new space for abuses, and for the creation of increasingly difficult to detect fraud systems. In order to detect these illegal actions, which are constantly evolving, it is necessary to adapt and improve methods for their identification and prevention. Given the increasing incidence of business fraud and the loss of trust in corporate financial reporting, forensic accounting is becoming a key instrument in strengthening transparency and building a system of corporate accountability in the modern business environment (Knežević et al, 2021).

APPLICATION OF BLOCKCHAIN TECHNOLOGY IN FINANCIAL FORENSICS

Blockchain is a decentralized, distributed database where all transactions are recorded in "blocks" that are cryptographically protected and linked, so that all records in the computer network are resistant to unauthorized changes (Hayes, 2025a). One of the basic and most important advantages of this technology lies precisely in the fact that once entered, data cannot be changed or deleted, which means that transaction data is stored long-term and that the space and opportunities for manipulation, abuse, concealment of fraud and traces are reduced to a minimum. Blockchain technology and its tools are most often used in monitoring the flow of money in cryptocurrencies.

One of the best examples of using this technology to detect fraud is a case from 2021 in the United States when the company Colonial Pipeline was the victim of a hacker attack. The hackers blocked all systems and access to the company and demanded that the company pay a certain amount of money in cryptocurrency, in this particular case in bitcoin. In order to regain access to its systems, the company paid over four million dollars in cryptocurrency to the hackers. The FBI was then able to track the movement of this cryptocurrency, thanks

to the public nature of blockchain transactions. During the investigation, the FBI was able to access the wallet containing the majority of the stolen bitcoins and seize these funds.

The application of blockchain in forensic accounting has proven to be very effective so far, especially because the evidence obtained from these analyses is irrefutable because data and transactions can be directly traced. Real-time monitoring uses the integration of multiple technologies that continuously monitor transactions, immediately detect suspicious activity, and respond to potential fraud in an automated manner, significantly increasing the efficiency and speed of detection without compromising the user experience (Tanvir Rahman et al, 2024). This capability significantly facilitates the collection and presentation of evidence in court and allows for the creation of a clear picture of financial flows.

THE ROLE OF DIGITAL FORENSICS IN DATA TRACE ANALYSIS

Digital forensics is one of the most important segments of financial forensics in modern business because it allows the collection, analysis and storage of data traces in the digital environment that can be crucial for detecting fraud. Given that today almost every transaction, information, contract, communication and other business processes leave an electronic trace, favorable opportunities for detecting fraud and perpetrators are opening up more easily than ever before. These opportunities are reflected precisely in the reconstruction of all activities of suspected employees or entire organizations. In the modern technology-based business environment, digital forensics is becoming a key tool for auditors in detecting and preventing fraud by monitoring complex ERP systems and using various digital tools to effectively identify illegal activities inside and outside the organization (Segal, 2016).

One of the main tasks of digital forensics is to determine the security of the network and the existence of unauthorized access, attempts to manipulate data or transactions, illegal money transfers and similar abuses. Also, during the investigation of fraud, digital forensics can recover all deleted data or those that were tried to be hidden and thus provide irrefutable evidence of fraud. Cases from practice show that digital forensics is most successful in investigating and detecting fraud related to cyber attacks and blackmail, identity theft, unauthorized access to sensitive data, internal fraud in financial institutions, fraudulent transactions, phishing, etc.

APPLICATIONS OF COMPUTER ANALYSIS IN PROCESSING LARGE DATA SETS

Traditional forensic accounting methods cannot process large data sets, especially not in a short period of time, especially when considering the number of transactions that are carried out in real time. Big data analytics technologies enable the analysis of various types

of data, structured and unstructured, numerical and non-numerical, textual, image, video, market sentiment, etc. These technologies can be used to detect anomalies and suspicious patterns of behavior that would otherwise likely, if not certainly, be missed by forensic accountants. Although analyses based on these technologies require significant investments, they have proven very effective in sectors such as banking, e-commerce and crypto exchanges, where they have significantly reduced losses from fraud (Udeh et al, 2024).

In practice, various data analysis techniques are used, including data mining, predictive models, business network analysis, real-time data movement monitoring, etc. Research on the application of these tools for detecting financial fraud shows that supervised methods such as logistic regression are most commonly used, and fraud in financial statements and bank fraud are most frequently investigated (Albashrawi, 2016). The application of computational analysis tools for large data sets has so far proven to be efficient and highly cost-effective. A large area for the growth and development of the effectiveness of this technology is its integration with other similar innovative technologies, such as artificial intelligence and machine learning. By crossing these technologies, it would be possible to predict new potential forms of fraud, which would further improve the preventive capacity of financial institutions.

APPLICATION OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TOOLS

Artificial intelligence plays a key role in fraud prevention by analyzing large amounts of data in real time, recognizing unusual patterns in transactions, and automatically detecting and preventing suspicious activities such as money laundering, phishing, and cyberattacks (Bello & Olufemi, 2024). Machine learning techniques find application in various fields, such as network intrusion detection, credit card fraud, and time series analysis, using methods such as neural networks, Bayesian networks, and predictive models (Đorđević et al, 2022).

These technologies enable dynamic learning from data and its analysis that far surpasses human capabilities. Machine learning significantly contributes to the detection of financial fraud by using historical data to train models that can identify potential fraud in real time by analyzing user behavior and spotting anomalies (Sathisha & Sowmya, 2024). Also, the most common application of machine learning is in fraud detection. Machine learning helps classify transactions into those that are suspicious and those that are harmless (Bogojević Arsić, 2021).

These technologies can be used to monitor customer behavior and transactions in real time in the banking sector. Also, if such models detect an attempt at unauthorized or suspicious access to data or accounts, they can request additional authentication to prevent potential fraud. Artificial intelligence and machine learning are also widely used in fraud prevention in the cryptocurrency market by searching for fund flows, suspicious transactions and wallets and mapping them to track the flow of stolen cryptocurrency if this occurs. A particular advantage of these systems is that they continuously learn from

the examples they have processed and improve themselves so that, over time, the number of cases that are incorrectly labelled as fraud decreases.

The tools of these technologies are extremely powerful and effective, but they also come with certain risks and challenges. One of the main problems with these technologies is that they are considered "black boxes", meaning that it is not known how exactly they work, what logic they use and what decisions they make. Transparency is something that can be a problem in court because it is difficult to explain how certain findings and conclusions were reached.

CHALLENGES AND LIMITATIONS OF TECHNOLOGY APPLICATION

The implementation of complex technologies requires a reliable infrastructure to prevent system downtime or malfunctions and errors that can lead to negative consequences. Due to the large amounts of data that are stored and processed, there is a fear of unauthorized access to them. Also, one of the biggest problems is the lack of standardization in the application of new technologies, as different accounting systems use different software or models that are not compatible. In addition, the costs of implementing, developing and maintaining these systems are extremely high, and for smaller organizations they often represent the biggest obstacle. Data quality and availability a challenges common to all systems based on these technologies, as their operation directly depends on them, and in practice, incomplete, inaccurate or outdated data can often be found.

Innovative technologies are often born before their operation and use are regulated. Collaboration between companies and regulators is crucial as it would allow a wider range of stakeholders to drive innovative legislation to build an ecosystem of financial actors and innovators who will work together to create a more resilient digital financial system (Jarvis & Han, 2021).

The implementation of innovative technologies requires a certain technical infrastructure, but in addition, there is also a problem related to employees. The automation of many processes means that the need for personnel will be reduced, so the fear of losing their jobs is a real problem that employees face. Employees who deal with finance now have to cooperate more with IT specialists and engineers, whose number is increasing in the organizational structure. Given that the accounting profession is continuously changing, it is necessary to constantly improve curricula and integrate forensic accounting into the education system in order to respond to the increasingly complex challenges of the digital age (Knežević et al, 2021).

CONCLUSION

Forensic accounting in the digital era is one of the most dynamic areas of finance. It is no longer just a system for detecting fraud that has already been committed, but is also considered a preventive step. When it comes to risk management, forensic accounting is also gaining a strategic role. What remains a worrying fact is that even with the use of

advanced technology and the expert knowledge of forensic accountants, fraud is occurring on an increasing scale and the root cause of its occurrence is largely constant: the human factor. It is not enough to simply use innovative technologies if they do not respect ethical principles, and regulatory and legal authorities must be more agile in adopting new regulations that govern new technologies. The future of forensic accounting in the digital era lies precisely in the combination of several factors: the implementation of new technologies in the work of regulatory institutions and companies, the development of ethical standards, and international cooperation in the issue of adopting standards and legal frameworks. Education of forensic accountants regarding new forms of fraud, as well as the development of new tools and technologies, is also a step that must be continuously implemented.

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forenzičko računovodstvo u digitalnoj eri: Savremene tehnologije u detekciji finansijskih prevara

Apstrakt: *Duboke promjene koje su nastale digitalizacijom poslovanja uticale su na sve segmente finansijskog sistema, posebno na načine otkrivanja i sprečavanja finansijskih prevara. Forenzičko računovodstvo, kao disciplina koja objedinjuje finansije, pravo i tehnologiju, postalo je jedan od ključnih mehanizama očuvanja integriteta tržišta i povjerenja javnosti. U eri u kojoj su podaci najvredniji resurs, savremeni tehnološki alati poput vještačke inteligencije, blokčejna, digitalne forenzike i analize velikih skupova podataka postaju nezaobilazni u identifikaciji nepravilnosti i rekonstrukciji finansijskih tokova. Njihova primjena mijenja ne samo tehnike otkrivanja prevara, već i sam koncept profesionalne odgovornosti u finansijskom izvještavanju. Rad ukazuje na nove pravce razvoja forenzičkog računovodstva kao discipline koja spaja tradicionalne principe tačnosti i pouzdanosti sa mogućnostima koje nudi digitalna era.*

Ključne riječi: *forenzičko računovodstvo, finansijske prevare, digitalna forenzika, blokčejn, vještačka inteligencija, analiza podataka.*

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Profit, novčani tokovi i veštačka inteligencija: Izazovi u donošenju finansijskih odluka

Apstrakt: *Za razliku od računovodstvenog dobitka (profita), koji je podložan različitim procenama i računovodstvenim politikama, novčani tok obezbeđuje realniji uvid u sposobnost preduzeća da generiše likvidna sredstva, izmiruje obaveze i finansira rast. Novčani tok predstavlja jedan od najpouzdanijih pokazatelja finansijske stabilnosti i operativne uspešnosti organizacija, zbog čega se sve češće koristi kao referentna tačka (benčmark) u proceni poslovnih performansi. Cilj ovog rada je da se ispita uloga profita i novčanog toka u sklopu evaluacije finansijskih performansi, te donošenju menadžerskih odluka. Pored toga, ispituje se i uticaj veštačke inteligencije. Rezultati ukazuju da korišćenje novčanog toka kao referentnog kriterijuma doprinosi objektivnijoj proceni performansi i unapređenju finansijskog upravljanja, naročito u uslovima povećane neizvesnosti i ograničenog pristupa eksternim izvorima finansiranja, kao i da su različiti uticaji veštačke inteligencije na operativne performanse.*

Ključne reči: *profit, novčani tok, evaluacija, veštačka inteligencija, finansijsko odlučivanje*

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UVOD

Cash is a fact, profit is an opinion.
*(*Alfred Rappaport)

Računovodstvo je sistem koji definiše, meri i tumači finansijske rezultate ekonomskih aktivnosti. Iz tog razloga se često naziva „jezikom poslovanja". Računovodstvo pruža dinamičnu strukturu za evidentiranje, izveštavanje i transformaciju organizacionih aktivnosti u značajne informacije za donosioce odluka. Evolucija računovodstvenih praksi je složeno isprepletena sa razvojem trgovine i rastućim finansijskim odgovornostima koje je prate. Računovodstveni produkt su finansijski izveštaji, kao skup korisnih finansijskih informacija o performansama organizacija. Finansijski računi se koriste kao jednako važna osnova za (pre)raspodelu bogatstva između investitora, menadžera i zaposlenih u organizaciji (između ostalog), s jedne strane, kao i za oblikovanje tržišnih očekivanja koja direktno utiču na vrednovanje kapitala na investicionim tržištima, s druge strane. Neke od finansijskih informacija koje su korisne investitorima i kreditorima jesu profit i novčani tokovi. Računovodstveni podaci se pored ostalog, u širokoj meri koriste za praćenje i regulisanje ugovora između kompanije i njenih brojnih zainteresovanih strana (8).

Obračunska osnova računovodstva priznaje prihode kada su realizovani i troškove kad su nastali i obično je razlika između obračunske i novčane osnove značajna. Upotreba obračunske osnove usložnjava računovodstveni proces, ali krajnji rezultat je reprezentativniji za finansijsko stanje entiteta nego kod primene novčane osnove. Ovo je sve važno imati u vidu prilikom tumačenja dobijenih rezultata, posebno po pitanju analize kvaliteta zarade preduzeća (17).

Knjiga „Profit u modernoj ekonomiji" (*Profits in the Modern Economy*) prvi put je objavljena 1967. godine. Kako urednici ističu u uvodu u ovu knjigu, profit je koncept oko kojeg postoji mnogo nesporazuma. Čovek sa ulice, biznismen i ekonomista svi razmišljaju o profitu u različitim značenjima i zbog toga imaju poteškoća u međusobnoj komunikaciji. Iako je tema od ključne važnosti u modernoj ekonomiji, relativno malo teksta naučne prirode je napisano o profitu (21).

Profit je možda jedan od načina na koji poslovna firma može da koristi brojku koju smo uobičajeno nazvali profit kao indikator uspeha. Veličina profita je mera uspeha, ali profit je nedefinisan dok se ne definiše proces kojim se meri. Operativne definicije su važne, a postaje gotovo besmisleno govoriti o profitu osim ako se ne precizira proces kojim se stvar koja se zove „profit" meri (21).

Prvi deo rada posmatra profit kao obračunsku meru. Drugi deo rada se bavi sagledavanjem novčanog toka kao referentne tačke za poređenje. Treći deo rada je posvećen razmatranju profita i novčanog toka kao baza za odlučivanje. Četvrti deo se odnosi na analizu uticaja veštačke inteligencije na pokazatelje performansi. Na kraju slede zaključna razmatranja.

PROFIT KAO OBRAČUNSKA MERA

Profit se tradicionalno posmatra ne samo kao pokazatelj uspešnosti poslovanja, već i kao obračunska mera koja omogućava kvantifikaciju rezultata poslovnih aktivnosti u novčanim jedinicama. Profit tj. dobitak se često koristi kao merilo uspešnosti ili kao osnovica za druga merenja, kao što su prinos na ulaganja ili zarada po akciji. Kao obračunska mera, profit predstavlja razliku između prihoda i troškova tokom određenog perioda i služi kao osnova za procenu finansijskog učinka preduzeća. Pored toga, profit kao obračunska kategorija omogućava uporedivost između različitih vremenskih perioda, poslovnih jedinica i sektora, što je ključni element u donošenju menadžerskih odluka i evaluaciji strategija. Postojanje profita je povezano ili sa prisustvom rizika ili sa ukupnim aktivnostima preduzetnika, a izvor profita su inovacije i nove tehnologije. Skoro svi rani engleski pisci su naglašavali činjenicu da je profit plaćanje za nošenje rizika, a takođe je nekoliko ranih francuskih ekonomista naglašavalo poentu da poreklo profita proističe iz rizika. Prema Knight (12), poreklo profita se prvenstveno nalazi u postojanju „nesavršene konkurencije" koja proizilazi iz prisustva nemerljivih rizika, tj. neizvesnosti. Profit (dobit) predstavlja izvor sredstava za rast preduzeća, a njegova veličina dodatno je određena uslovima proizvodnje i pritiscima dugoročne konkurencije (20).

Dobitak je preostali iznos koji preostaje nakon što se svi rashodi (uključujući i rashode za održanje kapitala) odbiju od prihoda (18). Profit je jednak promeni ekonomske vrednosti neto imovine entiteta koja bi se desila u odsustvu transakcija sa akcionarima, pri čemu je važno istaći da se ekonomska vrednost neto imovine razlikuje od knjigovodstvene vrednosti (3).

Zarada (earnings) je rezimirana mera preformansi privrednog subjekta generisana prema principu obračunskog računovodstva (accrual accounting). Zarada je važna jer je koristi kao rezimiranu meru učinka firme širok spektar korisnika. Na primer, koristi se u planovima naknada rukovodilaca, u dužničkim sporazumima, u prospektima firmi koje žele da izađu na berzu, kao i od strane investitora i poverilaca (5).

Različita shvatanja značenja pojma „profit" mogu se sažeti na sledeći način (14: 280):

Ekonomija	**Pravo**	**Računovodstvo**
Povećanje bogatstva	Sadašnja vrednost imovine umanjena za obaveze i kapital	Neto promena ukupne imovine
Višak u odnosu na troškove proizvodnje	Višak preko troškova proizvodnje	Višak zarade nakon pokrića svih troškova

Razlikovanje stavki prihoda i rashoda i njihovo kombinovanje na različite načine dovodi do ishoda u vidu različitih finanisjskih merila kao što su: bruto poslovni dobitak, dobitak iz redovnih aktivnosti pre oporezivanja, dobitak iz redovnih aktivnosti nakon oporezivanja i neto dobitak. Iznos profita za jednu kompaniju, za istu finansijsku godinu, razlikovaće se u zavisnosti od toga kada je sastavljen prema US GAAP, MSFI ili drugom skupu GAAP. Prema istom skupu računovodstvenih pravila, jedna transakcija može se tretirati na drugačiji način, tako da profit nije samo stvar konvencije, već je zapravo stvar mišljenja.

Kao što je već pomenuto, važno je razumeti da računovodstveni profit često ne odražava direktno stvarni novčani tok organizacije, zbog primene različitih obračunskih metoda, amortizacije, rezervisanja i drugih računovodstvenih politika. Zbog toga, iako profit kao obračunska mera pruža vredan uvid u ekonomske rezultate, njegovo tumačenje mora biti dopunjeno analizom novčanih tokova, posebno u kontekstu strateškog i operativnog finansijskog odlučivanja.

NOVČANI TOK KAO REFERENTNA TAČKA

Drebit (6) predlaže da se novčani tok definiše kao usmereno kretanje gotovine koje se izražava u njenom prijemu, raspodeli i raspolaganju iz poslovnih, investicionih i finansijskih aktivnosti. Rezultat kretanja gotovine je stanje gotovine i gotovinskih ekvivalenata, koje služi kao statička determinanta novčanih tokova. Važno je napomenuti i poznatu činjenicu da prihode diktira i određuje tržište, a rashode (ulaganja) racionalizuje preduzeće, kao i da postoji značajan broj preduzeća koja su ostvarila visok profit, ali su završila u stečaju zbog nelikvidnosti i insolventnosti, pri čemu je jedan od ključnih uzroka bilo neadekvatno upravljanje obrtnim kapitalom (10:61).

U svrhu analize novčanog toka se mogu koristiti statički i dinamički pristup. Statički pristup razumevanju prirode novčanih tokova preduzeća podrazumeva da se novčani tok tumači sa stanovišta njegovog uticaja na stanje sredstava na računima preduzeća i definiše se kao „neto kretanje gotovine za period". Osnovne kategorije koje karakterišu novčani tok u okviru statičkog pristupa su: „stanje gotovine u bilo kom datom trenutku", „neto kretanje gotovine" i „neto novčani tok". Priroda novčanih tokova se može posmatrati i kao priroda novčanih tokova na dinamičkom nivou. Na ovom nivou, novčani tok predstavlja kretanje gotovine na dva načina: u obliku plana budućih novčanih tokova preduzeća u vremenu ili izveštaja o njihovom kretanju u prethodnim periodima (6).

Efikasno upravljanje novčanim tokom je deo funkcionalnih strategija. Efikasno upravljanje informacijama o novčanim tokovima pruža koristi preduzećima kao što su otkrivanje učinka gotovine, merenje likvidnosti i sposobnosti upravljanja resursima, predviđanje budućih otplata kredita i zajmova i određivanje učinka firme. Shodno tome, informacije o novčanim tokovima su visoko rangirane u odnosu na druge izvore informacija za potrebe donošenja odluka. S druge strane, loš kvalitet informacija o novčanim tokovima može dovesti u zabludu poverioce u pogledu učinka novčanih tokova i može ograničiti mogućnost procene učinka firme (7).

Postoji sve veća potražnja među kompanijama za pomoć u upravljanju ciklusom novčanog toka: od obaveza prema dobavljačima do zaliha i potraživanja (obrtni kapital). Menadžeri moraju znati poziciju svoje kompanije u odnosu na gotovinu, a ne da se fokusiraju isključivo na krajnji profit bez obzira na delatnost kojom se bave ili veličinu organizacije čijim resursima upravljaju. Sa finansijskim podacima i računarskom tehnologijom koja je lako dostupna, svaka kompanija može na jednostavan način razviti referentne vrednosti za poređenja. Time se stvara dobra platforma za unapređenje performansi.

PROFIT I/ILI NOVČANI TOK KAO BAZE ZA ODLUČIVANJE

Mnogi finansijski analitičari smatraju novčani tok iz poslovnih aktivnosti boljim pokazateljem finansijskih performansi kompanije nego neto dobitak, a osnovni razlog za to je što je on manje pod uticajem različitih računovodstvenih praksi, te različitih distorizija koje iz toga proizilaze. Sve je širi obuhvat interesnih grupa koje favorizuju novčane tokove kao meru vrednosti kompanije u odnosu na prijavljenu zaradu. Među njima se posebno ističu finansijski analitičari i portfolio menadžeri. Profit pokazuje učinak prema računovodstvenim pravilima, dok gotovina pokazuje pravu likvidnost kompanije.

Novčani tok, krvotok kompanije, je primarni fokus finansijskog direktora, kako u upravljanju svakodnevnim finansijama, tako i u planiranju i donošenju strateških odluka radi stvaranja vrednosti za akcionare. Iz računovodstvene perspektive, novčani tokovi kompanije mogu se sumirati u bilansu novčanih tokova u tri dela: poslovne aktivnosti, investicione aktivnosti i finansijske aktivnosti. Imajući u vidu da profitno orijentisane kompanije koriste koncept obračunskog računovodstva u svom računovodstvu, potrebno je istaći dobro poznatu činjenicu da je neophodno pratiti tokove profitabilnosti i novčane tokove za efikasno upravljanje njihovom imovinom.

Kvalitetno prognoziranje novčanih tokova omogućava menadžerima rizika da odrede optimalnu količinu novca za kratkoročna, srednjoročna i dugoročna ulaganja. Imajući u vidu da ulaganja uzrokuju nedostatak likvidnosti, važno je da su licu koje je odgovorno za novčane tokove dostupne pouzdane informacije kako bi mogao da imobiliše sredstva i uskladi rokove dospeća sa planiranim obavezama (11:23). Novčani tokovi moraju biti klasifikovani u jednu od tri kategorije: poslovni, investicioni ili finansijski. Za korisnike finansijskih izveštaja, ova klasifikacija je korisna jer im omogućava da utvrde kako svaka aktivnost utiče na finansijski položaj i gotovinu i gotovinske ekvivalente entiteta, kao i kako ove aktivnosti međusobno deluju. Iako finansijski zdrava kompanija treba da ima jak novčani tok iz poslovnih aktivnosti, potrebno je biti oprezan u evaluaciji ove finansijske stavke, jer prevaranti mogu manipulisati tako što „naduvaju“ ovu brojku. To ostvaruju preusmeravanjem novčanog toka iz finansiranja na novčani tok iz poslovnih aktivnosti, preusmeravanjem odliva novca iz poslovnih aktivnosti na investicione odlive i na druge načine.

Da bi finansijske informacije bile relevantne, one takođe moraju uticati na sposobnost entiteta da predvide buduće novčane tokove (15). Pored predviđanja buduće zarade, informacije o novčanim tokovima igraju važnu ulogu u proceni budućeg novčanog toka iz poslovnih aktivnosti (19). Iako su zaključci dvosmisleni, prediktivni kapacitet novčanih tokova je takođe istaknut u literaturi .

Nekoliko autora je takođe procenilo relevantnost finansijskih izveštaja iz ove perspektive, uključujući one koji se odnose na bilanse uspeha i novčanih tokova (na osnovu obračuna naspram gotovinskog), kako bi utvrdili koji je najtačniji prediktor novčanog toka iz poslovnih aktivnosti. U tom smislu, Bowen et al. (4) navode da su i obračunske mere i novčani tok iz poslovnih aktivnosti relevantni, jer pružaju različite, ali komplementarne informacije.

Rezultati istraživanja Albuquerque et al. (2) pokazuje da pokazatelji novčanog toka imaju veći uticaj na cene akcija u poređenju sa profitom ili gubitkom (oko 40% naspram 20%). Takođe, istorijski podaci o novčanom toku se pokazali kao pouzdaniji prediktor budućih novčanih tokova nego što je to profit ili gubitak (90% naspram 80%). S druge strane, ni računovodstvene mere profita niti pokazatelji novčanog toka ne pokazuju značajnu sposobnost predviđanja budućeg profita ili gubitka (ispod 35% u svim slučajevima).

UTICAJ VEŠTAČKE INTELIGENCIJE NA PERFORMANSE KOMPANIJA

Poslovanje u današnjem svetu tehnološke ere je očigledno pod uticajem veštačke inteligencije. Poslednjih godina, veštačka inteligencija postala je centralna tačka akademskih i poslovnih istraživanja. Sa prodorima u algoritmima učenja, primene veštačke inteligencije u poslovnim aktivnostima postaju sve praktičnije i uticajnije (9). Prethodna literatura je pokazala da veštačka inteligencija ima pozitivan efekat na performanse kompanija (16). Međutim, potrebno je imati u vidu, da pored svih koristi od primene veštačke inteligencije, ona ne zamenjuje profesionalno prosuđivanje, već ga dopunjuje, naglašavajući potrebu za adekvatnim institucionalnim okvirima, transparentnošću modela i razvojem finansijskih i digitalnih kompetencija donosilaca poslovno-finansijskih odluka u kompanijama. Čovek je taj koji donosi konačno mišljenje ili odluku.

Rezultati istraživanja Tania et al. (23) ukazuju na to da firme koje više ulažu u veštačku inteligenciju, doživljavaju smanjenje volatilnosti sva tri pokazatelja operativnog učinka - prodaje, zarade i novčanih tokova firme, u poređenju sa firmama sa nižim investicijama u veštačku inteligenciju. Ovo otkriće ističe kako usvajanje veštačke inteligencije može koristiti firmama ne samo povećanjem prvog trenutka njihovog operativnog učinka (npr. povećanjem prodaje) već i smanjenjem drugog trenutka (smanjenjem volatilnosti). Studija Agarwall et al. (1) je pokazala da veštačka inteligencija ima značajan uticaj na operativne troškove kompanija, kao i na operativni profit.

Usvajanje veštačke inteligencije u poslovanju maksimizuje profit kroz smanjenje troškova i operativnu efikasnost (13). Veštačka inteligencija odnosi se na širok spektar otkrića koja nude višestruke prednosti kompanijama u smislu povećanja prodaje. Uzimajući u obzir obilje podataka i značajno povećanje računarskih resursa, organizacije su se brzo okrenule veštačkoj inteligenciji kako bi stvorile finansijske koristi. Ipak, preduzeća i dalje otkrivaju da je teško implementirati i koristiti veštačku inteligenciju u svojim svakodnevnim aktivnostima. Stoga je potrebno sveobuhvatno razumevanje zbog nedostatka integrisanog razumevanja kako veštačka inteligencija stvara poslovnu vrednost i kakva se vrsta korporativne vrednosti očekuje (22).

ZAKLJUČAK

Analiza profita i novčanih tokova u eri veštačke inteligencije ukazuje na značajnu transformaciju finansijskog odlučivanja. Bitno pitanje je šta je profit, kako ga vide ekonomisti, ili drugačije rečeno, koje su to sile koje generišu profit? Pored toga, relevantno je i pitanje širine primene novčanih tokova u evaluaciji finansijskih performansi kompanija. Primena alata veštačke inteligencije omogućava dublje razumevanje odnosa između računovodstvene profitabilnosti i stvarne likvidnosti, kao i pravovremeno prepoznavanje rizika koji se ne mogu uočiti tradicionalnim analitičkim pristupima. Time se unapređuje kvalitet finansijskih odluka, posebno u domenu planiranja, kontrole i procene održivosti poslovanja.

Finansijski svet je opsednut profitom i njegovim rastom. Međutim, svaki iznos profita oblikovan je konvencijama i tumačenjima. Za napredak kompanije ključno je pažljivo upravljanje novčanim tokom. Za investitore je novčani tok posebno važan, jer upravo on omogućava kompaniji rast, isplatu dividendi i otkup akcija. Analitičari, investitori, pa čak i menadžment često zanemaruju novčani tok, a on je žila kucavica svakog preduzeća.

Modeli veštačke inteligencije mogu identifikovati obrasce koji ukazuju na potencijalne finansijske rizike, prepoznati neusklađenosti između prikazanih profita i stvarnih novčanih tokova, te tako podržati proaktivne intervencije menadžmenta. Ovo, s druge strane, povećava pouzdanost finansijskih izveštaja, doprinosi boljem upravljanju likvidnošću i jača poverenje investitora i drugih zainteresovanih strana. Integracija veštačke inteligencije u finansijsko odlučivanje stoga ne predstavlja samo tehničku inovaciju, već i strateški alat za održivo i informisano upravljanje poslovanjem.

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Profit, Cash Flows and Artificial Intelligence: Challenges in Making Financial Decisions

Abstract: Unlike accounting profit (income), which is subject to different estimates and accounting policies, cash flow provides a more realistic insight into a company's ability to generate liquid assets, settle liabilities and finance growth. Cash flow represents one of the most reliable indicators of financial stability and operational success of organizations, which is why it is increasingly used as a reference point (benchmark) in assessing business performance. This paper aims to examine the role of profit and cash flow in evaluating financial performance and making managerial decisions. In addition, the impact of artificial intelligence is also examined. The results indicate that the use of cash flow as a reference criterion contributes to a more objective assessment of performance and the improvement of financial management, especially in conditions of increased uncertainty and limited access to external sources of financing, as well as the different impacts of artificial intelligence on operational performance.

Keywords: profit, cash flow, evaluation, artificial intelligence, financial decision-making

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Uticaj kvaliteta interne revizije na performanse organizacije

Apstrakt: *Kvalitet interne revizije predstavlja jedan od ključnih faktora uspešnosti savremenih organizacija jer prevazilazi tradicionalnu ulogu kontrole i postaje strateški instrument unapređenja performansi. Njegov značaj ogleda se u unapređenju efikasnosti i efektivnosti procesa, smanjenju operativnih i reputacionih rizika, poboljšanju kvaliteta finansijskog izveštavanja i jačanju transparentnosti i odgovornosti menadžmenta. U ovom radu ispitan je uticaj kvaliteta interne revizije na performanse organizacija na uzorku od 285 ispitanika iz Republike Srbije i Bosne i Hercegovine. Podaci prikupljeni putem standardizovanog upitnika analizirani su metodom PLS-SEM, a rezultati potvrđuju snažnu i statistički značajnu vezu između kvaliteta interne revizije i performansi organizacije ($\beta = 0,692$; $p < 0,001$). Dobijeni nalazi ukazuju da skoro polovina varijanse performansi može biti objašnjena kvalitetom interne revizije, čime se potvrđuje njen strateški značaj. Posebno su naglašeni značaj kompetencija revizora i podrške menadžmenta kao ključnih pretpostavki ostvarivanja punog doprinosa interne revizije.*

Ključne reči: *interna revizija, kvalitet interne revizije, faktori kvaliteta interne revizije, performanse organizacije.*

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UVOD

U savremenim uslovima poslovanja, koje karakterišu intenzivne tržišne promene, pojačani regulatorni zahtevi i rastuća očekivanja interesnih grupa, pitanje kvaliteta interne revizije nameće se kao jedno od centralnih pitanja korporativnog upravljanja i organizacione uspešnosti. U literaturi i praksi interna revizija se sve više posmatra kao funkcija koja prevazilazi svoju tradicionalnu ulogu otkrivanja grešaka i kontrole usklađenosti, prerastajući u strateškog partnera menadžmentu i značajan instrument unapređenja poslovnih performansi (Arena & Azzone, 2009; Cohen & Sayag, 2010). Kvalitet interne revizije ne ogleda se u njenom formalnom postojanju u okviru organizacije, već u stepenu u kojem revizija ostvaruje svoju svrhu i doprinosi stvaranju dodatne vrednosti. Revizorski nalazi i preporuke postaju korisni samo ukoliko su zasnovani na profesionalno sprovedenim postupcima, objektivno prezentovani i prihvaćeni od strane menadžmenta. Drugim rečima, kvalitet interne revizije meri se njenim stvarnim uticajem na organizaciju – koliko uspeva da unapredi efikasnost procesa, poveća pouzdanost finansijskog izveštavanja, smanji rizike i doprinese ostvarivanju strateških ciljeva (Mihret & Yismaw, 2007; Alzeban & Gwilliam, 2014).

Sa aspekta korporativnog upravljanja, kvalitetna interna revizija predstavlja neophodan mehanizam za jačanje poverenja interesnih grupa, jer investitori, regulatori i javnost sve više traže dokaze o odgovornom poslovanju, transparentnosti i usklađenosti sa standardima. Organizacije koje raspolažu efikasnom funkcijom interne revizije percipiraju se kao pouzdanije i manje rizične, što direktno utiče na njihovu reputaciju i tržišnu poziciju, pa se interna revizija pozicionira kao faktor konkurentske prednosti i dugoročne održivosti poslovanja. Posebno je značajno istaći kontekst tranzicionih ekonomija, poput Republike Srbije i Bosne i Hercegovine, gde interna revizija relativno kasno dobija institucionalni značaj i gde se još uvek razvijaju profesionalni standardi i regulatorni okviri. U takvim uslovima kvalitet interne revizije zavisi ne samo od individualnih kompetencija revizora, već i od institucionalne podrške, dostupnih resursa i spremnosti rukovodstva da prihvati i implementira revizorske preporuke (OECD, 2019), dok nedovoljna podrška i slab institucionalni okvir mogu dovesti do formalnog postojanja funkcije bez njenog stvarnog doprinosa poslovanju.

Tokom poslednje dve decenije razvijen je niz istraživanja koja empirijski potvrđuju vezu između kvaliteta interne revizije i performansi organizacije, pri čemu su najčešće korišćeni modeli uključivali merenje dimenzija kvaliteta – poput nezavisnosti, objektivnosti, kompetentnosti, podrške menadžmenta i kvaliteta procesa – i njihovo povezivanje sa različitim indikatorima organizacionih performansi, kako finansijskih, tako i nefinansijskih. Rezultati tih istraživanja u najvećem broju slučajeva potvrđuju da organizacije sa kvalitetnijom funkcijom interne revizije ostvaruju bolje poslovne rezultate, brže prepoznaju rizike i efikasnije odgovaraju na promene u okruženju (Wahyudi et al., 2021). Ovakvi nalazi dodatno naglašavaju da interna revizija nije izolovana tehnička aktivnost, već višedimenzionalni proces koji kroz svoju nezavisnost, objektivnost i stručnost postaje stub institucionalne izgradnje i organizacione otpornosti.

U tom kontekstu, cilj ovog rada jeste da se, na osnovu teorijskog pregleda i empirijske analize, istraži uticaj kvaliteta interne revizije na performanse organizacije. Poseban akcenat stavlja se na identifikaciju ključnih pretpostavki kvaliteta interne revizije, pregled relevantnih istraživanja u ovoj oblasti, kao i empirijsko ispitivanje veze između kvaliteta interne revizije i organizacionih performansi na uzorku iz Republike Srbije i Bosne i Hercegovine. Na taj način rad doprinosi razumevanju uloge interne revizije kao faktora organizacione uspešnosti i ukazuje na praktične implikacije za unapređenje korporativnog upravljanja u lokalnom kontekstu.

PRETPOSTAVKE KVALITETA INTERNE REVIZIJE

Polazne pretpostavke kvaliteta interne revizije predstavljaju temelj njenog doprinosa poslovanju i dugoročnoj održivosti organizacije. Njihovo ispunjenje omogućava da interna revizija ne bude posmatrana isključivo kao regulatorna obaveza ili funkcija usklađenosti, već da bude strateški partner menadžmentu i odboru za reviziju u unapređenju efikasnosti, jačanju transparentnosti i kreiranju dodatne vrednosti za sve zainteresovane strane. Suština kvaliteta interne revizije ogleda se u njenoj sposobnosti da pruži verodostojne i pouzdane informacije koje mogu poslužiti kao osnova za donošenje poslovnih odluka, što je moguće samo ukoliko su obezbeđene određene polazne pretpostavke koje čine okvir njenog funkcionisanja.

Prva i najznačajnija pretpostavka odnosi se na nezavisnost i objektivnost, koje omogućavaju da revizori postupaju oslobođeni od neprikladnih pritisaka menadžmenta i drugih interesnih grupa. Nezavisnost se ostvaruje institucionalno, kroz adekvatno pozicioniranje interne revizije u organizacionoj hijerarhiji, najčešće kroz direktno izveštavanje odboru za reviziju ili upravnom odboru, čime se smanjuje mogućnost uticaja izvršnog menadžmenta na njen rad (IIA, 2017). Pored toga, nezavisnost ima i individualnu dimenziju, jer se ogleda u integritetu i otpornosti revizora na spoljne pritiske i lične interese. Objektivnost je usko povezana sa nezavisnošću i podrazumeva da revizori svoje zaključke temelje isključivo na činjenicama i dokazima, bez upliva ličnih stavova ili predrasuda. Empirijska istraživanja potvrđuju da odsustvo objektivnosti dovodi do smanjenog poverenja u nalaze interne revizije i umanjuje njihovu vrednost za menadžment i druge korisnike, dok njeno očuvanje jača kredibilitet i povećava verovatnoću da će preporuke biti implementirane (Cohen & Sayag, 2010).

Druga ključna pretpostavka odnosi se na kompetentnost internih revizora. Ona se ne svodi samo na posedovanje tehničkih znanja iz oblasti računovodstva i finansija, već obuhvata širok spektar multidisciplinarnih veština, uključujući razumevanje rizika, regulatornih zahteva, informacionih tehnologija i poslovnih procesa. Poseban značaj imaju komunikacione veštine, sposobnost kritičkog mišljenja i profesionalnog prosuđivanja, jer one omogućavaju revizorima da svoje nalaze predstave na način koji će biti jasan i prihvatljiv menadžmentu. U kontekstu Republike Srbije i Bosne i Hercegovine,

gde se funkcija interne revizije još uvek institucionalno razvija, problem kompetencija je posebno izražen, budući da značajan broj revizora potiče iz oblasti finansija i računovodstva, dok je znatno manje onih sa formalnim zvanjem ovlašćenog internog revizora i sveobuhvatnim poznavanjem upravljanja rizicima i informacionih sistema. Institut internih revizora (IIA) naglašava važnost kontinuiranog profesionalnog usavršavanja i obaveze stalnog obrazovanja, a istraživanja potvrđuju da upravo kompetentnost revizora spada među najvažnije prediktore kvaliteta interne revizije i njenog pozitivnog uticaja na performanse organizacije (Arena & Azzone, 2009; Sarens, De Beelde & Everaert, 2009).

Podrška menadžmenta i odbora za reviziju predstavlja još jedan neizostavan faktor kvaliteta. Ona se ogleda u obezbeđivanju adekvatnih resursa – finansijskih, tehničkih i ljudskih – ali i u institucionalnom priznavanju značaja funkcije interne revizije. Kada rukovodstvo prepoznaje internu reviziju kao strateškog partnera, nalazi i preporuke dobijaju veću težinu i postaju sastavni deo procesa donošenja odluka, čime se direktno doprinosi unapređenju performansi organizacije. Suprotno tome, u organizacijama u kojima se interna revizija tretira samo kao formalnost radi usklađivanja sa regulatornim zahtevima, njen značaj je sveden na minimum, a potencijal da doprinese poslovanju ostaje neostvaren. Empirijski nalazi potvrđuju da je kvalitet interne revizije u direktnoj vezi sa angažovanošću odbora za reviziju, a posebno sa njihovom spremnošću da osiguraju nezavisnost i aktivno prate sprovođenje preporuka (Alzeban & Gwilliam, 2014; Goodwin-Stewart & Kent, 2006). U lokalnom kontekstu Republike Srbije i BiH institucionalna podrška često zavisi od regulatornih zahteva, dok je strateško uvažavanje funkcije interne revizije još uvek nedovoljno razvijeno, što predstavlja izazov za unapređenje njenog kvaliteta.

Kvalitet sprovođenja samog revizorskog procesa predstavlja dodatnu pretpostavku. Dobro planiran i metodološki dosledan proces revizije osigurava sistematičnost, pouzdanost i relevantnost nalaza. To podrazumeva jasno definisane ciljeve, optimalno planiranje resursa, doslednu primenu standardizovanih metoda i blagovremeno izveštavanje. Kada su svi ovi elementi usklađeni, nalazi interne revizije imaju veći kredibilitet i veću šansu da budu prihvaćeni od strane menadžmenta, dok preporuke postaju operativno primenljive i doprinose unapređenju poslovanja (Wahyudi et al., 2021). U praksi Republike Srbije i BiH primećuje se da interna revizija često ostaje fokusirana na proveru usklađenosti sa propisima, dok se savetodavna uloga i identifikovanje strateških rizika stavljaju u drugi plan, što ograničava njen doprinos performansama organizacije.

Savremeni kontekst donosi i tehnološke pretpostavke kvaliteta interne revizije. Digitalna transformacija omogućava primenu softverskih alata za automatizaciju procedura, analizu velikih skupova podataka, korišćenje veštačke inteligencije za otkrivanje anomalija i procenu rizika u realnom vremenu. Ovi alati značajno povećavaju obuhvat i preciznost revizorskog rada, doprinose pravovremenosti nalaza i jačaju ulogu interne revizije u strateškom odlučivanju (Alles, 2015). Međutim, u Republike Srbiji i BiH primena naprednih tehnologija je još uvek ograničena, naročito u javnom sektoru, zbog nedostatka resursa i kadrova, što predstavlja jedan od ključnih izazova za unapređenje kvaliteta interne revizije.

Ne manje važna pretpostavka jeste i organizaciona kultura, koja značajno utiče na percepciju i efikasnost interne revizije. Organizacije koje neguju kulturu transparentnosti, etičnosti i otvorenosti prema kontrolama omogućavaju internim revizorima da deluju u okruženju koje podržava promene i implementaciju preporuka. Nasuprot tome, organizacije koje se zatvaraju pred nalazima revizije i pokazuju otpor prema sprovođenju preporuka stvaraju ambijent u kojem je interna revizija lišena mogućnosti da ostvari svoj puni potencijal (Mihret, James & Mula, 2010). U lokalnom kontekstu Republike Srbije i BiH tranzicioni izazovi, nedovoljna razvijenost korporativnog upravljanja i otpor prema promenama često predstavljaju prepreku efektivnosti interne revizije, dok kompanije integrisane u međunarodne tokove poslovanja pokazuju viši nivo otvorenosti i uvažavanja ove funkcije.

Sve pomenute pretpostavke – nezavisnost i objektivnost, kompetentnost revizora, podrška menadžmenta i odbora za reviziju, kvalitet procesa, primena tehnologije i organizaciona kultura – čine međuzavisne i komplementarne dimenzije kvaliteta interne revizije. Njihova integrisana primena u savremenim uslovima poslovanja, kako globalno, tako i u lokalnom kontekstu Republike Srbije i Bosne i Hercegovine, više nije stvar teorijskih postulata već praktični imperativ. Samo njihovo dosledno ispunjenje omogućava da interna revizija bude istinski faktor unapređenja performansi poslovanja i ključni akter u ostvarivanju dugoročne otpornosti i održivosti organizacije.

PREGLED LITERATURE O UTICAJU KVALITETA INTERNE REVIZIJE NA POSLOVANJE ORGANIZACIJE

Uticaj kvaliteta interne revizije na poslovanje organizacija već duži niz godina predstavlja centralnu temu istraživanja u oblasti korporativnog upravljanja i računovodstva. Brojni autori ističu da interna revizija, kada se sprovodi u skladu sa profesionalnim standardima i kada su obezbeđene ključne dimenzije poput nezavisnosti, objektivnosti, kompetentnosti i podrške menadžmenta, značajno doprinosi unapređenju performansi organizacije, kako u finansijskom, tako i u nefinansijskom smislu (**Arena & Azzone, 2009; Cohen & Sayag, 2010; Alzeban & Gwilliam, 2014**). Rezultati sprovedenih istražovanja ukazuju na to da veća efikasnost inerne revizije korelira sa višim nivoom organizacionih performansi, jer interna revizija obezbeđuje dodatnu vrednost kroz jačanje kontrolnog okruženja i pružanje podrške menadžmentu. Uz prethodno navedeno, kvalitet interne revizije se u literaturi sve češće posmatra kao višedimenzionalan konstrukt, koji prevazilazi tradicionalnu kontrolnu funkciju i time obuhvata širu ulogu u strateškom upravljanju, optimizaciji procesa, jačanju sistema upravljanja rizicima i razvoju organizacione kulture (**Sarens & De Beelde, 2006; Wahyudi et al., 2021**).

Empirijska istraživanja sprovedena u različitim sektorima i državama potvrđuju da kvalitet interne revizije ima i direktne i indirektne implikacije na poslovne performanse. Direktni efekti odnose se na poboljšanje pouzdanosti finansijskog izveštavanja, efikasnije

korišćenje resursa i unapređenje procesa odlučivanja, dok se indirektni efekti ogledaju u jačanju reputacije, većoj transparentnosti i izgradnji poverenja kod interesnih strana. **Mihret i Yismaw (2007)**, kroz studiju slučaja u javnom sektoru Etiopije, ističu da efektivnost interne revizije zavisi prvenstveno od podrške menadžmenta i institucionalnog okvira. Autori naglašavaju da čak i najkvalitetniji revizorski nalazi ne proizvode rezultate ukoliko rukovodstvo ne pokazuje spremnost da ih implementira, što osvetljava kompleksnu interakciju između tehničkog kvaliteta nalaza i organizacione volje da se oni primene.

Arena i Azzone (2009), na uzorku od 153 italijanske kompanije, potvrđuju da su kompetentnost revizora, adekvatno pozicioniranje funkcije i podrška menadžmenta ključne determinante doprinosa interne revizije poslovnim rezultatima. Njihovi nalazi ukazuju da, kada revizori imaju dovoljne resurse i kada su uključeni u proces strateškog odlučivanja, oni ne samo da identifikuju slabosti, već učestvuju i u formulisanju preporuka od dugoročnog značaja, čime interna revizija prerasta iz tradicionalnog kontrolnog u savetodavni mehanizam. **Cohen i Sayag (2010)** dopunjuju ovaj okvir kroz istraživanje, pokazujući da kvalitet interne revizije ima direktan uticaj na poverenje korisnika i na percepciju njene korisnosti. Prema njihovim nalazima, organizacije u kojima menadžment i zaposleni imaju poverenja u internu reviziju beleže veći stepen implementacije preporuka i samim tim viši nivo efikasnosti i efektivnosti poslovanja.

Istraživanje **Alzebana i Gwilliam (2014)**, sprovedeno u javnom sektoru Saudijske Arabije, naglašava da komunikacija između revizora i menadžmenta, kao i institucionalna podrška, predstavljaju presudne faktore korisnosti interne revizije. Iako je formalna nezavisnost u mnogim organizacijama bila obezbeđena, njen stvarni značaj bio je ograničen kada podrška najvišeg rukovodstva nije postojala. Ovi nalazi potvrđuju da kvalitet interne revizije nije isključivo rezultat tehničke stručnosti, već je u velikoj meri oblikovan organizacionim kontekstom i odnosima poverenja. **Prawitt, Smith i Wood (2009)** u američkom korporativnom sektoru pružaju empirijske dokaze o vezi između kvaliteta interne revizije i smanjenja manipulacija u finansijskom izveštavanju. Njihovi rezultati pokazuju da prisustvo profesionalnih revizora i njihovo aktivno uključivanje u revizorske odbore značajno smanjuju verovatnoću računovodstvenih manipulacija i povećavaju pouzdanost izveštavanja. Ova studija posebno naglašava ulogu interne revizije u očuvanju integriteta finansijskog sistema i zaštiti interesa investitora.

Endaya i Hanefah (2016), kroz istraživanje u javnom sektoru Malezije primenom PLS-SEM metodologije, potvrđuju postojanje snažne veze između nezavisnosti, kompetentnosti i uspešnosti organizacija. Njihovi nalazi pružaju empirijsku potvrdu da su upravo ove dimenzije ključne za efektivnost interne revizije, što je posebno važno u institucionalnim okruženjima u razvoju. **Wahyudi, Maria i Sudarsono (2021)**, istražujući javni sektor Indonezije, ističu da integritet revizora predstavlja najvažniji prediktor kvaliteta nalaza. Autori zaključuju da profesionalni integritet, u kombinaciji sa podrškom rukovodstva, značajno povećava uticaj interne revizije na organizacione performanse. Njihovi nalazi ukazuju da kompetentnost i institucionalna nezavisnost, iako važne, nisu dovoljne ukoliko revizori ne poseduju etičku čvrstinu i otpornost na pritiske.

Na kraju, **Kai, Li i Wu (2022)** razvijaju indeks evaluacije kvaliteta interne revizije na uzorku kineskih kotiranih kompanija. Njihovo istraživanje pokazuje da kompanije sa višim vrednostima indeksa ostvaruju bolje performanse, efikasnije koriste resurse i imaju stabilnije finansijske rezultate. Ovaj indeks predstavlja značajan doprinos jer omogućava sistematsko merenje kvaliteta interne revizije i njegovo povezivanje sa finansijskim i nefinansijskim pokazateljima uspeha.

Na osnovu ovih nalaza može se zaključiti da, iako postoje razlike u intenzitetu i oblicima uticaja između razvijenih i tranzicionih ekonomija, osnovna veza između kvaliteta interne revizije i organizacionih performansi ostaje univerzalno potvrđena. Dok u razvijenim zemljama akcenat često pada na sofisticirane metodologije, digitalizaciju i integraciju sa sistemima korporativnog upravljanja, u tranzicionim ekonomijama ključnu ulogu i dalje imaju institucionalna podrška i jačanje profesionalnih kapaciteta.

Tabela 1. Pregled istraživanja o uticaju kvaliteta interne revizije na performanse organizacije

Autor(i), godina	Kontekst istraživanja	Metodologija	Ključni nalazi
Mihret & Yismaw (2007)	Javni sektor u Etiopiji	Studija slučaja	Efektivnost interne revizije zavisi od podrške menadžmenta i institucionalnog okvira; nalazi ostaju bez uticaja ukoliko nema spremnosti rukovodstva na implementaciju preporuka.
Arena & Azzone (2009)	153 italijanske kompanije	Kvantitativna analiza	Kompetentnost revizora, dostupni resursi i podrška menadžmenta ključne determinante doprinosa poslovnim rezultatima; interna revizija prelazi u savetodavnu ulogu.
Prawitt, Smith & Wood (2009)	SAD, korporativni sektor	Empirijska analiza	Visok kvalitet interne revizije smanjuje menadžerske manipulacije i povećava pouzdanost finansijskog izveštavanja.
Cohen & Sayag (2010)	Izraelske organizacije	Empirijsko istraživanje	Kvalitet interne revizije jača poverenje korisnika, povećava verovatnoću implementacije preporuka i podiže efikasnost poslovanja.
Alzeban & Gwilliam (2014)	Saudijski javni sektor	Anketno istraživanje	Iako formalna nezavisnost postoji, efektivnost zavisi od komunikacije i podrške menadžmenta; značaj organizacione dinamike i poverenja.
Endaya & Hanefah (2016)	Javni sektor Malezije	PLS-SEM	Potvrđena snažna veza između nezavisnosti, kompetentnosti i uspešnosti organizacija; značaj multidimenzionalnog pristupa.
Wahyudi et al. (2021)	Indonezija, javni sektor	PLS-SEM	Integritet revizora identifikovan kao glavni prediktor kvaliteta nalaza; kompetencija bez etičke čvrstine nije dovoljna.
Kai et al. (2022)	Kina, kotirane kompanije	Indeks evaluacije	Organizacije sa višim indeksom kvaliteta interne revizije ostvaruju bolje performanse, efikasnije koriste resurse i imaju stabilnije finansijske rezultate.

Analizirani radovi prikazani u Tabeli 1 potvrđuju da kvalitet interne revizije predstavlja višedimenzionalan konstrukt čiji se efekti protežu kroz različite sfere poslovanja. Bez obzira na institucionalni kontekst, zajednički denominator svih istraživanja jeste da interna revizija svoj puni potencijal ostvaruje tek kada se kombinuju tehnička stručnost,

etički integritet i snažna podrška rukovodstva. Time se potvrđuje da kvalitet nije proizvod samo formalnih procedura i standarda, već i kulture saradnje, poverenja i strateške orijentacije unutar organizacije.

Upoređivanjem nalaza iz različitih zemalja jasno je da u razvijenim ekonomijama naglasak prelazi na sofisticirane metodologije, digitalna rešenja i ulogu interne revizije kao savetodavnog partnera u strateškom odlučivanju (**Arena & Azzone, 2009; Kai et al., 2022**). Nasuprot tome, u tranzicionim i institucionalno slabijim okruženjima poput Etiopije, Saudijske Arabije ili Malezije (**Mihret & Yismaw, 2007; Alzeban & Gwilliam, 2014; Endaya & Hanefah, 2016**), ključni izazovi vezuju se za obezbeđivanje podrške menadžmenta, institucionalne nezavisnosti i profesionalnih kapaciteta. Ovakva razlika ukazuje da je, iako je veza između kvaliteta interne revizije i performansi univerzalno potvrđena, njen intenzitet i način manifestacije značajno oblikovan lokalnim faktorima.

Posebno se ističe uloga integriteta i profesionalne etike revizora (**Wahyudi et al., 2021**), što je važan podsetnik da formalna znanja i sertifikati sami po sebi ne garantuju kvalitet ukoliko nisu praćeni ličnim integritetom i otpornošću na pritiske. Na sličan način, istraživanja pokazuju da se bez jasne podrške menadžmenta i spremnosti da implementira revizorske preporuke (**Cohen & Sayag, 2010; Alzeban & Gwilliam, 2014**) kvalitetni nalazi mogu svesti na formalnost bez stvarnog uticaja.

Sveobuhvatno posmatrano, pregled literature ukazuje da interna revizija mora biti posmatrana kao strateški resurs, a ne kao puka regulatorna obaveza. Kroz osnaživanje kompetencija revizora, jačanje institucionalne podrške i uvođenje modernih metoda i digitalnih tehnologija, interna revizija može doprineti većoj efikasnosti, pouzdanosti i dugoročnoj održivosti organizacija. Ovi nalazi predstavljaju polaznu osnovu za dalje istraživanje u kontekstu Republike Srbije i Bosne i Hercegovine, gde je funkcija interne revizije još u fazi razvoja i gde jačanje njenog kvaliteta može imati transformacioni značaj za unapređenje performansi poslovanja i korporativnog upravljanja.

REZULTATI ANALIZE UTICAJA KVALITETA INTERNE REVIZIJE NA PERFORMANSE POSLOVANJA ORGANIZACIJE

Za potrebe rada, empirijsko istraživanje sprovedeno je na uzorku od 285 ispitanika zaposlenih u internoj reviziji, od čega 130 iz organizacija u Republici Srbiji, a 155 iz Bosne i Hercegovine. Struktura uzorka pažljivo je oblikovana tako da obuhvati revizore različitih obrazovnih profila, dužine radnog iskustva i sektorske pripadnosti, uključujući javni i privatni sektor, kao i finansijske i nefinansijske organizacije. Na taj način obezbeđena je dovoljna heterogenost podataka, što je posebno važno u istraživanjima ovog tipa, jer omogućava sagledavanje različitih organizacionih praksi i percepcija u širem institucionalnom kontekstu. Ovakav pristup doprinosi većoj validnosti nalaza i njihovoj mogućnosti generalizacije, što potvrđuju i prethodna istraživanja u literaturi (Arena & Azzone, 2009; Alzeban & Gwilliam, 2014).

Instrument istraživanja bio je standardizovani upitnik koncipiran u dve glavne celine. Prva celina bila je usmerena na merenje kvaliteta interne revizije kroz pet ključnih dimenzija: nezavisnost, objektivnost, kompetentnost, podršku menadžmenta i kvalitet realizacije procesa. Ove dimenzije prepoznate su u literaturi kao temeljne odrednice kvaliteta revizorske funkcije (Mihret & Yismaw, 2007; Cohen & Sayag, 2010). Druga celina odnosila se na performanse poslovanja organizacije, pri čemu su mereni indikatori efikasnosti i efektivnosti procesa, sposobnosti smanjenja rizika, kvaliteta finansijskog izveštavanja i nivoa transparentnosti. Ovakav višedimenzionalni pristup omogućava da se obuhvati i „tvrd" aspekt performansi, meren kroz finansijske pokazatelje i kontrolne mehanizme, i „mekši" aspekt, koji se odnosi na percepciju poverenja, odgovornosti i reputacije organizacije (Prawitt, Smith & Wood, 2009; Lenz & Hahn, 2015).

Odgovori ispitanika ocenjivani su na petostepenoj Likertovoj skali (1 = u potpunosti se ne slažem, 5 = u potpunosti se slažem). Korišćenje Likertove skale u ovakvim istraživanjima već je uobičajena praksa, jer omogućava jednostavnu kvantifikaciju percepcija i njihovo poređenje kroz statističke modele (Cohen & Sayag, 2010; Endaya & Hanefah, 2016). Pored toga, ovakav način merenja olakšava testiranje složenih modela, što je naročito značajno kada se analizira interakcija kvaliteta interne revizije i performansi poslovanja.

Za statističku obradu podataka primenjena je metoda PLS-SEM (Partial Least Squares – Structural Equation Modeling) u softveru SmartPLS 4. Ova metoda pokazala se naročito pogodnom za istraživanja koja obuhvataju latentne konstrukte, kao što je slučaj sa kvalitetom interne revizije i performansama organizacije. Prednost PLS-SEM-a u odnosu na klasične regresione tehnike ogleda se u njegovoj sposobnosti da istovremeno proceni pouzdanost mernih instrumenata, potvrdi konstruktnu validnost i testira uzročno-posledične veze u modelu (Hair et al., 2017). Sličan metodološki okvir uspešno su primenili i Wahyudi et al. (2021) u Indoneziji i Kai et al. (2022) u Kini, čime je dodatno potvrđena relevantnost i robusnost ovog pristupa za istraživanja u oblasti interne revizije.

Rezultati PLS analize jasno su ukazali na snažnu i statistički značajnu vezu između kvaliteta interne revizije i performansi poslovanja organizacije. Visok koeficijent putanje i značajni p-nivoi potvrđuju da dimenzije kvaliteta interne revizije nisu samo formalni okvir, već realno utiču na poboljšanje poslovne efikasnosti i efektivnosti, što se uklapa u širi korpus savremenih nalaza u literaturi (Arena & Azzone, 2009; Sarens & De Beelde, 2006; Pavić, 2022). Dobijeni parametri detaljno su prikazani u Tabeli 2.

Tabela 2. Rezultati PLS analize

Veza	Putni koeficijent (β)	t-vrednost	p-vrednost	R^2 za PPO
Kvalitet interne revizije → Performanse poslovanja organizacije	0.692	14.317	< 0.001	0.479

Analiza pokazuje da kvalitet interne revizije ima snažan i pozitivan uticaj na performanse poslovanja ($\beta = 0.692$; $p < 0.001$). T-vrednost od 14.317 višestruko prevazilazi pragove statističke značajnosti ($t > 1.96$ za 5%, $t > 3.29$ za 0.1%), dok $p < 0.001$ potvrđuje da dobijeni rezultat nije slučajan. Koeficijent determinacije ($R^2 = 0.479$) pokazuje da se

gotovo polovina varijabiliteta performansi može objasniti kvalitetom interne revizije, što predstavlja srednje jak do snažan efekat u kontekstu društveno-ekonomskih istraživanja i potvrđuje stratešku vrednost funkcije interne revizije.

Detaljnija analiza prosečnih vrednosti ocena ispitanika dodatno ukazuje koje dimenzije i segmenti poslovanja najviše profitiraju od kvalitetne interne revizije. Najviše su ocenjeni aspekti povezani sa unapređenjem efikasnosti i racionalnijim korišćenjem resursa (M = 4.27). Sledeći segment odnosi se na smanjenje operativnih i reputacionih rizika (M = 4.19), zatim na povećanje transparentnosti i odgovornosti menadžmenta (M = 4.12), poboljšanje kvaliteta finansijskog izveštavanja (M = 4.08) i podršku ostvarivanju strateških ciljeva (M = 4.05). Ovi rezultati dosledno potvrđuju da interna revizija prevazilazi tradicionalnu kontrolnu ulogu i prerasta u savetodavnog partnera menadžmenta (Sarens & De Beelde, 2006; Goodwin-Stewart & Kent, 2006).

Dodatno, analiza pojedinačnih tvrdnji o performansama u Tabeli 3 (PE1–PE6) pruža detaljniji uvid u specifične aspekte doprinosa interne revizije.

Tabela 3. Deskriptivna statistika po pojedinačnim tvrdnjama o performansama

Oznaka	Tvrdnja	Min	Max	Prosek (M)
PE1	Interna revizija doprinosi smanjenju troškova preduzeća.	1	5	3.94
PE2	Interna revizija značajno otkriva prevare u preduzeću.	1	5	3.72
PE3	Interna revizija doprinosi smanjenju naknada za eksternu reviziju.	1	5	3.41
PE4	Odnos dodane vrednosti interne revizije i njenih troškova je značajno na strani dodane vrednosti.	1	5	4.02
PE5	Interna revizija je doprinela povećanju profitabilnosti poslovanja.	1	5	3.87
PE6	Interna revizija je doprinela kontinuiranom rastu poslovanja od prošlosti do sadašnjosti.	1	5	3.78

Rezultati ukazuju da su ispitanici u najvećoj meri pozitivno ocenili tvrdnju da interna revizija generiše dodatu vrednost u odnosu na svoje troškove (PE4, M = 4.02). Ovo potvrđuje percepciju da interna revizija, iako predstavlja trošak za organizaciju, zapravo stvara neto vrednost kroz unapređenje procesa i smanjenje rizika. Relativno visoke prosečne ocene dobijene su i za doprinos smanjenju troškova (PE1, M = 3.94) i povećanju profitabilnosti (PE5, M = 3.87), što naglašava ekonomsku dimenziju njenog uticaja. Sa druge strane, najniže vrednosti proseka beleže tvrdnje o smanjenju naknada za eksternu reviziju (PE3, M = 3.41) i kontinuiranom rastu poslovanja (PE6, M = 3.78). Ovaj nalaz može biti posledica činjenice da interna i eksterna revizija u regionu i dalje funkcionišu kao komplementarne, a ne kao supstituti, kao i da na dugoročni rast utiču i širi ekonomski i institucionalni faktori (Munro & Stewart, 2011).

Važno je istaći da maksimalne vrednosti od 5 kod svih tvrdnji pokazuju da značajan deo ispitanika interne revizorske aktivnosti vidi kao u potpunosti korisne, dok minimalne vrednosti od 1 ukazuju na postojanje određene grupe koja i dalje dovodi u pitanje njen doprinos. Ova polarizacija percepcija dodatno potvrđuje heterogenost organizacionih praksi i značaj konteksta u oblikovanju percepcija o ulozi interne revizije, naročito u tranzicionim ekonomijama (Alzeban, 2020).

Nalazi istraživanja imaju i teorijske i praktične implikacije. Teorijski, potvrđuje se savremeni stav da interna revizija ne treba da se posmatra isključivo kao mehanizam kontrole, već kao strateški partner u unapređenju poslovnih procesa, jačanju efikasnosti i obezbeđivanju dugoročne održivosti (Arena & Azzone, 2009; Mihret & Grant, 2017). Praktično, potvrđuje se da kvalitetna interna revizija doprinosi kako finansijskim rezultatima (smanjenje troškova, rast profitabilnosti), tako i nematerijalnim aspektima uspeha (povećanje poverenja, reputacije i agilnosti organizacije). Ovakvi nalazi u skladu su sa stavovima Zaman, Broadhurst i Humphrey (2021), koji internu reviziju prepoznaju kao "katalizator promena" u kriznim i dinamičnim okruženjima, kao i sa istraživanjem Navarro-Espinosa i saradnika (2021), koji potvrđuju da kvalitetna interna revizija značajno doprinosi donošenju boljih strateških odluka i inovativnosti.

Sveukupno, analiza potvrđuje da kvalitet interne revizije predstavlja ključni faktor unapređenja performansi poslovanja. Njena uloga se ne iscrpljuje u zadovoljenju regulatornih zahteva, već postaje strateški resurs koji obezbeđuje dugoročni rast i konkurentsku prednost, naročito u institucionalno izazovnim okruženjima kakva su Republika Srbija i Bosna i Hercegovina. Ovaj nalaz posebno dobija na značaju imajući u vidu da interna revizija u tranzicionim ekonomijama može kompenzovati nedostatke u eksternim regulatornim okvirima i time doprineti stabilnosti poslovanja (Alzeban, 2020). Dodatno, moderna istraživanja ukazuju da interna revizija sve više doprinosi ne samo finansijskim performansama, već i oblastima kao što su ESG izveštavanje, reputacija i društvena odgovornost (IIA, 2021). Razlike u percepciji njenog doprinosa posebno su izražene između javnog i privatnog sektora, gde specifičnosti institucionalnog i regulatornog okruženja oblikuju njenu stvarnu ulogu i efikasnost (Sarens & De Beelde, 2006). Takođe, interna revizija predstavlja važan deo integrisanog sistema korporativnog upravljanja, pri čemu sinergija sa eksternom revizijom i revizorskim odborima dodatno jača transparentnost i poverenje (Goodwin-Stewart & Kent, 2006). Ipak, treba naglasiti da su nalazi ovog istraživanja zasnovani na percepcijama ispitanika, što može sadržati određene pristrasnosti u odgovaranju i varijacije u interpretaciji. To je u skladu sa opštim upozorenjima u literaturi o ograničenjima istraživanja zasnovanih na samoproceni (Podsakoff et al., 2003), pa bi buduća istraživanja trebalo da kombinuju percepcijske i objektivne finansijske pokazatelje.

ZAKLJUČAK

Kvalitet interne revizije predstavlja jednu od ključnih determinanti uspešnosti savremenih organizacija i sve više se posmatra kao strateški faktor, a ne samo kao tehnički ili regulatorni zahtev. Nalazi teorijskog pregleda i empirijskog istraživanja sprovedenog u ovom radu jasno potvrđuju da interna revizija, kada je kvalitetno organizovana i sprovedena, prevazilazi svoju tradicionalnu ulogu mehanizma kontrole i prerasta u važan instrument unapređenja performansi poslovanja. Rezultati istraživanja sprovedenog na uzorku od 285 ispitanika iz Republike Srbije i Bosne i Hercegovine pokazali su da kvalitet

interne revizije ima snažan i statistički značajan pozitivan uticaj na performanse organizacija ($\beta = 0.692$; $p < 0.001$). Vrednost koeficijenta determinacije ($R^2 = 0.479$) dodatno potvrđuje da skoro polovina varijabiliteta performansi poslovanja može biti objašnjena upravo kvalitetom interne revizije, što ukazuje na njen strateški značaj i pozicionira je u samo središte modernog korporativnog upravljanja.

Teorijski doprinos rada ogleda se u potvrđivanju univerzalne veze između kvaliteta interne revizije i organizacionih performansi, ali i u njenom produbljenom razumevanju u kontekstu tranzicionih ekonomija. Dosadašnja istraživanja su u najvećoj meri potvrđivala značaj nezavisnosti, objektivnosti, kompetentnosti, podrške menadžmenta i kvaliteta procesa, a nalazi ovog rada pokazuju da upravo kombinacija ovih dimenzija omogućava reviziji da prevaziđe formalnu funkciju i da postane strateški partner menadžmentu. Posebno se ističe da su kompetentnost revizora i podrška rukovodstva ocenjeni najvišim prosečnim vrednostima, što ukazuje da znanje, veštine i institucionalno priznavanje predstavljaju ključne preduslove da interna revizija ostvari svoj puni potencijal. S druge strane, dimenzije nezavisnosti i objektivnosti, iako teorijski visoko rangirane, u ovom istraživanju dobijaju nešto niže ocene, što oslikava specifične institucionalne i regulatorne izazove Srbije i Bosne i Hercegovine.

Praktične implikacije nalaza su višestruke. Organizacije koje žele da unaprede svoje performanse moraju interne revizore posmatrati ne samo kao kontrolore, već kao savetnike i partnere u donošenju odluka. To podrazumeva kontinuirano ulaganje u profesionalni razvoj revizora, jačanje njihove uloge kroz institucionalnu i funkcionalnu nezavisnost, kao i obezbeđivanje menadžerske podrške i spremnosti da se preporuke implementiraju. Dodatno, unapređenje samog procesa revizije kroz standardizovane procedure i savremene digitalne alate može povećati relevantnost nalaza i doprinosa revizije u strateškom odlučivanju. Na taj način interna revizija se sve više pomera sa pozicije regulatornog zahteva ka izvoru stvaranja dodatne vrednosti i jačanja konkurentske prednosti.

Sveukupno, nalazi ovog rada potvrđuju da interna revizija predstavlja više od kontrolnog mehanizma – ona je strateški partner menadžmentu i ključni faktor uspešnosti organizacije. Njena uloga ogleda se u unapređenju efikasnosti procesa, smanjenju rizika, jačanju transparentnosti, poboljšanju reputacije i ostvarivanju dugoročne održivosti poslovanja. Posebno u institucionalno izazovnim okruženjima, kao što su Srbija i Bosna i Hercegovina, kvalitet interne revizije može imati transformacioni efekat i postati jedan od stubova modernog korporativnog upravljanja i ekonomske otpornosti.

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The Impact of Internal Audit Quality on Organization Performance

Abstract: The quality of internal audit is one of the key factors in the success of modern organizations, as it surpasses the traditional control role and becomes a strategic tool for performance improvement. Its significance lies in enhancing the efficiency and effectiveness of processes, reducing operational and reputational risks, improving the quality of financial reporting, and strengthening the transparency and accountability of management. This paper investigates the impact of internal audit quality on organizational performance based on a sample of 285 respondents from the Republic of Serbia and Bosnia and Herzegovina. Data collected through a standardized questionnaire were analyzed using PLS-SEM methodology, and the results confirm a strong and statistically significant relationship between internal audit quality and organizational performance ($\beta = 0.692$; $p < 0.001$). The findings indicate that nearly half of the variance in performance can be explained by the quality of internal audit, confirming its strategic importance. Special emphasis is placed on the significance of auditor competencies and management support as key prerequisites for realizing the full contribution of internal audit.

Keywords: internal audit, internal audit quality, factors of internal audit quality, organizational performance

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The Impact of Artificial Intelligence on Contemporary Recruitment and Selection Practices

Abstract: *The rapidly increasing artificial intelligence market has significantly transformed various fields of business and the ways they do their everyday jobs, including human resource management. One of the most important segments of human resources , recruiting and selection, is mostly influenced by AI in the contemporary corporate world, where AI is used to increase efficiency and objectivity. This paper examines the impact of AI on modern hiring practices and procedures, focusing on its advantages, obstacles, and ethical implications. Analyzing the current hiring practices and AI implementations in the HR field, the paper examines how AI-powered tools – such as resume screening, predictive analysis, and data-driven decision-making software – contribute to faster and more efficient decision-making in the field of recruiting and hiring. Additionally, the paper also dives into the problems that come with the AI technologies, such as algorithm bias, lack of transparency, ethical questions, and the absence of the human element in this whole process. The research indicates that while AI has the potential to revolutionize recruitment, its effectiveness depends solely on responsible implementation, continuous human oversight, and adherence to ethical standards.*

Keywords: *algorithmic bias, resume screening, recruitment, selection, data-driven decision-making, job application.*

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INTRODUCTION

In the context of emerging technologies, companies face a crucial task to adapt in order to survive. Management and organizational methods are evolving as a result of these innovations, particularly artificial intelligence (AI), which has the potential to transform entire industries and society as a whole (29). In the modern corporate environment, AI has become integrated across various organizational functions, including finance and marketing (18,23). Human resources are no exception, as AI tools have enhanced efficiency and objectivity in human resources (HR)-related processes.

According to Koteczki et al. and their case study investigation, the implementation of AI in HR processes, especially recruitment and selection, could save thousands of man-hours per year and reduce expenses by approximately €17,000 annually (14). With comprehensive AI-driven solutions for resume screening, data analysis, and data-driven decision making, organizations can significantly improve the effectiveness of their recruitment and selection practices.

Despite growing attention to the positive impacts of AI on HR efficiency, there remains a lack of understanding of its ethical, social, and organizational implications. Most of the written studies focus primarily on the technical advantages of AI while underestimating issues such as algorithmic bias, data privacy, and transparency in automated decision-making (3,13). This gap in research calls for a balanced examination of both sides of AI, including the risks of its implementation in recruitment and selection practices.

This manuscript endeavors to provide new angles by objectively and critically analyzing the dual impact of AI, its potential to enhance efficiency and objectivity, as well as its limitations in terms of ethical challenges and bias. The main objective of this paper is to explore how artificial intelligence influences contemporary recruitment and selection practices, emphasizing both its transformative potential and the need for responsible and ethical implementation.

METHODOLOGY

This study uses a qualitative research design through a systematic review of the existing literature on the impact of artificial intelligence (AI) in recruitment and selection. The focus is on analyzing recent scholarly articles, scientific papers, and conference papers published in recent years. The selection criteria prioritized studies that addressed AI applications in human resource management, specifically recruitment and selection, while also examining the ethical, social, and organizational implications.

The collected sources were analyzed using a thematic approach, categorizing findings into: (1) Applications of AI in recruitment and selection; (2) Benefits of AI in human resource management; and (3) Challenges and ethical considerations. This approach allowed for a comprehensive synthesis of current knowledge, highlighting both the advantages and limitations of AI integration in recruitment processes.

LITERATURE REVIEW

Before diving into the detailed findings, it's important to set the stage for how the literature review is organized and what it aims to accomplish. The following section brings together a range of recent research and expert commentary on the use of artificial intelligence in recruitment and selection. By looking at the key trends, benefits, challenges, and ethical concerns identified in the literature, this review builds a foundation for understanding both the promises and pitfalls of AI-driven hiring practices.

Automation of Early Stages (sourcing, parsing, screening)

Organizations are increasingly embedding AI into Applicant Tracking Systems (ATS) to parse résumés, extract entities (such as skills, education, and experience), de-duplicate profiles, and produce ranked shortlists for human review, as showcased in Figure 1. According to systematic evidence, these automations can reduce recruiter workload and time-to-shortlist when models are trained on job-related features and validated on subsequent outcomes (13, 22). At the same time, reviews warn that screening systems may replicate historical discrimination if trained on biased data or proxies for protected attributes (13, 17). Recent audits of large language model (LLM)- assisted résumé screening documents have revealed measurable disparities for disability-related cues and propose mitigation steps (5). Accordingly, the literature converges on using AI-enabled screening as decision support, paired with bias audits, feature documentation, and periodic revalidation against structured interview or job-performance criteria (11, 24).

Candidate Experience and Engagement (chatbots, scheduling, interviews)

During and after the COVID-19 period, remote interviewing and asynchronous assessments became normalized to sustain hiring continuity (8). AI chatbots now handle FAQs, application status updates, and interview scheduling at scale; studies report faster response times and improved perceived responsiveness, though effects on perceived fairness depend on transparency and escalation to a human (3, 27). In atypical candidate–chatbot interactions, rigid dialogue flows can trigger unusual responses, underscoring the importance of conversation design and fallback to human agents (12). In short, AI augments the candidate journey best when it offers clarity (what is automated and why), accessibility accommodations, and a human-assisted path for edge cases.

Assessment and Prediction (validity, reliability, fairness)

Vendors increasingly market AI-enhanced assessments that infer competencies from text, audio, or video signals. Scholarly and policy analyses caution that some inferences—especially those relying on facial expression analysis—lack robust scientific consensus and

raise fairness concerns; several providers have discontinued controversial facial-analysis features while maintaining language and audio-based scoring (2, 27, 31). Recent vendor and independent studies report psychometric properties for automated video interview (AVI) competency assessments, but construct validity, subgroup differences, and transparency remain active debates (7, 15). For benchmarking, classic selection science provides reference points for predictive validity and multi-method combinations (26, 25). The prudent stance emerging in the literature is to validate AI-assisted assessments locally (job-relatedness, reliability) and to monitor adverse impact alongside performance outcomes over time (24, 11).

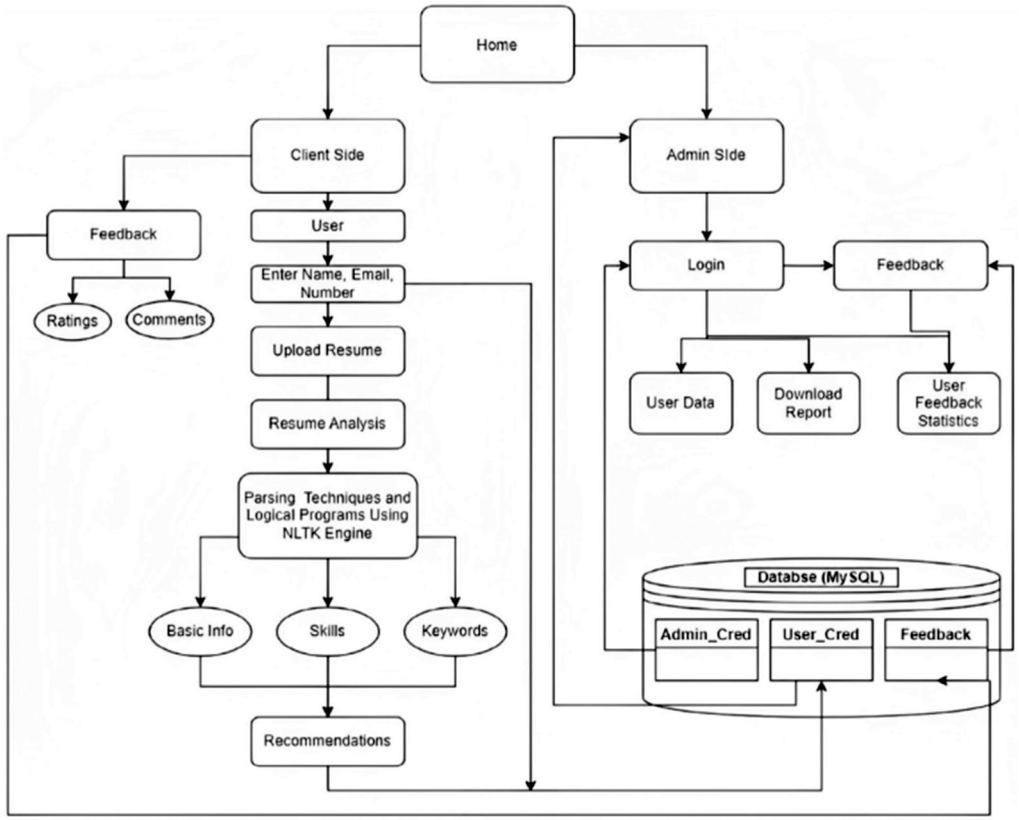
Governance, Ethics, and Regulation (obligations and audits)

The regulatory environment increasingly treats AI used for employment as high-stakes. In the European Union, the AI Act classifies AI systems used for employment, worker management, and access to self-employment as high-risk, triggering requirements for risk management, data governance, transparency, human oversight, and post-market monitoring (5). In New York City, Local Law 144 requires annual independent bias audits of automated employment decision tools (AEDTs), public posting of audit summaries, and advance candidate notices (20). U.S. federal civil rights agencies have also issued technical assistance clarifying disability protections in AI-mediated hiring (30). Scholarly reviews link these obligations to recurring risks noted above—proxy discrimination, opacity, and limited external validation (13, 10, 21). For organizations operating across jurisdictions, the literature increasingly recommends converging on a governance baseline: documented impact assessments, bias audits using representative data, candidate-facing notices, and a human-in-the-loop review for consequential decisions.

DISCUSSION

The findings of this study indicate that the application of contemporary technological solutions can significantly influence the improvement of processes within human resource management. The observed tendencies largely correspond with previous research, particularly regarding efficiency gains, cost reduction, and more accurate decision-making. This confirms that the development and integration of such technologies represent a stable direction in modern HRM practice. At the same time, several findings highlight specific characteristics typical of developing environments, suggesting that institutional and organizational contexts can shape the outcomes of technological implementation. Formal and informal factors—such as regulatory quality, organizational procedures, and the presence of practices that undermine meritocracy—emerge as particularly influential. These elements help explain the differences identified in comparison with more developed systems and point to several areas that require deeper analysis.

When compared with the existing theoretical framework, the outcomes of this study align with most established assumptions, while certain deviations indicate a need for more precise definitions of specific concepts and their interrelations. In this regard, the research contributes to the existing body of literature by identifying aspects where practical implementation diverges from theoretical expectations. It is important to consider the limitations of this study when interpreting the findings. These limitations primarily concern the characteristics of the sample, the availability of data, and the conditions under which the analysis was conducted, all of which may affect the generalizability of the results. Therefore, future research should employ broader and methodologically diverse samples, as well as examine context-specific factors that influence the functioning of the analyzed technologies. The results provide a reliable basis for further investigation of the topic and point to several directions for future research, including a more detailed evaluation of institutional conditions, the development of standardized assessment methodologies, and the analysis of long-term regulatory impacts.



Source: *(Abhishek et al., 2025)*

CONCLUSION

As the comprehensive qualitative research above demonstrates, AI and LLMs can simplify and enhance the effectiveness of recruitment and selection processes, but also make crucial mistakes and biased decisions that can harm organizations in the long run. The ability to automate everyday tasks and make decisions based on a large amount of analyzed data presents an enormous opportunity for the development of human resources. When applied correctly and within the boundaries, these tools can significantly improve the recruitment and selection process by making it consistent, structured, and transparent.

However, the results also demonstrate that these large machines and systems are not infallible: making biased decisions, limitations in human logic and understanding, and errors in automated tasks can lead to adverse outcomes if left unaddressed. Although they are designed to support objective decision-making, their opinion can be based on misinterpretation or errors embedded directly in the way they are trained. These mistakes and errors can have serious consequences, leading organizations to incur more losses than gains in the long run, making it unstable to rely solely on AI in these kinds of jobs.

For the reasons mentioned above, this study emphasizes the importance of a balanced approach that combines technology and human judgment to achieve the best possible results. Even the most advanced tools require constant human monitoring, periodic evaluation, and clear boundaries within which they can operate. HR officials are still the key part in making the final decision, which data-driven opinions from AI tools can inform, but they still rely solely on human, objective opinions.

To conclude the final discussion, AI tools in HR are not something that happens overnight, and should not be viewed as a quick fix but rather a continuously improving solution that can help speed up these processes and make them more efficient. They can make hiring faster and more organized, reduce the number of man-hours, and even make more objective decisions than humans sometimes, but it is important how they are used. When technology is paired with clear ethical guidelines and boundaries, it can genuinely improve every aspect of HR; however, when left unregulated and without limitations, it can simply destroy everything. Ultimately, it all comes down to how much people rely on AI and how much freedom it will have in making the decisions in the processes of recruitment and selection.

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Uticaj veštačke inteligencije na savremene prakse regrutacije i selekcije

Apstrakt: *Brzo rastuće tržište veštačke inteligencije (VI) značajno je transformisalo različite oblasti poslovanja i načine na koje obavljaju svoje svakodnevne poslove, uključujući ljudske resurse. Jedan od najvažnijih segmenata ljudskih resursa (LJR), regrutovanje i selekcija, najviše je pod uticajem VI u savremenom korporativnom svetu, gde se VI koristi za povećanje efikasnosti i objektivnosti. Ovaj rad ispituje uticaj VI na moderne prakse i procedure zapošljavanja, fokusirajući se na njene prednosti, prepreke i etičke implikacije. Analizirajući trenutne prakse zapošljavanja i implementacije VI u oblasti HR-a, rad ispituje kako alati zasnovani na VI – kao što su pregled biografija, prediktivna analiza i softver za donošenje odluka zasnovan na podacima – doprinose bržem i efikasnijem donošenju odluka u oblasti regrutovanja i zapošljavanja. Pored toga, rad se bavi i problemima koji dolaze sa tehnologijama veštačke inteligencije, kao što su pristrasnost algoritama, nedostatak transparentnosti i etička pitanja, kao i odsustvo ljudskog elementa u celom ovom procesu. Istraživanje pokazuje da, iako VI ima potencijal da revolucionizuje regrutovanje, njena efikasnost zavisi isključivo od odgovorne implementacije, kontinuiranog ljudskog nadzora i poštovanja etičkih standarda.*

Ključe reči: *Algoritamska pristrasnost, skeniranje biografije, regrutovanje, selekcija, donosenje zakljucaka na osnovu podataka, prijava za posao.*

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Auditing Risk in Conditions of Economic Instability: New Approaches to Risk Assessment and Management*

Abstract: *Economic instability, characterized by inflationary pressures, market volatility, supply chain disruptions, and increased bankruptcy risks, significantly affects the reliability of financial reporting and elevates auditors' exposure to various types of audit risk. The aim of this paper is to examine how contemporary auditors assess and manage audit risk under heightened economic uncertainty, as well as to identify new methodological approaches that enhance the quality of audit procedures. Special attention is given to the integration of advanced analytical techniques, data-driven risk assessment models, scenario analysis, and evaluations of organizational resilience to macroeconomic shocks. The paper also explores the role of internal controls, regulatory requirements, and professional skepticism in mitigating inherent, control, and detection risk. The research findings indicate that the application of digital tools, forensic procedures, and dynamic risk assessment models significantly contributes to more effective management of audit risk during periods of economic instability. The conclusion emphasizes the need for continuous development of auditing methodologies, improvement of professional competencies, and strengthening of the institutional framework in order to ensure a higher level of reliability in audit opinions under unstable economic conditions.*

Keywords: *audit risk, economic instability, financial reporting reliability, professional skepticism, internal controls, digital auditing tools, forensic procedures, risk assessment models, scenario analysis and macroeconomic shocks.*

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INTRODUCTION

The contemporary business environment is marked by pronounced economic instability and increasingly frequent disruptions in both national and global markets. Inflationary pressures, rising financing costs, exchange rate volatility, and liquidity risks create additional challenges for business entities, as well as for auditors whose task is to provide an objective and reliable assessment of financial reporting. Under such conditions, audit risk assessment becomes more complex, as uncertainty in the environment raises the likelihood of material misstatements arising from error or fraud.

Traditional approaches to audit planning and risk assessment (5) although still relevant, demonstrate limited effectiveness in conditions of sudden and unexpected economic shocks. Therefore, there is a growing need for methodological improvements that incorporate advanced analytical techniques, greater reliance on quantitative models, and the use of digital tools that enable timely identification of risk patterns. Modern auditing practice increasingly integrates forensic elements, big data analytics, and assessments of business model resilience to macroeconomic disturbances.

The role of professional skepticism, the quality of internal controls, and regulatory requirements also becomes more prominent, since economic instability increases inherent and control risks for most economic entities. Auditors are therefore compelled to adopt more flexible, dynamic, and comprehensive approaches to managing audit risk, as well as to continuously enhance their professional competencies.

Based on this, the aim of this paper is to examine how economic instability contributes to heightened audit risk and how modernization of auditing procedures can be applied to mitigate it. The paper seeks to provide new insights into methodological approaches that contribute to a higher-quality, more reliable, and more efficient audit process in an increasingly uncertain business environment.

LITERATURE REVIEW

Audit risk and its management are central topics in modern auditing theory and practice, especially under conditions of economic instability. According to the International Auditing and Assurance Standards Board (IAASB), audit risk is the risk that an auditor expresses an inappropriate opinion when financial statements contain material misstatements due to error or fraud. Classical literature highlights three components of audit risk: inherent, control, and detection risk (1).

Contemporary studies indicate that economic instability—such as inflation, market volatility, and liquidity crises—significantly increases inherent and control risks, requiring new methodological approaches (10). Audit digitalization, forensic procedures, big data analytics, and scenario analyses are tools that allow auditors to improve the accuracy of risk assessment and the efficiency of audit procedures (2).

Moreover, research shows that the quality of internal controls, regulatory frameworks, and professional skepticism directly affects auditors' ability to identify and mitigate risks in unstable economic environments (8). The literature also emphasizes the importance of continuous auditor education and adaptive audit methods that respond to dynamic changes in the business environment.

METHODOLOGY

This study utilizes a combined research approach, integrating qualitative literature analysis with a comparative examination of audit procedures in economically unstable environments. This methodology allows for a comprehensive understanding of both theoretical frameworks and practical applications of audit risk management under conditions of uncertainty.

The **literature analysis** involved a systematic review of relevant academic publications, professional auditing standards, and reports issued by regulatory authorities and international organizations, including the OECD and the World Bank, covering the period from 2015 to 2024. The purpose of this review was to identify key theoretical models, methodological approaches, and practical recommendations that can enhance the effectiveness of audit risk assessment and management.

The **comparative analysis** focused on the application of modern auditing practices across various economic contexts, including stable, unstable, and transitional markets. This part of the study examined several critical factors, including the assessment of inherent, control, and detection risks, the implementation of digital auditing tools and forensic procedures, the role of professional skepticism, and the influence of regulatory support on audit quality.

For **data categorization and synthesis,** the content analysis method (3) was employed. This technique enabled the identification of core themes, including risk management, digitalization of auditing processes, the regulatory framework, and the challenges and limitations faced by auditors in different economic settings.

Based on the combined insights from the literature review and comparative analysis, the study formulated a set of recommendations aimed at improving audit methodologies. These recommendations focus on enhancing audit risk assessment and management practices in conditions of economic instability, emphasizing the integration of advanced tools, adaptive approaches, and regulatory alignment.

RESEARCH RESULTS

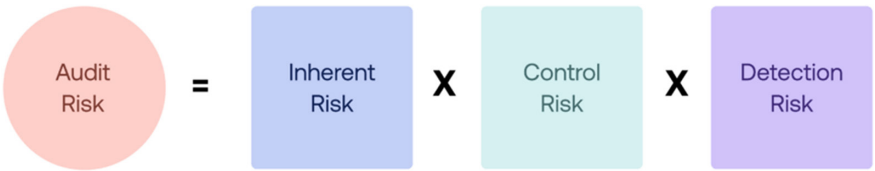
The study clearly demonstrated that economic instability has a significant impact on audit risk management processes. Based on a combined analysis of the literature and a comparative

review of audit procedures across different economic environments, key patterns and trends were identified, highlighting the specific approaches to auditing under conditions of uncertainty. These results provide a better understanding of the challenges auditors face in unstable markets and the potential strategies for more effective risk management.

One of the key findings of the study relates to the assessment of audit risk in economically unstable conditions. Auditors in such environments focus on all three components of risk: inherent, control, and detection risk. The analysis showed that inherent risk, which represents the potential for errors and irregularities intrinsic to business operations, increases due to rapid changes in the market environment, unpredictable economic developments, and sector instability.

Control and detection risks, on the other hand, largely depend on the availability and application of modern digital tools as well as the level of regulatory support in the country. In economies with well-developed infrastructure and strong regulatory frameworks, these risks are significantly reduced, whereas in transitional and unstable markets, auditors often have limited opportunities for adequate control and detection of irregularities.

Figure 1: Audit Risk Model



Source: *Authors, based on available literature*

As illustrated in Figure 1, the Audit Risk Model explains the relationship between overall audit risk and its three main components: inherent risk, control risk, and detection risk. Overall audit risk represents the probability that the auditor will issue an inappropriate opinion when the financial statements contain material misstatements.

Inherent risk refers to the susceptibility of financial statements to material misstatements arising from the nature of the entity's business, industry, or economic environment, before considering internal controls. Control risk (4). represents the possibility that the entity's internal controls will fail to prevent, detect, or correct such misstatements on a timely basis. These two components are largely determined by the client's operating environment and internal control systems and cannot be directly controlled by the auditor.

Detection risk, in contrast, depends on the nature, timing, and extent of audit procedures and the auditor's professional judgment. It represents the risk that audit procedures will fail to detect material misstatements that exist. As shown in the figure, the interaction among these components implies that higher levels of inherent and control risk require a lower level of detection risk, which is achieved through more extensive and rigorous audit procedures.

The study also emphasized the importance of using digital tools and forensic procedures in modern auditing. The application of data analysis software, blockchain technology, and

automated auditing platforms significantly contributes to more accurate detection of irregularities and reduction of operational risk.

However, the use of these technologies is uneven. In countries with low levels of digital infrastructure or limited digital literacy among auditors, the effectiveness of digital tools is constrained. This highlights the need for additional investments in technology and continuous training of audit personnel to improve the efficiency of risk management.

Professional skepticism and regulatory support proved to be key factors in audit quality. Auditors who apply a high level of skepticism are better able to identify irregularities and potential business risks.

Regulatory support, including clear guidelines and standards, contributes to the greater reliability of audit reports and increases compliance with professional standards. Countries with strong regulatory frameworks achieve significantly better results in risk management, while transitional economies often have limited support, which complicates the implementation of modern auditing methods.

Table 1: Regulatory Support, Professional Skepticism, and Their Impact on Audit Quality

Economic Environment	Degree of Regulatory Support	Level of Professional Skepticism	Expected Audit Quality
Stable Economy	High	Moderate	High
Transitional Economy	Moderate	High	Moderate to High
Unstable Economy	Low to Moderate	Very High	Moderate
Crisis Economy	Low	Extreme	Low to Moderate

Source: *Authors, based on available literature*

Table 1 presents the interaction between regulatory support and professional skepticism across different economic environments and their impact on audit quality. The table indicates that in stable economic environments, a high degree of regulatory support combined with a moderate level of professional skepticism is associated with a high level of audit quality. This finding underscores the importance of strong regulatory frameworks in enhancing the effectiveness of the audit process.

In transitional economies, where regulatory support is assessed as moderate, audit quality is evaluated as moderate to high, primarily due to an increased level of professional skepticism. However, in unstable and crisis economic environments, regulatory support is low or low to moderate, while professional skepticism reaches very high or extreme levels. Despite elevated skepticism, the expected level of audit quality remains moderate or low to moderate, suggesting that professional skepticism alone is insufficient to fully offset the limitations imposed by weak regulatory structures.

The study identified several advantages and challenges in managing audit risk under unstable economic conditions.

Advantages include: increased accuracy in risk assessment, improved detection of irregularities and potential fraud, and more efficient use of resources and time in the audit process.

Challenges include: lack of digital infrastructure in some countries, high initial costs of implementing modern technologies and resistance to change among auditors and organizations, combined with low digital literacy.

The combined analysis of literature and comparative studies indicates that effective audit risk management in conditions of economic instability depends on the integration of multiple factors. Key elements include the use of advanced digital tools, consistent application of professional skepticism, and adequate regulatory support.

Countries with well-developed infrastructure and stronger regulation achieve better risk control outcomes, while transitional and unstable economies have significant potential for improvement through further education, investments in technology, and adaptation of regulatory frameworks to meet modern auditing needs. These findings underline the necessity of a comprehensive approach that combines technology, human factors, and regulatory strategy to ensure effective audit risk management.

DISCUSSION

The findings of this study provide valuable insights into the dynamics of audit risk management under conditions of economic instability. The analysis confirms that unstable and transitional economic environments present unique challenges for auditors, particularly in terms of assessing inherent, control, and detection risks. Inherent risk tends to increase due to rapid market fluctuations, unpredictable economic events, and sectoral instability, making audit planning more complex and demanding. This aligns with prior research emphasizing the sensitivity of audit processes to external economic shocks (6).

The study also highlights the growing importance of digital tools and forensic procedures in mitigating audit risks. Digital technologies such as data analytics software, blockchain applications, and automated audit platforms enable more precise detection of irregularities, enhance efficiency, and reduce operational risk. However, the effectiveness of these technologies is constrained by factors such as limited digital infrastructure, low digital literacy among auditors, and resistance to change within organizations. These findings corroborate previous studies that emphasize the role of technology adoption as both an opportunity and a challenge in modern auditing (9).

Professional skepticism emerges as another critical factor in risk management. Auditors who actively apply a skeptical mindset are better equipped to identify anomalies, assess complex transactions, and prevent misstatements. This underscores the importance of human judgment in the audit process, which cannot be fully replaced by technological tools. Regulatory support further enhances audit quality by providing clear standards, guidance, and enforcement mechanisms. (7). Countries with strong regulatory frameworks demonstrate higher compliance and reliability in audit outcomes, while transitional economies often face limited regulatory guidance, reducing the effectiveness of audit procedures.

The interplay of these factors—technology, professional judgment, and regulatory support—indicates that audit risk management is inherently multidimensional. Effective strategies must integrate these elements, especially in environments characterized by uncertainty and volatility. For transitional economies, the study suggests that targeted investments in digital infrastructure, continuous professional training, and the modernization of regulatory frameworks can significantly improve audit outcomes.

The research contributes to the understanding of audit practices in unstable markets by linking theoretical frameworks to practical applications. It emphasizes that sustainable audit risk management is not only about adhering to standards but also about adapting to contextual challenges and leveraging available tools effectively. These insights are particularly relevant for policymakers, regulators, and audit firms seeking to strengthen audit quality and financial reporting reliability in economically volatile contexts.

CONCLUSION

The study clearly demonstrates that economic instability significantly affects audit risk management processes, with various factors interacting in complex ways. Effective risk management in unstable and transitional economies requires an integrated approach that includes the use of advanced digital tools, the continuous application of professional skepticism, and adequate regulatory support.

The analysis showed that inherent risk increases in conditions of rapid market changes and unpredictable economic situations, while control and detection risks largely depend on the level of digital infrastructure and the regulatory framework. The use of digital technologies and forensic procedures enables more precise detection of irregularities and reduces operational risks, but their effectiveness depends heavily on the availability of resources and auditors' digital literacy.

Professional skepticism and regulatory support are highlighted as key elements for improving audit quality and reducing risk. Countries with more developed infrastructure and strong regulatory frameworks achieve better results, whereas transitional economies have significant potential for improvement through education, investment, and modernization of regulatory standards.

In conclusion, the results indicate that sustainable and effective audit risk management is possible only through a comprehensive approach combining technology, human competencies, and regulatory strategy. Such an approach not only reduces risks and increases audit accuracy but also strengthens trust in financial reporting and the stability of the business environment, even under conditions of economic instability.

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Revizija rizika u uslovima ekonomske nestabilnosti: Novi pristupi proceni i upravljanju rizicima

Apstrakt: Ekonomska nestabilnost, koju karakterišu inflatorni pritisci, volatilnost tržišta, poremećaji u lancu snabdevanja i povećani rizici od stečaja, značajno utiče na pouzdanost finansijskog izveštavanja i povećava izloženost revizora različitim vrstama revizijskog rizika. Cilj ovog rada je da se ispita kako savremeni revizori procenjuju i upravljaju rizikom revizije pod povećanom ekonomskom neizvesnošću, kao i da identifikuju nove metodološke pristupe koji poboljšavaju kvalitet revizijskih procedura. Posebna pažnja se posvećuje integraciji naprednih analitičkih tehnika, modela procene rizika zasnovanih na podacima, analize scenarija i procene organizacione otpornosti na makroekonomske šokove. U radu se takođe istražuje uloga internih kontrola, regulatornih zahteva i profesionalnog skepticizma u ublažavanju inherentnog, kontrolnog i otkrivanja rizika. Nalazi istraživanja pokazuju da primena digitalnih alata, forenzičkih procedura i dinamičkih modela procene rizika značajno doprinosi efikasnijem upravljanju rizikom revizije tokom perioda ekonomske nestabilnosti. U zaključku se naglašava potreba za kontinuiranim razvojem metodologija revizije, unapređenjem stručnih kompetencija i jačanjem institucionalnog okvira kako bi se osigurao viši nivo pouzdanosti revizorskih mišljenja u nestabilnim ekonomskim uslovima.

Ključne reči: Revizijski rizik, ekonomska nestabilnost, pouzdanost finansijskog izveštavanja, profesionalni skepticizam, interne kontrole, alati za digitalnu reviziju, forenzičke procedure, modeli procene rizika, analiza scenarija i makroekonomski šokovi.

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Računovodstvene prevare i forenzičko računovodstvo

Apstrakt: *Računovodstvene prevare predstavljaju jedan od najozbiljnijih oblika finansijskih nepravilnosti, sa značajnim posledicama po stabilnost finansijskih tržišta, poverenje investitora i ukupnu ekonomsku sigurnost organizacija. Ove prevare obuhvataju namerno iskrivljavanje finansijskih izveštaja, prikrivanje obaveza, precenjivanje imovine i manipulaciju prihodima i rashodima, često u cilju ostvarivanja lične ili korporativne koristi. U radu se koristi metodologija sistematskog pregleda literature. Cilj ovog rada je sagledavanje karakteristika računovodstvenih prevara i posledica istih, kao i uloge forenzičkog računovodstva u otkrivanju, istragama i prevenciji takvih prevara.*

Ključne reči: *računovodstvene prevare, otkrivanje, forenzičko računovodstvo*

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UVOD

„Zašto" – prevarom se bavi psihijatar, a „kako" je briga za računovođu
(Seidman, 1939)

U poslednjih nekoliko decenija, računovodstvene prevare privlače veliku pažnju istraživača i praktičara, jer postaju sve češće i raznovrsnije. Računovodstvena prevara, poput skandala sa kompanijama Enron, Worldcom, HealthSouth, Parmalat, Royal Ahold i mnogim drugima, ima duboke posledice, uključujući bankrotstvo kompanija, gubitke investitora, eroziju poverenja u tržišta kapitala i štetu po reputaciju revizora. Činjenica da evidencija obuhvata veliki broj prevara nije iznenađujuća, jer su one posledica ljudskih slabosti. Međutim, zabrinjava to što se često tek po njihovom otkrivanju utvrdi da su trajale godinama bez revizorskog nadzora (31). Imajući u vidu sve složenije ekonomsko okruženje i pojavu novih vrsta prevara (20), očekuje se da će forenzičko računovodstvo u perspektivi dodatno povećati svoju efikasnost u otkrivanju prevarnih radnji, posebno sa razvojem naprednih alata.

Lažno predstavljanje finansijskih izveštaja generalno čine izvršni donosioci odluka u ime kompanije, a ono može potkopati poverenje investitora u tržišta kapitala i dovesti do ogromnih gubitaka, a to može biti i brojka od trilion dolara (6). Postoji sve veća zabrinutost na globalnom nivou zbog eskalacije prevara, a posebno prevarnog finansijskog izveštavanja, jer ono dovodi veliki broj korisnika u zabludu. Otkrivanje prevara u finansijskim izveštajima i dokazivanje takvih prevara je veoma složen proces. Crvene zastavice su sistem ranog upozoravanja koji revizori i računovođe koriste za utvrđivanje verovatnoće nastanka prevara u finansijskim izveštajima, (21), ali je potrebno naglasiti da se bez obzira na njihovu korisnost, ne smatraju definitivnim dokazom nastanka prevarne radnje. Prema podacima Udruženja sertifikovanih istražitelja prevara (Association of Certified Fraud Examiners - ACFE) „Occupational Fraud 2024: Report to the Nations" prevarene organizacije gube u proseku oko 5% prihoda svake godine, kao i da je prevarno finansijsko izveštavanje kao vid prevare, skuplji od prevare koja uključuje zloupotrebu imovine (3).

Posmatrajući razvoj forenzičkog računovodstva kroz vreme, uočava se rastuća globalna tražnja za forenzičkim računovodstvom, što se dokazuje, između ostalog i osnivanjem specijalizovanih jedinica unutar velikih kompanija i regionalnih računovodstvenih subjekata (13). Međutim, iako je u poslednjih nekoliko godina nešto bolja situacija, u Srbiji se u okviru redovne nastave i dalje nudi ograničen broj kurseva i programa iz forenzičkog računovodstva, što smanjuje mogućnosti učenja o teoriji i metodama otkrivanja prevara u poređenju sa drugim evropskim zemljama. Pored toga, naglašava se da spor tempo istraživanja metoda za otkrivanje prevara može otežati, pa čak i onemogućiti, uspešnu prevenciju prevarnih aktivnosti menadžera. Kada se menadžeri suoče sa nepovoljnim organizacionim ishodima i pribegnu prevarama u finansijskim izveštajima, mogu nastojati da koriste manipulaciju čitljivošću u narativnim objavama kako bi doveli u zabludu

korisnike finansijskih izveštaja (25). Prevara od strane viših menadžera ima razarajući efekat na akcionare i zaposlene kompanije i može da uništi reputaciju i kredibilitet firme (27). Informacije o korporativnim prevarama se često drže u strogoj tajnosti, što je i očekivano ako se ima u vidu reputacioni rizik.

Rad je strukturisan iz tri dela. Prvi deo rada se bavi definisanjem obmana i prevarnih radnji i ukazivanjem na njihove vrste. Drugi deo rada se odnosi na forenzičko računovodstvo kao sredstvo za identifikovanje prevarnih radnji na sudu i u druge svrhe. Treći deo rada je se bavi ulogom akademske zajednice u daljem razvoju forenzičkog računovodstva. Nakon toga slede zaključna razmatranja.

OBMANE I PREVARNE RADNJE

Razlikovanje obmane i prevare predstavlja polaznu tačku za razumevanje okolnosti u kojima prevare nastaju. Najočigledniji pokazatelj obmane javlja se kada predstavljene činjenice ne odgovaraju objektivnoj, proverljivoj stvarnosti (10). Obmana se može definisati kao proces u kojem obmanjivač namerno manipuliše okruženjem kako bi izazvao obmanjujuću predstavu kod ciljnog agenta (17), a obmanjujuća namera može uključivati prikrivanje, promenu postojeće teme, dvosmislenost i preusmeravanje pažnje i slično tome. Obmana je namerna poruka ili signal za preuveličavanje pogrešnog verovanja ili zaključka (5). Namerna obmana uključuje laži pošiljaoca, izostavljanje ključnih činjenica i izbegavanje problema promenom teme (4). Obmanjivač može biti menadžment, ciljni agent može biti eksterni revizor, a okruženje može biti u vezi sa finansijskim izveštavanjem. Prevara je namerna obmana da bi se neko lice lišilo nekog zakonskog prava ili da bi se od njega stekla nezakonita ili nepravedna korist. Logično je napraviti konceptualnu razliku između tri vrste finansijske prevare: lažna finansijska obelodanjivanja, prevarne šeme i finansijske prevare kod prodaje (30).

Prevara je problem sa kojima se suočavaju društva različitih kultura. Ona spada u kategoriju problema koji traju do danas i koji su kroz istoriju objašnjavani veoma različitim pristupima i tumačenjima. Kako se navodi u jednoj od enciklopedija (33), pod prevarom se podrazumeva "lažno predstavljanje činjenice – bilo rečima ili ponašanjem, lažnim ili obmanjujućim tvrdnjama, ili prikrivanjem onoga što je trebalo otkriti – koje obmanjuje i ima za cilj da obmane drugog kako bi pojedinac delovao na osnovu toga na svoju pravnu štetu". U istoj publikaciji se ističe da se prevara mora dokazati pokazivanjem da su radnje okrivljenog uključivale pet odvojenih elemenata: (1) lažnu izjavu o materijalnoj činjenici, (2) saznanje okrivljenog da je izjava netačna, (3) nameru okrivljenog da obmane navodnu žrtvu, (4) opravdano oslanjanje navodne žrtve na izjavu i (5) povredu navodne žrtve kao rezultat toga".

U današnjem dinamičnom okruženju prevara i finansijski kriminal postaju sve složeniji i stvaraju probleme za organizacije svih veličina i specijalnosti. Kada je u pitanju upravljanje rizikom od prevara, bitno je sagledati ne samo posledice prevara, već i uzroke.

U tom smislu se ističe da je potrebno istražiti kako je prevara bila moguća, identifikovati slabosti sistema i utvrditi kritične tačke koje se dovode u vezu sa situacijama gde su kontrole zakazale. Potrebno je primenjivati proaktivan, a ne reaktivan pristup. Rizične aktivnosti treba pažljivo identifikovati i sprečiti njihovo ponavljanje. Sagledavanjem istraživanja koja se bave prevarama, uočava se da se ona obično fokusiraju ili na pojedinca ili na organizaciju (15, 8).

Kada se posmatra kontekst u vezi sa nastankom prevara, važno je pomenuti da to uključuje razmatranje sledećih pitanja: regulatorni okvir (slaba ili neadekvatna regulativa), organizacionu kulturu, sistem nagrađivanja, slabe interne kontrole, pritisak u vezi sa dostizanjem ciljnih prodajnih peformansi, slabu finansijsku pismenost, neadekvatne interne kontrole i nadzor. U našoj zemlji, kao i u regionu, informacije o korporativnim prevarama i aktuelnim trendovima u toj oblasti su vrlo ograničene.

Počinioci računovodstvenih prevara imaju različite motive za sprovođenje prevare. Neki od njih mogu biti motivisani ličnom koristi (npr. maksimizacija paketa kompenzacija) ili eksplicitnim ili implicitnim ugovornim obavezama, kao što su dužnički sporazumi i potreba da se ispune tržišne projekcije i očekivani ekonomski rast. Generalno, najveća šteta se nanosi dugoročnoj reputaciji same organizacije, uništava se vrednost investitora, smanjuje se poverenje javnosti u tržište kapitala (26), i najzad, prevara dovodi do posledica po zaposlene koji mogu izgubiti posao. Računovodstvene prevare sprečavaju investitore da donose ispravne investicione odluke zbog otkrivanja lažnih informacija, što čini tržište nefunkcionalnim, a javna dobra napuštenim. Štaviše, računovodstvene prevare sprečavaju pravilnu raspodelu od strane tržišta tako što sprečavaju investitore da otkriju prevarne firme i odaberu one koje to nisu (2). Druge žrtve često uključuju dobavljače, partnere, kupce, regulatorne institucije, agencije za sprovođenje zakona, poreske vlasti, berzu, poverioce i finansijske analitičare (27).

Imajući u vidu sve veću složenost poslovnog okruženja i digitalizaciju finansijskih procesa, tradicionalni mehanizmi interne kontrole i revizije često nisu dovoljni za pravovremeno otkrivanje prevara. U tom kontekstu, razvijeni su različiti modeli za otkrivanje računovodstvenih prevara, koji uključuju statističke, ekonometrijske i računovodstvene pristupe, kao i savremene metode zasnovane na veštačkoj inteligenciji i analizi velikih skupova podataka. Za otkrivanje prevara se mogu koristiti razni modeli, a neki od njih jesu: drvo odlučivanja, *random forest*, XGBoost, LightGBM i CatBoost.

Investitori su često zabrinuti za to da bi menadžeri mogli sakriti važne informacije. Pored toga, moguće su i takve situacije da su modeli za otkrivanje prevara podložni mogućnosti pogrešne klasifikacije firmi kao prevarnih, a koje to nisu (tj. lažno pozitivnih) i onih koje nisu prevarne, a tako su kategorizovane (tj. lažno negativnih). U oba slučaja, pogrešne klasifikacije imaju posledice za investitore, direktne ili indireknte. Ako investitor investira u prevarnu kompaniju, a ona je pritom pogrešno klasifikovana kao ona koja nije prevarna, nastaće posledice po investitora, jer će trpeti gubitak. S druge strane, ako je reč o firmi koja nije prevarna, a klasifikovana je kao prevarna i nije izabrana za investiciju, doći će se u situaciju da investitor izgubi profitabilnu investicionu priliku (11).

FORENZIČKO RAČUNOVODSTVO KAO SREDSTVO ZA OTKRIVANJE PREVARE NA SUDU I U DRUGE SVRHE

Brojne institucije i autori su predstavili različite definicije forenzičkog računovodstva. Međutim, i pored svega toga, danas ne postoji široko prihvaćena definicija forenzičkog računovodstva. Zysman (34) navodi definiše da se forenzičko računovodstvo bavi otkrivanjem i izbegavanjem ekonomskih prevara i različitih finansijskih prestupa. Prema PricewaterhouseCoopers (29), forenzičko računovodstvo se odnosi na posao računovođa koji sprovode istrage, podržavaju sporove i parnice, pregledaju odštetne zahteve kod osiguranja, i druga pitanja koja mogu završiti na sudu. Prema Američkom institutu ovlašćenih javnih računovođa (American Institute of Certified Public Accountants - AICPA), forenzičko računovodstvo se može sagledati kao primena specijalizovanog znanja i istražnih veština ovlašćenih javnih računovođa za prikupljanje, analizu i procenu dokaznog materijala, kao i za tumačenje i saopštavanje nalaza u sudnici, sali za sastanke ili drugom pravnom ili administrativnom mestu (1).

Forenzičko računovodstvo se fokusira na otkrivanje prevara i sprovodi detaljne istrage i analize koristeći pristup koji se razlikuje od revizije (20). Od forenzičkih računovođa se očekuje da će vršiti temeljne analize finansijskih izveštaja preduzeća, bankarske dokumentacije i ostalih poslovnih zapisa, kao i da identifikuju i prate tokove novca i transfere između različitih pravnih subjekata i pojedinaca. Predlaže se računovodstveno-forenzički pristup kako bi se dodatno poboljšalo ispitivanje javnih dokumenata kroz preporuku smislene analize računovodstvenih stavki. Forenzičko računovodstvo pored ostalog, uključuje sajber bezbednost i važan je činilac za efikasno korporativno upravljanje. Forenzičke računovođe imaju ključnu ulogu u unapređenju procesa *due diligence*, jer omogućavaju informisano odlučivanje i precizniju procenu rizika u postupcima spajanja i akvizicija.

Usluge koje pruža forenzičko računovodstvo se koriste u okolnostima kada postoji sumnja na nepravilnosti, prevare ili kod finansijskih sporova. Neke od usluga uključuju: istragu prevara, IT forenziku, usluge u sudskim sporovima i procenu vrednosti preduzeća (13). Forenzičke računovođe ispituju obimne skupove finansijskih podataka radi identifikovanja indikatora prevare i skrivene imovine, odnosno s ciljem da provere i potvrde postojanje tzv. crvenih zastavica (14). Crvene zastavice su znak da postoje stvari koje ne odgovaraju svom mestu i kojima je potrebna pažnja, a mogu se smatrati i neobičnim stanjem ili drugačijim od normalnog stanja, i svakako da zahtevaju dalju istragu. Tumačenje crvenih zastavica u stvarnom poslovnom svetu je veoma teško (12). Crvene zastavice mogu uključivati skrivenu ili potcenjenu imovinu, značajno povećanje nematerijalne imovine, nižu stopu amortizacije od proseka u industriji, nedavne transfere gotovine ili imovine visoke vrednosti rođacima ili saradnicima radi sprečavanja konfiskacije tokom stečaja, iznenadni odlazak ključnog osoblja i preferencijalna plaćanja poveriocima, neorganizovane ili obmanjujuće finansijske evidencije (28). Pored toga, neorganizovane evidencije, odsustvo ili nedovoljne informacije mogu biti znak upozorenja da postoji mogućnost da je nešto prikriveno.

Širok je krug potencijalnih klijenata kada su u pitanju usluge forenzičkih računovođa: advokati, policijski organi, banke i osiguravajuća društva, sudovi, korporacije, investitori, poreski organi itd. Forenzičke računovođe moraju znati gde da usmere analizu i imati temeljno razumevanje potencijalnih crvenih zastavica koje mogu ukazivati na nepravilnosti, odnosno identifikovati oblasti koje zahtevaju dodatno i detaljnije ispitivanje (12).

Sve složenije poslovno okruženje, zajedno sa sve češćom praksom preduzimanja pravnih radnji, povećalo je potrebu za računovođama koji razumeju pravne postupke i sposobni su da sprovode istrage, vrše finansijsku analizu i primenjuju druge postupke na način prihvatljiv za sudove (19). Forenzičko računovodstvo se smatra sredstvom za otkrivanje prevare na sudu. Ono pruža računovodstvenu analizu koja bi trebalo da bude održiva u sudskom postupku i koja bi trebalo da predstavlja bazu za diskusiju, raspravu i najzad, za rešavanje sporova. U ovom slučaju, u krajnjoj liniji je neophodno da sudija razume i prizna da se prevara dogodila; neophodno je strateški otkriti prevaru, a istovremeno biti svestan u kojoj meri se može dokazati da utvrđivanje činjenica sudskim putem prepoznaje da se prevara dogodila, a ne da je samo reč o sumnji da je prevara moguća. U određenim situacijama, forenzičke računovođe mogu biti angažovane radi pružanja usluge procene vrednosti, kao što su: saveti o analizi rizika, bankrot, porodično pravo, bračna pitanja, kompenzacije zasnovane na akcijama i fer vrednost kod finansijskog izveštavanja (24). U krivičnim postupcima računovodstveni forenzičar može obavljati različite funkcije, uključujući ulogu finansijskog forenzičara, veštaka, svedoka ili stručnog savetnika (16).

DALJI RAZVOJ FORENZIČKOG RAČUNOVODSTVA: DOPRINOS AKADEMSKE ZAJEDNICE

Najčešći razlog zbog kojeg se počinje računovodstvena prevara, pored svrhe obmanjivanja zainteresovanih strana, često je povezan sa dobijanjem kvalitetnijih izvora finansiranja ili izbegavanja obaveza po osnovu nastalog duga (32). Zbog sve većeg broja slučajeva korupcije i finansijskih prevara, naročito u zemljama u razvoju, obrazovanje iz forenzičkog računovodstva postalo je od značaja, te univerziteti treba da ga uključe u svoj nastavni program. Kako Knežević et al. (18) ističu, u savremenoj računovodstvenoj profesiji otkrivanje prevarnih radnji sve više dobija na značaju. Zaštita kapitala na tržištima, s jedne strane, i očuvanje ugleda računovodstvene struke, s druge strane, nameću potrebu za intenzivnijim razvojem kapaciteta u oblasti forenzičkog računovodstva.

Poznato je da je obrazovanje iz forenzičkog računovodstva multidisciplinarno. Ono obuhvata reviziju, računovodstvo, statistiku, informacione tehnologije (IT), pravna pravila i ljudske veštine. Slično je reviziji, ali je drugačije. Praktični statistički alati deluju kao dodatna oprema za brzu isporuku rezultata kada je u pitanju veliki broj podataka. Veština u korišćenju IT alata je neophodna za otkrivanje sajber kriminala. Ljudske veštine dobijaju na značaju zbog napada socijalnog inženjeringa. Forenzičke računovođe moraju

da prate relevantne zakone u kontinuitetu. Pored toga, u forenzičkom računovodstvu su neophodne različite istraživačke veštine i znanja za efikasno upravljanje rizikom od nastanka prevarnih radnji (23). Teme koje izlaze iz okvira tradicionalnog računovodstva trebalo više uključiti u obrazovanje iz forenzičkog računovodstva, uz veće vrednovanje nastavnih metoda koje integrišu iskustveno učenje (22). Posebnu pažnju bi trebalo posvetiti studijama slučajeva. U tom kontekstu se ističu kao posebno važni segmenti forenzička tehnologija i intervujisanje. Veštačka inteligencija je postala ključna transformativna snaga u forenzičkom računovodstvu, menjajući pristupe otkrivanju, istragama i prevenciji finansijskih prevara (9).

Jedan od pristupa u daljem razvoju je da se ulože napori kako bi se obrazovanje iz forenzičkog računovodstva moglo razviti kao posebna disciplina u funkciji pravilnog regulisanja profesije forenzičkog računovodstva. U tom slučaju, može se pojaviti potreba za razvojem posebnih standarda forenzičkog računovodstva. Ovim pitanjem treba da se pozabave akademska zajednica i profesionalna tela (23). Nesporna je potreba da forenzičke računovođe steknu nove veštine i prilagode se tehnološkim promenama, dok preporuke za praktičare i kreatore politike uključuju kontinuirano učenje, prihvatanje novih tehnologija i razvoj regulatornih okvira koji podržavaju napredne prakse uz poštovanje etičkih standarda (7).

ZAKLJUČAK

Propusti u računovodstvu i reviziji nisu nova pojava, ali su prisutni u kontinuitetu. Forenzičko računovodstvo je potrebno posmatrati kao alat koji omogućava zainteresovanim stručnjacima da predvide da li su firme uključene u nepravilnosti u finansijskom izveštavanju ili nisu. Nepravilnosti u finansijskom izveštavanju imaju ozbiljne ekonomske i lične posledice. Potrebno je uključiti veštačku inteligenciju u forenzičko računovodstvo kako bi se unapredila efikasnost i skalabilnost u otkrivanju prevara. Prediktivna analitika ima poseban značaj u unapređenju upravljanja rizikom od prevara.

S obzirom na visoke troškove korporativnih prevara, prirodno je očekivati intenzivnu istraživačku aktivnost usmerenu na procenu efikasnosti mehanizama koji su razvijeni kako bi se prevare sprečile ili umanjile. To je posebno važno pitanje kada je reč o nacionalnim okvirima. U ovom segmentu su potrebni dodatni napori, kako bi došlo do značajnog unapređenja forenzičkog računovodstva, kako u akademskom obrazovanju, tako i u praktičnoj primeni.

Računovodstvene prevare predstavljaju ozbiljan rizik za finansijsku stabilnost i poverenje u poslovne subjekte, a njihovo otkrivanje zahteva stručnost i primenu specijalizovanih forenzičkih metoda. Forenzičko računovodstvo se pokazalo kao ključni alat za identifikaciju nepravilnosti, podršku istragama i sa razvojem veštačke inteligencije dobija novu dimenziju.

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Accounting Fraud and Forensic Accounting

Summary: Accounting fraud is one of the most serious forms of financial irregularities, with significant consequences for the stability of financial markets, investor confidence and the overall economic security of organizations. These frauds include the deliberate distortion of financial statements, the concealment of liabilities, the overstatement of assets, and the manipulation of income and expenses, often for personal or corporate benefits. The paper uses the methodology of a systematic literature review. This paper aims to perceive the characteristics of accounting fraud and its consequences, as well as the role of forensic accounting in the detection, investigation and prevention of such fraud.

Keywords: accounting fraud, detection, forensic accounting

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The Role of Responsible Leadership in Post-Retirement Disengagement: A Comparative Study Between the UK and Serbia

Abstract: *The rapidly aging populations in Serbia, and the UK present significant socio-economic challenges, particularly in retirement. While retirement theoretically offers rest and financial security, many retirees in these countries face heightened social isolation and financial vulnerability. Disengagement from the workforce often leads to a loss of purpose and underutilization of silver talent, exacerbating financial instability. This study addresses these dual challenges by exploring how re-engagement in social and economic activities can mitigate their impact. It assesses the effectiveness of existing retirement policies and proposes strategies for better integrating retirees into society and the workforce to improve their quality of life.*

Keywords: *responsible leadership, post-retirement disengagement, aging population, retirement policies, financial vulnerability.*

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INTRODUCTION

Population aging is reshaping socio-economic and political landscapes worldwide, challenging traditional notions of retirement and civic participation. In Europe, these dynamics are particularly pronounced in countries like Serbia (6) and the UK (13), where demographic shifts intersect with structural inequalities and evolving democratic norms. Retirement, often framed as a period of rest and security, increasingly exposes older adults to financial vulnerability, social isolation, and diminished civic engagement. These challenges raise critical questions about how societies can harness the potential of "silver talent" while safeguarding democratic resilience in the face of growing inequality.

This paper adopts an explicitly intersectional approach to explore how age, gender, education, and employment history interact to influence retirees' experiences of economic security and democratic participation. By comparing Serbia and the UK—a post-Brexit liberal democracy—the study examines variations in engagement across public, private, and informal sectors, highlighting territorial and sector-specific inequalities often overlooked in existing research. Through a combination of objective indicators and validated self-report measures, we investigate how structural disadvantage and perceived marginalization shape attitudes toward equality, trust, and civic belonging. In doing so, the research offers policy-relevant insights into inclusive employment practices, age-responsive community programs, and retirement reforms that strengthen both social cohesion and democratic values.

The study explores how re-engagement in social and economic activities can improve well-being and unlock the potential of "silver talent." Focusing on the role of small and medium-sized enterprises (SMEs), which are well-positioned to offer flexible, age-inclusive opportunities that benefit both older adults and local economies, this research assesses current retirement and employment policies, identifies barriers to active aging, and highlights best practices across the countries. Drawing on interdisciplinary expertise, the evidence-based strategies and practical tools for policymakers are developed. The main goal of this study is to shift the narrative around aging by demonstrating how older populations can continue to contribute meaningfully to society, while fostering more inclusive, resilient, and sustainable communities. The study employs a Matched Panel Experiment to compare retirees who are engaged in post-retirement activities with those who are not across public, private, and informal/agricultural sectors. We argue that the re-engagement in socio-economic activities can significantly reduce social isolation and enhance financial stability among retirees. The findings are anticipated to reveal gaps in current retirement policies and provide actionable insights for developing targeted interventions aimed at improving the well-being and financial security of the aging populations in Serbia and the UK.

LITERATURE REVIEW

Economic inequalities, encompassing wealth and income inequalities (e.g., in the form of money, financial assets, or real estate), pose a significant challenge to democratic societies. Over the past decades, while between-country inequality has generally decreased, within-country inequality has risen in numerous countries as global economic growth has not been evenly distributed (12; 1). This widening gap in wealth has exacerbated political polarisation and fuelled distrust in democratic institutions worldwide (4). These trends not only suggest correlations between these phenomena but also threaten core democratic principles such as social justice, inclusion, and equal participation and representation. For instance, extremist parties often gain traction when governments fail to protect those disadvantaged by economic changes. Research indicates that governmental shortcomings in protecting those marginalised by structural economic shifts (e.g., cuts to social security entitlements, public investment and/or tax increase) fuel the roots of populism (15; 5; 16). Understanding this cycle and the complex relationship between economic inequality and democracy is key to a functioning democratic society. Proposals are encouraged to look at the efficiency and effectiveness of public policies in addressing inequalities. For instance, examining the gap between the design and implementation phases of policies aimed at reducing economic inequalities can help better understand their impact on democracy (5).

Historically, economic disparities have sometimes revitalised public participation and political engagement in various forms, such as trade unions, civic involvement, and political parties. This contrasts with contemporary trends where economic inequalities often correlate with disinterest or even rejection of democracy (15). Hence, there is a pressing need for social sciences and humanities research to delve into why, how, and to what extent economic inequalities can undermine trust in democracy and broader societal structures, and how to counteract these trends. Proposals should consider diverse territorial contexts, moving beyond urban/rural dichotomies, and explore strategies to bolster democracies in these different contexts (14).

Moreover, research has shown that economic inequalities, when assessed solely through economic indicators, fail to provide a comprehensive understanding of their impact on democracy. Citizens' perceptions of economic inequalities appear to play a central role in shaping attitudes towards democratic processes and institutions (8; 10). These perceptions are often exacerbated by dichotomies such as rich/poor, rural/urban, employed/unemployed, educated/uneducated, and native/immigrant (14; 11). There is a lack of comparative work including citizens' perceptions, particularly through an intersectional and intergenerational lens (9; 77; 3). Addressing this gap is essential for understanding how subjective experiences of inequality shape democratic legitimacy and political behaviour.

INTERSECTIONALITY, AGING, AND DEMOCRATIC RESILIENCE

An explicitly intersectional lens is used to examine how age, gender, education, and employment history interact to shape older adults' socio-economic conditions and democratic experiences. Focusing on Serbia and the UK (as a post-Brexit liberal democracy), the study offers comparative insights at local and national levels. We analyse retirees' engagement across public, private, and informal/agricultural sectors to capture territorial variation and sector-specific inequalities often overlooked in research on democratic participation.

Our findings indicate that economic inequalities are experienced differently depending on structural location and the lifetime accumulation of advantage or disadvantage, particularly within ageing cohorts. Methodologically, we integrate objective socio-economic indicators with validated self-report measures, the CFPB Financial Well-Being Scale and the UCLA Loneliness Scale, to incorporate citizens' perceptions of inequality, well-being, exclusion, and institutional trust. Preliminary evidence suggests that retirees who remain economically and socially engaged tend to sustain a stronger sense of civic belonging and trust in public institutions. We test these relationships empirically, producing granular insights into how economic conditions and perceived marginalisation shape attitudes toward women's rights, minority protections, and broader democratic values.

The study generates targeted recommendations for inclusive employment practices, age-responsive community programmes, and retirement policy reform. By linking retirees' social and financial engagement with democratic attitudes, we reconceptualise post-retirement engagement not only as economic activity but also as civic participation that reinforces social cohesion and democratic resilience. We examine involvement in SMEs, volunteering, and intergenerational mentoring as mechanisms to combat social exclusion, sustain individual agency, and foster democratic trust, with particular attention to groups experiencing downward mobility from the middle class and facing precarious ageing trajectories.

Anchored in an intersectional framework, our analysis accounts for differences by sex, gender identity, education level, geographic location, and sectoral affiliation, enabling finely tuned policy solutions to address the multifaceted nature of democratic exclusion (2). Beyond Europe, the project has global significance and can inform the United Nations' 2030 Agenda for Sustainable Development, particularly in aligning ageing-related challenges with the Sustainable Development Goals.

Key research questions revolve around the intersection and impact of income and wealth inequalities on democratic practices. This involves exploring:

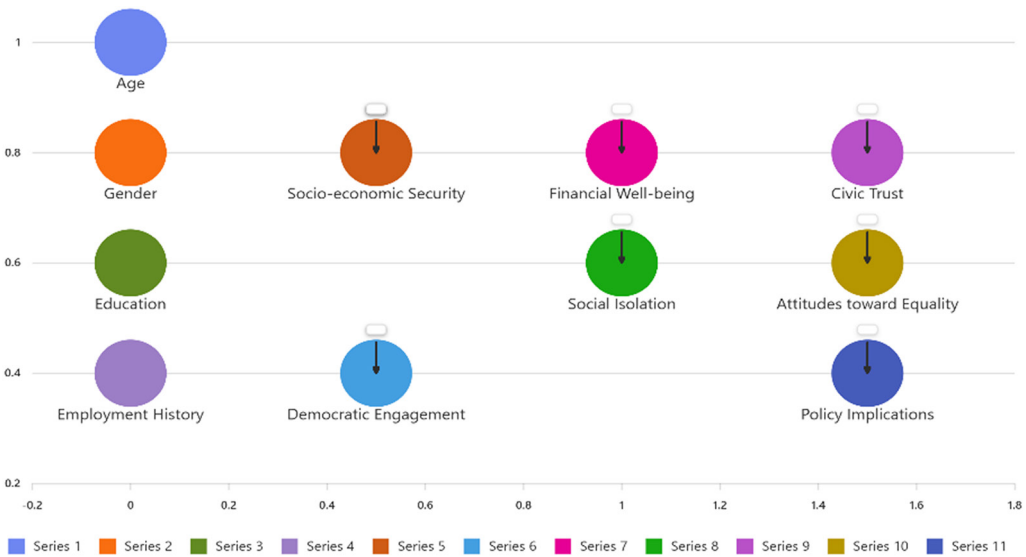
- How do age, gender, education, and employment history intersect to shape retirees' socio-economic security and democratic engagement in Serbia and the UK?
- What role does post-retirement economic and social re-engagement play in mitigating financial vulnerability and fostering trust in democratic institutions among older adults?
- How do perceptions of inequality and well-being, measured through validated self-report scales, correlate with attitudes toward civic participation, minority rights, and democratic values in aging populations?

CONCEPTUAL FRAMEWORK DIAGRAM

The conceptual framework below illustrates the theoretical relationships underpinning this study. It integrates intersectional factors—such as age, gender, education, and employment history—with mediating variables like financial well-being and social isolation to explain variations in democratic engagement among retirees. The model emphasizes how structural determinants shape socio-economic security, which in turn influences both objective and subjective experiences of vulnerability and inclusion. These experiences ultimately affect civic trust, attitudes toward equality, and policy implications. By mapping these pathways, the framework provides a foundation for empirical testing and policy recommendations aimed at strengthening democratic resilience in aging societies.

The conceptual framework diagram below (Figure 1) illustrates the relationships between intersectional factors, mediators, and outcomes:

Figure 1: The conceptual framework



The conceptual framework presented in Figure 1 illustrates the theoretical relationships underpinning this study. It adopts an intersectional perspective to capture how structural determinants, age, gender, education, and employment history, shape socio-economic security among older adults. These factors influence both objective conditions and subjective experiences of vulnerability, which are operationalized through mediating variables such as financial well-being and social isolation. Socio-economic security serves as a central node, connecting intersectional attributes to retirees' capacity for democratic engagement.

Democratic engagement is conceptualized broadly to include civic participation, trust in public institutions, and attitudes toward equality. The framework posits that retirees

who maintain economic and social involvement are more likely to exhibit stronger civic trust and inclusive democratic attitudes. These relationships are empirically tested using validated self-report measures alongside socio-economic indicators, enabling a nuanced analysis of perceived marginalization and its impact on democratic resilience. The model culminates in policy-relevant outcomes, including recommendations for inclusive employment practices, age-responsive community programs, and retirement reforms. By mapping these pathways, the framework provides a foundation for understanding how aging intersects with inequality and democratic values, offering insights that extend beyond Europe to inform global strategies aligned with the United Nations' Sustainable Development Goals.

ANTICIPATED OUTCOMES

We expect this study to demonstrate that population aging is not merely a demographic trend but a transformative force reshaping socio-economic structures and democratic participation. By adopting an intersectional approach, we reveal how age, gender, education, and employment history interact to produce differentiated experiences of financial security, social inclusion, and civic engagement among retirees in Serbia and the UK. Our findings underscore that post-retirement disengagement exacerbates vulnerabilities, while re-engagement, through economic activity, volunteering, and intergenerational mentoring, can strengthen both individual well-being and democratic resilience.

The evidence suggests that retirees who remain socially and economically active exhibit higher levels of trust in public institutions and stronger commitments to democratic values, including equality and minority rights. These insights highlight the urgent need for policy interventions that move beyond passive retirement models toward frameworks that promote active aging as a form of civic participation. Recommendations include inclusive employment practices, age-responsive community programs, and reforms to retirement policy that leverage the potential of "silver talent" for societal benefit. By linking aging, inequality, and democratic resilience, this research contributes to global debates on sustainable development and offers actionable strategies aligned with the United Nations' 2030 Agenda. Ultimately, fostering opportunities for meaningful engagement in later life is essential for building inclusive, cohesive, and democratic societies.

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Uloga odgovornog liderstva u post-penzionom povlačenju: Komparativna studija između UK i Srbije

Apstrakt: Ubrzano starenje populacije u Srbiji i Ujedinjenom Kraljevstvu predstavlja značajan socioekonomski izazov, posebno u kontekstu penzionisanja. Iako penzija teorijski obezbeđuje odmor i finansijsku sigurnost, mnogi penzioneri u ovim zemljama suočavaju se sa izraženijom socijalnom izolacijom i finansijskom ranjivošću. Povlačenje sa tržišta rada često dovodi do gubitka svrhe i nedovoljnog iskorišćavanja „srebrnog talenta", što dodatno pogoršava finansijsku nestabilnost. Ova studija se bavi ovim dvostrukim izazovima kroz ispitivanje načina na koje ponovno uključivanje u društvene i ekonomske aktivnosti može ublažiti njihove negativne posledice. Istraživanje procenjuje efikasnost postojećih politika penzionisanja i predlaže strategije za bolje uključivanje penzionera u društvo i tržište rada, kako bi se unapredio njihov kvalitet života.

Ključne reči: Odgovorno liderstvo, post-penziono povlačenje, starenje populacije, politike penzionisanja, finansijska ranjivost.

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Priznavanje prihoda od ugovora sa kupcima: Primer telekomunikacionih kompanija u Srbiji

Apstrakt: *Cilj ovog rada je da prikaže način priznavanja prihoda u finansijskim izveštajima prema IFRS 15 Prihodi od ugovora sa kupcima. Za ilustraciju zahteva navedenih u Standardu korišćeni su finansijski izveštaji telekomunikacionih kompanija u Srbiji, jer su ovi entiteti među najzahtevnijim korisnicima IFRS 15 u praksi. Iako nam to nije bio cilj, razmatranja su ukazala i na potrebu za manjim poboljšanjima u primeni ovog standarda, kako na mikro, tako i na makro nivou.*

Ključne reči: *IFRS 15, finansijsko izveštavanje, modeli poslovanja telekomunikacionih kompanija.*

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UVOD

Osnovni princip priznavanja prihoda je jednostavan: prihodi se priznaju kada prodavac prenese svu kontrolu nad svojom robom ili uslugama (tj. sve rizike i koristi) na kupca, za iznos koji zaista očekuje da će dobiti. Ova definicija je opšteprihvaćena i u Međunarodnim standardima finansijskog izveštavanja (IFRS) koje donosi Odbor za međunarodne računovodstvene standarde (IASB) i u Opšte prihvaćenim računovodstvenim principima koji važe u Sjedinjenim američkim državama (US GAAP), a koje donosi Odbor za finansijsko računovodstvo (FASB) (Beke-Trivunac, 2021). U okviru IFRS, priznavanje prihoda uređuje se standardom IFRS 15 *Revenue from Contracts with Customers* (Prihodi od ugovora s kupcima), a u okviru US GAAP, priznavanje prihoda uređuje se Accounting Standards Codification (ASC) Topic 606 – *Revenue from Contracts with Customers*. Oba standarda su rezultat projekta konvergencije FASB i IASB standarda (3; 4).

Primena IFRS 15 zahteva kompleksne procene, profesionalno prosuđivanje i sofisticirane IT sisteme za obračun i fakturisanje prihoda. Neposredno utiče na poslovne modele i ima značajan uticaj na rentabilnost poslovanja i strukturu bilansa stanja.

IFRS 15 je posebno zanimljiv i važan za telekomunikacione i tehnološki intenzivne kompanije poput Telekoma, Yettela i A1, jer se njihov prihod ne sastoji samo od jedne usluge, već od paketa proizvoda i usluga koji se isporučuju bilo u jednom trenutku, bilo tokom vremena. Telekomunikacione kompanije su među najzahtevnijim korisnicima IFRS 15 u praksi.

IFRS 15 U FINANSIJSKIM IZVEŠTAJIMA TELEKOMUNIKACIONIH KOMPANIJA U SRBIJI

Razmatranje primene IFRS 15 od strane telekomunikacionih kompanija u Srbiji započinjemo analizom modela njihovog poslovanja, posebno, analizom vrste prihoda tih kompanija. Svi podaci za ova razmatranja preuzeti su iz finansijskih izveštaja ovih kompanija (5; 6; 1).

Standard zahteva zahteva od entiteta da raščlani prihod od ugovora sa kupcima na kategorije koje opisuju kako ekonomski faktori utiču na prirodu, iznos, vreme i neizvesnost prihoda i tokove gotovine. Način raščlanjivanja prihoda zavisi od konkretnih činjenica i okolnosti koje se odnose na ugovore entiteta sa kupcima. Struktura prihoda u izabranim telekomunikacionim kompanijama data je Tabeli 1.

Prema IFRS 15, proces priznavanja prihoda odvija se u pet koraka:
Korak 1: Identifikacija ugovora;
Korak 2: Identifikacija obaveze izvršenja;
Korak 3: Utvrđivanje cene transakcije;
Korak 4: Alokacija cene transakcije;
Korak 5: Priznavanje prihoda.

Tabela 1. Prihodi telekomunikacionih kompanija u Srbiji po osnovu ugovora sa kupcima

TELEKOM SRBIJA a.d. BEOGRAD	YETTEL D.O.O. BEOGRAD	A1 SRBIJA D.O.O. BEOGRAD
Prihodi od ugovora sa kupcima u 2024. godini		
2024: 131.842.486.000 dinara	2024: 65.356.119.000 dinara	2024: 47.033.315.000 dinara
Vrste prihoda		
1. Prihodi od usluga fiksne telefonije (mesečne naknade, zakup vodova i prenos podataka, veleprodaja internet usluga, ostvareni saobraćaj, interkonekcija, priključci i instalacione usluge, ostalo); 2. Prihodi od usluga mobilne telefonije (postpejd usluge (mesečne naknade i saobraćaj) prepejd usluge, interkonekcija, roaming, ostalo); 3. Maloprodaja internet usluga; 4. Multimedijalne usluge; 5. ICT usluge; 6. Prihodi od prodaje robe;	1. Prihodi od prodaje robe (uključuju i kamate po osnovu značajne komponente finansiranja); 2. Prihodi od pružanja usluga postpejd korisnicima (odlazni pozivi, mesečna pretplata, prihodi od SMS, MMS, GPRS usluga, ostalo); 3. Prihodi od pružanja usluga pripejd korisnicima (odlazni pozivi, prihodi od SMS, MMS, GPRS usluga, ostalo); 4. Prihodi od pružanja usluga na fiksnoj lokaciji (od hiperneta i povezanih usluga); 5. Prihodi po osnovu interkonekcije, rominga i ostalo;	1. Prihodi od prodaje robe, na domaćem tržištu; 2 Prihodi od prodaje proizvoda i usluga na domaćem tržištu; 3. Prihodi od prodaje proizvoda i usluga na inostranom tržištu; 4. Prihodi od prodaje matičnim i zavisnim pravnim licima; 5. Prihodi od aktiviranja usluga za osnovna sredstva; 6. Ostali poslovni prihodi;
Detaljna struktura ovih prihoda prikazana je u Napomeni 7 uz finansijske izveštaje za 2024. godinu.	Detaljna struktura ovih prihoda prikazana je u Napomeni 4 uz finansijske izveštaje za 2024. godinu.	Detaljna struktura ovih prihoda prikazana je u Napomeni 5 uz finansijske izveštaje za 2024. godinu.
Zapažanja: 1. TELEKOM SRBIJA a.d. I YETTEL DOO prikazuju strukturu prihoda prema funkcijama, dok A1 SRBIJA D.O.O. prikazuje strukturu prihoda prema zvaničnoj šemi iz Bilansa uspeha. Funkcionalna klasifikacija pruža bolju osnovu za upravljanje prihodima i sagledavanje rezultata poslovanja. 2: YETTEL D.O.O. prikazuje kamate po osnovu značajne komponente finansiranja u okviru poslovnih prihoda. Druge dve kompanije ne prikazuju ove prihode kao posebnu stavku, niti pružaju informacije o tome da li takvi prihodi i rashodi postoje.		

Korak 1: Identifikacija ugovora. Prema računovodstvenim standardima, ugovor može biti pisan, usmen, ili čak podrazumeva standardne poslovne prakse. Važno je da ugovor stvara izvršna prava i izvršne obaveze i za prodavca i za kupca. Da bi ugovor bio osnov za priznavanje prihoda, mora biti odobren od obe strane, i mora jasno navesti prava svake strane i uslove plaćanja, mora imati komercijalnu supstancu i mora prodavcu obezbediti naplatu ekonomskih koristi.

Primer potrebe za modifikacijom ugovora

Telekomunikacione kompanije suočavaju se i sa čestim promenama ugovora zbog promene tarifa, prelazak sa pripejd na postpejd pakete, prihvatanje dodatnih usluga tokom ugovora, kao i prevremeni raskidi ugovora. U takvim slučajevima, IFRS 15 zahteva modifikacije ugovora, što obuhvata i ponovni prolazak kroz naredne korake (ponovnu procenu transakcione cene, prilagođavanje raspodele prihoda, ...)

Korak 2: Identifikacija obaveze izvršenja. Obaveza izvršenja je u suštini svako obećanje da će prodavac preneti posebnu robu ili uslugu. Obećanje mora da ispuni dva kriterijuma: kupac može imati samostalnu korist od robe ili usluge. Na primer, ako pri prodaji softverske licence i posebnog paketa za obuku, prodavac verovatno ima dve različite obaveze

po osnovu učinka, tako da je jasno razlikovanje svake pojedinačne obaveze važno, jer ispunjenje obaveze određuje kako će kasnije priznati prihod.

Primer modela poslovanja
Telekomunikacione kompanije retko prodaju samo jednu stvar. Tipičan ugovor uključuje:
- mobilni paket (mesečna pretplata);
- uređaj (telefon);
- dodatne usluge (roaming, oblak, TV, aplikacije);

Za ugovore sa više komponenti, IFRS 15 zahteva da se svaka komponenta identifikuje kao zasebna obaveza izvršenja iz ugovora.

Primer modela poslovanja telekomunikacionih kompanija za 2024. godinu		
Prihodi po ugovorima sa više komponenti telekomunikacionih društava u Srbiji		
TELEKOM SRBIJA a.d. BEOGRAD	YETTEL D.O.O. BEOGRAD	A1 SRBIJA D.O.O. BEOGRAD
Integrisani paketi usluga obezbeđuju korisnicima kombinovane usluge fiksne telefonije, postpejd paket mobilne telefonije, internet i TV usluge, kao i prodaju uređaja i opreme, uz odgovarajuću ugovornu obavezu i druge povoljnosti.	Kod najvećeg broja ugovora sa kupcima mogu se identifikovati dve ili više obaveza izvršenja (npr., tarifni paket i telefon)	Odvojive ugovorne obaveze povezane su sa: • Prodajom opreme • Pružanjem usluge mobilne telefonije.
Izvor: Napomena 5.4.1.3. uz finansijske izveštaje za 2024. godinu.	Izvor: Napomena 3 uz finansijske izveštaje za 2024. godinu.	Izvor: Napomena 3.11 uz finansijske izveštaje za 2024. godinu.

Korak 3: Utvrđivanje cene transakcije. Cena transakcije je ukupan iznos koji prodavac očekuje da će dobiti u zamenu po ispunjenju datih obećanja. Ugovorena naknada može da obuhvata promenljive iznose, kao što su potencijalni rabati, popusti, povraćaji ili bonusi za performanse.

Primer promenljive naknade
Promenljive naknade nastaju po osnovu popusti, programa poverenja, promotivnih akcija i slično.
Prema IFRS 15, ako korisnik dobije popust na paket, deo popusta mora da se alocira i na uređaj. Isto tako, ako kupac ima mogućnost da robu vrati ako njome nije zadovoljan, cena transakcije mora se umanjiti za procenjeni iznos povraćaja.

Korak 4: Alokacija cene transakcije. Utvrđena cena raspodeljuje se na svaku pojedinačnu obavezu izvršenja, tj. na svaku različitu robu ili uslugu kao da su u pitanju samostalni proizvod ili usluga. Drugim rečima, to je cena koja bi se naplatila za stavku kao da je prodata odvojeno kupcu. Ako samostalna cena nije direktno vidljiva, mora da se proceni. Ova raspodela osigurava da prihod za svaku stavku tačno odražava vrednost koja se pruža kupcu.

Primer alokacija transakcione cene
Kada korisnik potpiše ugovor za 1 dinar telefon + 24 meseca pretplate, onda u skladu sa IFRS 15, treba:
- izračunati pojedinačnu prodajnu cenu za svaku komponentu; a zatim
- raspodeli ukupnu cenu ugovora proporcionalno na svaku komponentu, kao što su telefon i mobilni paket (usluge iz pretplate).

Korak 5: Priznavanje prihoda. Prihod se može priznati po ispunjavanju svake obaveze izvršenja, što se smatra momentom prenosa kontrole nad obećanom robom ili uslugom sa prodavca na kupca. Prenos kontrole može se desiti u jednom "trenutku u vremenu" Ili "tokom vremena".

Primer trenutka prenosa kontrole i priznavanja prihoda
- Kada se roba (telefoni, ruteri, oprema) proda, kontrola se sa prodavca na kupca prenosi u trenutku vremena (trenutku isporuke).
- Nakanada za usluge (pretplata, internet, TV, oblak) priznaje se tokom vremena (na pr. svakog meseca), jer su usluge pružaju tokom ugovorenog perioda.

Ako se kontrola prenosi tokom vremena, entitet bira metod za merenje napretka koji je u skladu sa ciljem prikazivanja njegovog učinka i primenjuje taj metod za priznavanje prihoda. Za merenje napretka ka potpunom ispunjenju obaveza izvršenja po ugovoru tokom nekog vremenskog perioda koriste se izlazne i ulazne metode.

Vreme priznavanja prihoda telekomunikacionih kompanija u Srbiji		
TELEKOM SRBIJA a.d. BEOGRAD	YETTEL D.O.O. BEOGRAD	A1 SRBIJA D.O.O. BEOGRAD
Prihodi koji se priznaju u momentu kada je usluga izvršena: • Prihodi od odlaznih telefonskih poziva; • Naknada za telefonski priključak; • Prihodi od priključaka i instalacione usluge; • Prihodi od pruženih pripejd usluga u meri u kojoj je usluga pružena; • Prihodi od prodaje opreme.	• Prihodi od prodaje robe priznaju se u momentu izvršenja.	• Prodaja opreme - priznavanje prihoda u momentu isporuke
Prihodi koji se priznaju tokom perioda: • Prihodi od internet i multimedijalnih usluga; • Naknada za postpejd usluge; • Prihodi od kombinovanih paketa usluga; • Prihodi od iznajmljivanja kapaciteta i optičke infrastrukture.	• Svi drugi prihodi po osnovu ugovora sa kupcima priznaju se ispunjenjem obaveza izvršenja tokom vremena.	• Pružanje usluge mobilne telefonije – priznavanje prihoda tokom ugovorenog perioda linearno uz priznavanje troškova po nastanku.
Za obaveze izvršenja koje se ispunjavaju tokom vremena, koristi se metod "izlaza" zasnovan na proteklom vremenu.	Nema podataka o primenjenoj metodi merenja izvršenja prihoda.	Nema podataka o primenjenoj metodi merenja izvršenja prihoda.
Izvor: Napomena 5.4.1 uz finansijske izveštaje za 2024. godinu.	Izvor: Napomena 4 uz finansijske izveštaje za 2024. godinu.	Izvor: Napomena 3.11 uz finansijske izveštaje za 2024. godinu.

POSTOJANJE ZNAČAJNE KOMPONENTE FINANSIRANJA U UGOVORU

Prilikom određivanja cene transakcije, entitet treba da prilagode iznose naknade uzimanjem u obzir efekte vremenske vrednosti novca, ako je to odgovarajuće (2). U takvom slučaju, ugovor sadrži značajnu komponentu finansiranja. Značajna komponenta ne mora

biti jasno ugovorena, već može biti određena i uslovima plaćanja koje su prihvatile obe ugovorne strane.

Primer implicitnog finansiranja
Ako korisnik dobije telefon po nižoj ceni, a plaća veću pretplatu, IFRS 15 traži procenu:
- da li postoji značajna komponenta finansiranja?
- da li korisnik zapravo „otplaćuje" uređaj kroz pretplatu?

U slučaju da su odgovori na ova pitanja pozitivni, nastaje potreba za priznavanjem finansijskih prihoda i finansijskih rashoda.

Način prikazivanja prihoda od značajne komponente finansiranja telekomunikacionih kompanija u Srbiji prikazan je u uvodnom delu rada.

ZAKLJUČAK

Cilj ovog rada je da prikaže način priznavanja prihoda u finansijskim izveštajima prema IFRS 15. Za ilustraciju načina prikazivanja izabrane su telekomunikacione kompanije, jer su ovi entiteti među najzahtevnijim korisnicima IFRS 15 u praksi.

Iako nam to nije bio cilj, mišljenja smo da finansijski izveštaji ovih kompanije prikazuju prihode u skladu sa zahtevima IFRS 15, s tim što su neka manja poboljšanja u njihovom prikazivanju poželjna.

Posebno, predlažemo da se u zvaničnoj bilansnoj šemi uvede dodatna pozicija u okviru prihoda i rashoda od finansiranja, na kojoj bi se iskazivala kamate po osnovu značajne komponente finansiranja. To bi pomoglo da se ovi prihodi jasno razdvoje, ne samo od poslovnih prihoda, već i od drugih prihoda od finansiranja.

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Recognition of Revenues from Contracts with Customers – An Example of Telecommunications Companies in Serbia

Abstract: This paper presents a method for recognizing revenue in financial statements according to IFRS 15 Revenue from Contracts with Customers. To illustrate the requirements set out in the Standard, the financial statements of telecommunications companies in Serbia were used, as these entities are among the most demanding users of IFRS 15 in practice. Although this was not our goal, the considerations also pointed to the need for minor improvements in the application of this Standard, both at the micro and macro levels.

Keywords: IFRS 15, financial reporting, business models of telecommunications companies.

Edin Glogić[1]

PRIKAZ 2. MEĐUNARODNE NAUČNO-ISTRAŽIVAČKE KONFERENCIJE ISRCFA 2025 „Forenzičko računovodstvo i revizija u doba vještačke inteligencije, kripto-imovine i održivosti – integritet dokaza, regulativa i granice odgovornosti“

Krajem novembra 2025. godine, tačnije 28. novembra, Tuzla je postala epicentar regionalne akademske i stručne misli iz oblasti finansijske forenzike. U organizaciji Ekonomskog fakulteta Univerziteta FINRA Tuzla, održana je 2. Međunarodna naučno-istraživačka konferencija ISRCFA 2025, događaj koji je svojom aktuelnošću i dubinom diskusija potvrdio status nezaobilazne platforme za razmjenu znanja u ovom dijelu regiona. Pod nazivom „Forenzičko računovodstvo i revizija u doba vještačke inteligencije, kripto-imovine i održivosti – integritet dokaza, regulativa i granice odgovornosti“, konferencija je hrabro adresirala najkompleksnija pitanja današnjice. Realizovana u saradnji sa renomiranim Međunarodnim udruženjem forenzičkih računovođa i revizora (IAFAA) iz Beograda, te uz snažnu institucionalnu podršku Federalnog ministarstva obrazovanja i nauke, ova manifestacija nije bila samo skup stručnjaka, već forum na kojem se redefinisala budućnost profesije pred naletom digitalnih promjena.

Svečani dio konferencije odisao je atmosferom zajedništva i posvećenosti nauci. Prisutnima se na samom početku obratio prof. dr. Ismet Kalić, predsjednik Uprave Univerziteta FINRA Tuzla, istaknuvši važnost kontinuiranog usavršavanja u eri brzih promjena. Dekan Ekonomskog fakulteta i organizator ovog skupa prof. dr. sc. Edin Glogić, imao je čast poželjeti dobrodošlicu gostima i otvoriti diskusiju o izazovima koji stoje pred nama. Posebnu težinu skupu dali su govori eminentnih stručnjaka iz regije. Svoja bogata iskustva su sa auditorijem podijelile emeritus prof. dr. Jozefina Beke Trivunac sa Univerziteta Alfa BK iz Beograda i prof. dr. Snežana Knežević sa Fakulteta organizacionih nauka, Univerziteta u Beogradu. Prof. dr. Branislav Radulović, senator Državne revizorske institucije Crne Gore, podijelio je svoja iskustva iz perspektive vrhovne revizije, dok su se putem video linka obratili prof. dr. Vinko Belak, regionalno priznati autoritet u oblasti poslovne

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forenzike, i Gordana Matović, predsjednica IAFAA Beograd, koja je naglasila važnost međunarodne saradnje u borbi protiv finansijskog kriminala.

Statistički podaci najbolje govore o obimu i značaju ovogodišnje konferencije. Učešće je uzelo više od 70 autora i koautora koji su pristigli iz šest zemalja regije: Slovenije, Hrvatske, Crne Gore, Makedonije, Srbije i Bosne i Hercegovine. Ova raznolikost osigurala je multiperspektivan pristup problemima, omogućavajući komparaciju praksi i iskustava iz različitih pravnih i ekonomskih sistema. Rezultat ovog intelektualnog napora je impresivan Zbornik radova ISRCFA 2025, u koji su uvrštena 32 rada na više od 800 stranica. Na samoj konferenciji prezentovano je 20 odabranih radova koji su pokrenuli izuzetno dinamične diskusije, a kvalitet istraživanja potvrđen je činjenicom da će najbolji radovi biti preporučeni za objavu u naučnom časopisu „Forenzičko-računovodstvena istraživanja".

Centralni dio radnog dijela konferencije bio je posvećen temeljnoj analizi uticaja vještačke inteligencije (AI) na profesiju. Jedan od dominantnih zaključaka, oko kojeg su se složili gotovo svi učesnici, jeste da AI više ne možemo tretirati kao puki pomoćni alat, već kao silu koja fundamentalno mijenja prirodu revizije i forenzike. Kroz panele se provlačila teza o tehnologiji kao „dvosjeklom maču". S jedne strane, AI alati omogućavaju analizu enormnih skupova podataka i otkrivanje anomalija u realnom vremenu, što drastično povećava efikasnost istraga. Međutim, ista ta tehnologija u rukama kriminalaca omogućava kreiranje sofisticiranih prevara, uključujući „deepfake" sadržaje koji ozbiljno ugrožavaju integritet digitalnih dokaza. Posebno zanimljivo izlaganje je bilo o „neuroforenzičkom računovodstvu", novoj paradigmi koja istražuje biološke korelate obmanjujućeg ponašanja, iako je naglašeno da su pravne i etičke barijere za njenu praktičnu primjenu još uvijek visoke. Učesnici su upozorili i na rizik od „black box" efekta – nedostatka transparentnosti algoritama – zaključujući da AI mora ostati „inteligentni saradnik", a ne zamjena za profesionalni sud revizora. Druga ključna tema ticala se kripto-imovine i blockchain tehnologije, područja koje donosi potpuno nove rizike pranja novca i finansiranja terorizma. Eksperti su naglasili da su implementacija „Travel Rule" (FATF standarda) i strog nadzor nad pružaocima usluga virtualne imovine (VASP) ključni mehanizmi odbrane. Međutim, u diskusijama je prepoznato da se BiH i regija suočavaju s problemima zbog nedovoljno definisanog regulatornog okvira i nedostatka tehničkih kapaciteta. Zaključeno je da je razvoj kripto-forenzike, uz primjenu specijalizovanih alata za praćenje transakcija na blockchainu, apsolutni imperativ kako bi se identifikovali rizici i spriječile prevare poput lažnih „green token" projekata koji su zapravo oblik „greenwashinga". Upravo je održivost, odnosno ESG izvještavanje, bilo treći stub konferencije. Forenzički revizori su sve više fokusirani na ovo područje jer, kako raste značaj ESG izvještavanja za investitore, tako raste i pojava manipulacija podacima i lažnog prikazivanja ekološke odgovornosti. Forenzička verifikacija nefinansijskih izvještaja postala je nužnost za očuvanje povjerenja tržišta. Posebno je istaknut značaj novih standarda, poput VSME standarda za mala i srednja preduzeća u zemljama pristupnicama EU, koji predstavlja ključni instrument za pristup jedinstvenom tržištu i izvorima finansiranja, olakšavajući tranziciju ka održivom poslovanju. Nisu izostale ni teme vezane za

metodologiju i pravo. U eri digitalne manipulacije, klasične metode prikupljanja dokaza moraju se adaptirati kako bi bile prihvatljive na sudu. Autentifikacija digitalnih dokaza putem analize metapodataka i hash-verifikacije označena je kao presudna u savremenim sudskim postupcima. Predstavljene su i inovativne metode poput LUCID metode, koja kombinuje vizualno mapiranje i logičku dekompoziciju za otkrivanje složenih obrazaca prevare. Također, reafirmisana je ključna uloga forenzičkih revizora u sprečavanju zloupotreba stečajnog postupka i otkrivanju manipulativnog računovodstva koje vodi do propasti privrednih društava.

Na kraju, ali ne manje važno, konferencija se bavila pitanjem obrazovanja i etike. Zaključeno je da, uprkos tehnološkom napretku, ljudski faktor ostaje nezamjenjiv. Visoko obrazovanje mora integrisati alate vještačke inteligencije u nastavne procese kako bi buduće računovođe bile kompetentne, ali uz stalan oprez da se ne izgubi kritičko razmišljanje. Integritet finansijskog izvještavanja direktno zavisi od etičkog liderstva koje oblikuje kulturu organizacije. Generalni zaključak ISRCFA 2025 je da se profesija nalazi na prekretnici. Budućnost leži u „hibridnom modelu" koji spaja naprednu tehnologiju sa strogim etičkim principima, a ključ uspjeha u borbi protiv kriminala je interdisciplinarnost – saradnja revizora, IT stručnjaka, pravnika i regulatora.

Zbornik radova učesnika konferencije dostupan je na linku https://finra.edu.ba/zbornik-radova-isrcfa/

NAUČNA POLITIKA ČASOPISA

Časopis REVIZOR objavljuje radove iz oblasti društvenih nauka, a izuzetno i iz drugih naučnih oblasti, ako je tema rada povezana sa tematikom finansija, rizika i kontrola, računovodstva, forenzike i revizije. Navedene teme mogu da se obrađuju sa stanovišta mikro i makro ekonomije (ocena rizika iz okruženja), i sa različitim pristupom, kao što su upravljanje organizacijom, menadžment, komunikacija, odgovornosti prema društvenoj zajednici, odgovornosti prema prirodnom okruženju, i slično. Finansija, rizici i kontrole, računovod stvo, forenzike i revizija nerazdvojno su vezane sa svakim oblikom organizacije u svim delatnostima i svim vidovima svojine, tako da je tema o svakoj od njih pokrivena naučnom politikom časopisa. Sve vrste naučnih i stručnih radova značajano doprinose vrednosti časopisa.

U časopisu se objavljuju sve vrste radova: originalni naučni radovi, pregledni radovi, prethodna saopštenja, stručni radovi, prikazi i osvrti i slično.

Časopis REVIZOR izlazi kvartalno, u kontinuitetu od 1997. godine i tradicionalno je prisutan u naučnoj i stručnoj javnosti u zemlji i regionu. Interesovanja za časopis iskazana preko društvenih i naučnih mreža poazuju da jei zadnjih nekoliko godina zapažen rast ugleda časopisa i u međunarodnom okruženju.

- **Naučno polje:** Društveno humanističke nauke.
- **Naučne oblasti:** Ekonomija i organizacione nauke
- **Uže naučne oblasti:** Poslovna ekonomija; Upravljanje organizacijama; Finansije; Računovodstvo; Revizija; Forenzika; Poslovno pravo (u kontekstu revizije i finansijskog izveštavanja).

SCIENTIFIC POLICY OF THE JOURNAL

The journal REVIZOR publishes papers in the field of social sciences, and exceptionally in other scientific fields, if the topic is related to finance, risk and control, accounting, forensics, and auditing. These topics may be addressed from the perspective of micro and macroeconomics (e.g., environmental risk assessment) and through various approaches, such as organizational management, communication, social responsibility, environmental responsibility, and similar frameworks. Finance, risks and controls, accounting, forensics, and auditing are inextricably linked with every form of organization across all industries and types of ownership, meaning that each of these topics falls within the journal's scientific scope. All types of scientific and professional papers contribute significantly to the journal's value.

The journal publishes all categories of work: original scientific papers, review articles, preliminary communications, professional papers, reports, commentaries, and similar contributions.

REVIZOR is published quarterly and has been continuously issued since 1997, maintaining a strong presence in the scientific and professional community both domestically and in the region. Interest expressed through academic and professional networks in recent years shows that the journal's reputation has also grown internationally.

- **Scientific field:** Social Sciences and Humanities
- **Scientific disciplines:** Economics and Organizational Sciences
- **Narrower fields:** Business Economics; Organizational Management; Finance; Accounting; Auditing; Forensics; Business Law (in the context of auditing and financial reporting)

OSNOVNE INFORMACIJE O ČASOPISU

REVIZOR

Časopis za upravljanje organizacijama, finansije i reviziju

Časopis REVIZOR, od 2023. godine, izdaje Naučno društvo za upravljanje organizacijama iz Beograda. Naučna i izdavačka politika časopisa usklađene su sa ciljevima i zadacima Naučnog društva. Časopis je osnovan 1997. godine od strane Instituta za ekonomiku i finansije, a prvi broj časopisa izišao je 1998. Prvi i dugogodišnji urednik časopisa bio je profesor dr Stanoje Vukić.

UREĐIVAČKE POLITIKE

Uređivačke politike časopisa usklađene su sa Pravilnikom o kategorizaciji i rangiranju naučnih časopisa („Službeni glasnik RS“ broj 159 od 30. decembra 2020.).

Uputstvo za autore navodi se u svakom broju časopisa.

Časopis objavljuje originalne naučne i pregledne naučne radove i stručne radove koji su dobili pozitivna mišljenja recenzenata. Svaki autor snosi moralnu i etičku odgovornost za podatke objavljene u radu.

Glavni urednik i članovi uređivačkog odbora dužni su da preduzmu sve razumne mere da recenzenti ostanu anonimni tokom i nakon procesa evaluacije u skladu sa procedurom. Spisak recenzenata se daju u prvom broju časopisa iz svake kalendarske godine.

BASIC INFORMATION ABOUT THE JOURNAL

REVIZOR

Journal of Organization Management, Finance and Auditing

The journal REVIZOR (Journal of Organization Management Finance and Auditing) has been published by the Scientific Society for Organization Management from Belgrade since 2023. The journal was founded in 1997 by the Institute for Economics and Finance, and the first issue was published in 1998. The first and longtime editor of the journal was Professor Dr. Stanoje Vukić.

EDITORIAL POLICIES

The editorial policies of the journal are aligned with the Regulation on Categorization and Ranking of Scientific Journals („Službeni glasnik RS“ No. 159 of December 30, 2020).

Instructions for authors are provided in every issue of the journal.

The journal publishes original scientific and review scientific papers and professional papers that have received positive reviews from reviewers. Each author bears moral and ethical responsibility for the data published in the paper.

The editor-in-chief and members of the editorial board are obliged to take all reasonable measures to ensure that reviewers remain anonymous during and after the evaluation process, in accordance with the

Recenzenti su dužni da stručno i u zadatim rokovima dostave glavnom uredniku ocenu vrednosti i tačnosti istraživanja.

U svom radu, redakcija primenjuje Committee on Publication Ethics (COPE) Smernice (COPE Guidance) koje se bave osnovne politike i prakse koje su potrebni časopisima i izdavačima da bi se dostigli najviši standardi etike objavljivanja (COPE Guidance dostupne su na: https://publicationethics.org/)

ORIGINALNOST RADA I BORBA PROTIV PLAGIJATA

Uz rad, autori dostavljaju i izjavu o autorstvu i autorskim pravima, kojom potvrđuju da je rad njihovo originalno delo.

U slučaju da redakcija časopisa sama ili posredstvom recenzenata otkrije da je rad koji je predat za objavljivanje plagijat, u prvom narednom broju časopisa biće objavljena informacija o tome da je odnosni autor predao rad koji je plagijat, i biće navedeno originalno delo iz kog je plagijat uzet. Takođe, radovi istog autora neće se ubuduće objavljivati u ovom časopisu.

Po potrebi, biće obavešteni autor originalnog rada i redakcija časopisa u kome je taj rad objavljen.

procedure. The list of reviewers is published in the first issue of the journal each calendar year.

Reviewers are obliged to provide a professional and timely evaluation of the value and accuracy of the research to the editor-in-chief.

In its work, the editorial board applies the Committee on Publication Ethics (COPE) Guidelines, which address the basic policies and practices needed by journals and publishers to achieve the highest standards of publishing ethics (COPE Guidelines available at: https://publicationethics.org/).

ORIGINALITY OF WORK AND FIGHT AGAINST PLAGIARISM

Authors submit a statement of authorship and copyright along with their work, confirming that the work is their original creation.

If the journal's editorial board, either independently or through reviewers, discovers that the submitted work is a plagiarism, the information about the author submitting a plagiarized work will be published in the next issue of the journal, along with the reference to the original work from which the plagiarism was taken. Additionally, works by the same author will no longer be published in this journal.

If necessary, the author of the original work and the editorial board of the journal in which the original work was published will be notified.

UPUTSTVA AUTORIMA

Radove pripremiti u skladu sa sledećim uputstvom:

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Rukopis se predaje u elektronskom obliku (MS Word) na srpskom ili engleskom jeziku. Uz rad se obavezno dostavlja i pisana izjava autora o tome da je rad originalno delo. Priloge za časopis dostavljati na e-mail adresu: **casopisrevizor@outlook.com**

Uslov da rad uđe u proceduru recenziranja jeste da u potpunosti zadovoljava tehničke kriterijume koji su propisani ovim uputstvom. Dostavljeni rad mora biti lektorisan, tj. mora da zadovoljava jezičke i pravopisne standarde srpskog odnosno engleskog jezika.

Dostavljati samo članke koji nisu bili niti će biti objavljeni pre štampanja u našem časopisu. Kod posebnih slučajeva postoji mogućnost dogovora sa glavnim urednikom.

Autori dostavljaju redakciji sve identifikacione podatke o sebi.

Uređivački odbor zadržava pravo na odlučivanje o prihvatanju dostavljenog teksta za objavljivanje i redakcijske intervencije na tekstu do obima koji ne zadire u strukturu rada.

JEZIK I OBIM RADA

Tekst se predaje na srpskom ili engleskom jeziku. Ako bude prihvaćen, biće objavljen na jeziku na kome je predat. Izuzetno, uređivački odbor može odlučiti da rad dostavljen na engleskom jeziku prevede na srpski, i obrnuto.

INSTRUCTIONS FOR THE AUTHORS

The papers are to be prepared in accordance with the following instructions:

THE MANUSCRIPT

The manuscript is submitted in electronic form (MS Word) in Serbian or English. The paper should be accompanied by the written Author's Statement of originality. The papers are submitted to the following e-mail address: **casopisrevizor@outlook.com**

Precondition for the paper to be accepted for the reviewing procedure is that it fully satisfies technical criteria according to the instructions given here. The paper has to be proofread before submission and must meet the criteria regarding the language (Serbian and English) and spelling.

Submit articles which were not and will not be published before printing in our journal. In special cases, there is a possibility of agreement with the editor-in-chief.

The authors have to submit their identification data to the editors.

The editorial office reserves the right to decide on the acceptance of the submitted text for publication and editorial interventions on the text to the extent that does not interfere with the structure of the work.

LANGUAGE AND VOLUME

The text is submitted in Serbian or English language. If accepted, it will be published in the language in which it was submitted. Exceptionally, the editors will decide that the text submitted in Serbian language is to be translated and published in English, or vice versa.

Obim predloženog članka treba da bude od 12000 do 30000 znakova sa belinama. Prikazi knjiga i drugi prilozi treba da obuhvate do 6000 znakova sa razmacima. Izuzetak ide po dogovoru.

ORGANIZACIJA RUKOPISA

Članak mora da sadrži sledeće elemente i to ovim redom:

1. **Podatke o autoru.** – Ime i prezime, zvanje (titula) autora, naziv institucije u kojoj je autor zaposlen (afilijacija); obavezno navesti e-mail adresu autora.
2. **Naslov rada.** – Naslov treba da je jasan i precizan.
3. **Sažetak (rezime, apstrakt).** – To je kratak informativni prikaz sadržaja članka, koji sadrži cilj istraživanja, metode, rezultate i zaključak. U pogledu obima, poželjno je da sažetak ima oko 600 slovnih mesta, uključujući i beline. Rezime se dostavlja na srpskom i engleskom jeziku. Sažetak članka treba da stoji između naslova rada i ključnih reči, nakon kojih sledi tekst članka.
4. **Ključne reči.** – Predstavljaju termine ili fraze koji najbolje opisuju sadržaj članka. Dozvoljeno je navesti do pet reči odnosno fraza. Ključne reči se dostavljaju na srpskom i engleskom jeziku, i stoje iza sažetka pisanog na odgovarajućem jeziku.

Primer:

Ključne reči: *prihodi, kapital, eksterna revizija, interna kontrola, računovodstveni standardi.*

The paper should have between 12000 and 30.000 characters, including spaces. Book reviews and other contributions should include up to 6000 characters with spaces. The exception is by agreement.

ORGANIZATION OF MANUSCRIPT

The article must contain the following elements, in the following order:

1. **Information about the author.** – Name and surname, title of the author, name of the institution where the author is employed (affiliation) and the author's e-mail address.
2. **Title of the paper.** – The title should be clear and precise.
3. **Abstract.** – This is a brief presentation of the article content, which contains the research goal, methods, results, and main conclusions. In terms of volume, it is desirable that the abstract has about 600 characters including spaces. Abstract are submitted in Serbian and English. It stands between the title and keywords, after which the text of the article follows.
4. **Key words**. – The terms or phrases which best describe the content of the article. It is allowed to write up to five words, i.e. phrases. Keywords are submitted in Serbian and English, and are behind the abstract written in the appropriate language.

Example:

Keywords: *revenues, capital, external audit, internal control, accounting standards.*

5. **Tekst članka.** – Centralni deo predstavlja tekst članka u kojem autor uz upotrebu odgovarajuće aparature obrađuje određeni naučni problem. Tekst dostaviti kucan fontom 10; svaki novi pasus ide bez uvlačenja reda i jednim proredom se odvaja od prethodnog pasusa. Naslovi i podnaslovi su bez numerisanja, centriranja i uvlačenja.
   Raščlanjivanje naslova ide najdublje do tri nivoa. Različiti nivoi naslova označavaju se prema sledećem primeru:

Primer:

PRVI NIVO NASLOVA: BOLD, VERZAL

Drugi nivo naslova: kurent

Treći nivo naslova: kurziv

   Tabele po mogućnosti dostaviti i odvojeno u excelu.
   Grafikone zajedno sa izvornim podacima, ilustracije i ostale priloge obavezno dostaviti odvojeno od teksta kao prilog tekstu koji dostavljate.

6. **Popis korišćene literature.** – Posle teksta članka, daje se popis korišćene literature i to abecednim redom po prezimenima autora.
   Kod navodenja korišćenih izvora od strane drugih autora obavezno je označiti izvor.
   Popis se daje prema niže izloženom **Uputstvu za citiranje**, s tim da se godina izdanja stavlja odmah iza imena

5. **Text of the article.** – The central part is the text of the article in which the author uses appropriate tools while processing the writing of a scientific paper. Text should be typed in font 10; each new paragraph goes without indenting and is separated from the previous paragraph by one line spacing. Titles and subtitles are without numbering, centering and indentation.
   Depending on the text, the titles can have different levels. Therefore, the following method is used for marking different title levels.

Example:

FIRST LEVEL OF THE TITLE: BOLD, UPPERCASE

Second Level of Title: Bold, Title Case

Third level of the title: Italics, sentencecase

   Tables should be submitted separately in Excel if possible.
   Graphs, together with original data, illustrations and other additions must be submitted separately from the text as an attachment to the text you are submitting.

6. **List of used literature.** – After the text of the article, the list of used literature is specified in alphabetical order by authors' last name.
   When citing sources used by other authors, it is obligatory to indicate the source.
   The list is given according to the **Citation instructions**, with the year of publication coming right after the author's,

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Grupa autora sa skraćenicom/ Group author with abbreviation		
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Dillard, J. P. (2020). Currents in the study of persuasion. In M. B. Oliver, A. A. Raney, & J. Bryant (Eds.), *Media effects: Advances in theory and research* (4th ed., pp. 115–129). Routledge.

Thestrup, K. (2010). To transform, to communicate, to play – The experimenting community in action. In E. Hygum & P. M. Pedersen (Eds.), *Early childhood education: Values and practices in Denmark*. Hans Reitzels Forlag. https://earlychildhoodeducation.digi.hansreitzel.dk/?id=192

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Miranda, C. (2019). *Exploring the lived experiences of foster youth who obtained graduate level degrees: Self-efficacy, resilience, and the impact on identity development* (Publication No. 27542827) [Doctoral dissertation, Pepperdine University]. PQDT Open. https://pqdtopen.proquest.com/doc/2309521814.html?FMT=AI

Zambrano-Vazquez, L. (2016). *The interaction of state and trait worry on response monitoring in those with worry and obsessive-compulsive symptoms* [Doctoral dissertation, University of Arizona]. UA Campus Repository. https://repository.arizona.edu/handle/10150/620615

Evans, A. C., Jr., Garbarino, J., Bocanegra, E., Kinscherff, R. T., & Márquez-Greene, N. (2019, August 8–11). *Gun violence: An event on the power of community* [Conference presentation]. APA 2019 Convention, Chicago, IL, United States. https://convention.apa.org/2019-video

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NOVA KNJIGA

Naučno društvo za upravljanje organizacijama

MEĐUNARODNI STANDARDI ZA FINANSIJSKO IZVEŠTAVANJE U JAVNOM SEKTORU MRS JS – IPSAS

Autori: Jozefina Beke-Trivunac Gordana Vukelić

Iz predgovora

Interesovanje za primenu Međunarodnih računovodstvenih standarda za javni sektor proističe iz zahteva za visokom transparentnošću rada svih subjekata u javnom sektoru, posebno organa vlasti. Međutim, prihvatanje ovih standarda u praksi zahteva prevazilaženje brojnih prepreka usled njihove složenosti.

- Za njihovu primenu potrebni su stručnjaci koji poseduju izuzetno dobra znanja i veštine, ne samo iz oblasti finansijskog računovodstva, već i iz drugih srodnih oblasti, kao što su upravljanje finansijama, informacioni sistemi, velike baze podataka, upravljačko i forenzičko računovodstvo, i drugo. Proces sticanja ovih znanja je dugotrajan, zahtevan i skup.
- Na akademskim institucijama u našoj zemlji skoro da nema studijskog programa na kojem se ova materija celovito obrađuje. Posebno što je za kvalitetno obuku potrebno da i nastavnici na tim programima, pored akademskih zvanja, poseduju i odgovarajuća profesionalna zvanja.
- Stručni materijal za obuku treba da je jednostavan. Osnovni preduslov je kvalitetan prevod računovodstvenih standarda za javni sektor i kontinuirano ažuriranje izmena i dopuna postojećih i novih standarda. Proces prevođenja standarda zahteva prevodioce i recenzente sa dobrim poznavanjem finansijskog računovodstva.

Pri definisanju strategije za primenu MRS JS / IPSAS, neophodno je uzeti u obzir sve te činioce.

Svrha ove stručne monografije je da približi materiju MRS JS i tako pomogne u periodu izrade strategije za njihovu primenu u javnom sektoru.

Knjiga se može naručiti preko Naučnog društva za upravljanje organizacijama.

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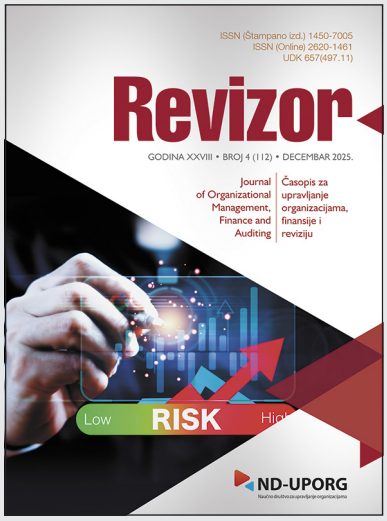

Osnovan 1997, s ciljem širenja kulture finansijskog izveštavanja

Inicijatori: prof. dr Stanoje Vukić, prof. dr Slavko Lisavac, prof. dr Marko Petrović, prof. dr Petar Cerović, prof. dr Miroslav M. Milojević

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