



Second Conference on Forensic Accounting

CONTEMPORARY FORENSIC ACCOUNTING
TRENDS IN COMBATING FINANCIAL FRAUD:
GLOBAL AND NATIONAL PERSPECTIVES

Conference Proceedings

Editors

Dejan Malinić

Savka Vučković Milutinović

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FOREWORD

An effective fight against fraud requires a stable regulatory framework, independent and robust institutions, transparency in the broadest sense, and the political willingness to undertake such an endeavor. In this context, three fundamental points must be clearly established. First, it is imperative to recognize that fraud is a global reality, and no country is immune to its occurrence. The absence of public discourse on fraudulent practices in certain jurisdictions does not imply their nonexistence. Second, fraud entails significant explicit and implicit costs for both individuals and institutions. Explicit losses are borne directly by those immediately affected, such as investors, employees, companies, financial institutions, business partners, and others. Nonetheless, the consequences extend beyond immediate losses, manifesting in compromised capital market efficiency and reduced investment inflows due to heightened uncertainty. The harm inflicted upon national economies amounts to billions annually. Public finances are further burdened as insufficiently effective institutions struggle to resolve a substantial number of cases, encounter obstacles in securing evidence for bringing indictments, suffer losses in litigation, and face significant compensation claims and associated expenditures. Finally, instances of fraud in financial reporting, enabled or facilitated, whether by action or inaction, by certain audit firms, result in reputational damage, while the integrity and credibility of the accounting profession at large are gravely undermined. Third, an effective fight against fraud, particularly organized crime and corruption, can yield meaningful results only when the expertise of those tasked with combating fraud surpasses the knowledge and capabilities of perpetrators. Education is of inestimable importance in this regard. Moreover, such an endeavor requires the coordinated integration of diverse competencies and activities across regulatory bodies, judicial institutions, investigative authorities, tax administrations, and both governmental and non-governmental sectors, in order to ensure a truly effective response to fraudulent practices.

The wide variety of fraudulent schemes further complicates their detection and prevention. Such practices may take numerous forms, ranging from relatively simple methods, such as deceptive emails (phishing) and text messages (smis-

hing), identity theft, credit card fraud, and insurance fraud, to more sophisticated instances, including public procurement fraud, online trading fraud, and asset misappropriation, and extending to major financial scandals, most often reflected in official financial statements, as well as large-scale corruption cases, including those of a political nature. Fraud can thus be identified across a broad spectrum of sectors, encompassing the real sector, the financial sector, large-scale public infrastructure projects, and major political corruption scandals.

Fraud is geographically widespread, occurring across all regions and economic contexts. While certain fraudulent practices exhibit a high degree of sophistication, long-standing traditional forms of fraud continue to persist. Although the most widely reported cases in the media tend to originate from developed countries with strong capital markets, this should not lead to the erroneous assumption that fraud is less prevalent in less developed countries with under-developed capital markets. Two key factors contribute to the greater public visibility of fraud in developed countries. The first stems from the fact that major financial scandals are frequently associated with publicly listed companies, a context reinforced by information asymmetry, particularly when ownership is widely dispersed, leaving shareholders, especially minority investors, in an informationally inferior position relative to management. The second factor arises from the higher transparency of regulatory bodies in developed countries, which actively publish information on major financial scandals, their investigation, and the outcomes of legal proceedings, thereby making such information publicly accessible. In contrast, in less developed countries, aside from media speculation, reliable information regarding fraudulent activities or the extent of budgetary losses resulting from insufficiently effective anti-fraud measures is typically difficult to obtain.

Moreover, the pressing global imperative to address sustainable development challenges gives rise to novel risks, including those emerging in the realm of fraud. The undeniable need to monitor progress toward the Sustainable Development Goals (SDGs) has brought companies, among the principal contributors to planetary boundary transgressions, into focus, requiring them to report on governance, environmental, and social impacts (ESG). The three-dimensional nature of ESG metrics increases both the complexity and cost of corporate reporting, thereby heightening the risks of fraudulent disclosures, which may arise in any of the ESG components. Pressures to achieve ESG targets are intensifying not only from investors and creditors, but also increasingly from regulators, the media, and the broader public. Therefore, combating fraud in general, and particularly at the corporate level, requires a proactive assessment of fraud risks through the ESG prism.

With the Second Conference on Forensic Accounting, “Contemporary Forensic Accounting Trends in Combating Financial Fraud: Global and National Perspectives,” we endeavor to address current challenges in the field of forensic accounting. Our objective is to provide professional support through the application of advanced investigative skills and effective tools that facilitate the clarification of complex business and financial transactions and the securing of evidence relevant to judicial practice. For the scientific program of the Conference, 22 papers have been accepted, authored by 52 contributors, which explore key issues in forensic accounting practice, with a key focus on areas such as financial statement fraud, anti-corruption measures, ESG-related fraud, and the detection of fraudulent activities across diverse industries. Importantly, the Conference underscores a regional perspective, reflecting our conviction that a coordinated regional approach to combating various forms of fraud is a key prerequisite for enhancing the effectiveness of public institutions in fraud prevention. The participation of authors and keynote speakers from the USA, the United Kingdom, the Netherlands, Romania, Slovenia, Montenegro, North Macedonia, Bosnia and Herzegovina, Croatia, and Serbia further attests to our commitment to fostering a forensic accounting approach that embraces diverse knowledge, methodologies, practices, and experiences.

Finally, we wish to express our sincere gratitude to our keynote speakers, authors, and reviewers, as well as to the members of the Program and Organizing Committees, whose tireless dedication ensured the successful fulfillment of the Conference objectives. We are also deeply thankful to the first- and second-generation students of the Master’s program in Forensic Accounting, who not only attended the Conference but also actively participated in practical case study exercises on the second day. In particular, we extend our heartfelt appreciation to the INL for their invaluable support and for providing the opportunity to collaborate in strengthening forensic accounting capacities in the Republic of Serbia.

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IDENTIFYING INDICATORS OF FRAUDULENT FINANCIAL REPORTING UNDER CONDITIONS OF INSTITUTIONAL OPACITY: THE RELEVANCE OF THE BENEISH MODEL

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Abstract

The growing complexity of global business operations, coupled with the challenges of recording and accounting for diverse transactions, as well as the ingenuity and unscrupulousness of fraud perpetrators, poses substantial obstacles to the accounting profession's pursuit of truthful and fair financial reporting. Manipulative reporting of net income, assets, equity, liabilities, and cash flows is a serious concern for investors, financial analysts, creditors, regulatory bodies, and the broader investment community. Timely fraud detection reduces adverse selection risk, improves investor returns, and enhances security for creditors. Moreover, it enables regulators to safeguard investor interests, ensure the orderly functioning of capital markets, and foster a stable and favorable business environment. The accounting profession's foremost priority is to be recognized for truthful and ethical reporting rather than for creative accounting practices, with its mission as the guardian of the public interest remaining paramount. Financial scandals and related frauds in financial reporting not only undermine the credibility of the accounting profession but also cause substantial harm that extends beyond companies and stakeholders to affect the state itself.

The absence of transparent information on fraud perpetrators, particularly in countries with underdeveloped capital markets, hampers the development of more sophisticated fraud indicators that could function not only as tools for fraud detection but also as early warning signals, supporting the prevention and mitigation of detrimental impacts. This paper explores the applicability of the five-variable Beneish model to companies operating in the Republic of Serbia. The research aims to assess the frequency of potential manipulations in financial statements and to examine sectoral differences in vulnerability to fraud-related risks. First, key performance indicators were employed to analyze the position of large companies, after which the aforementioned model was applied to a sample of 236 companies for the period between 2019 and 2022. The research findings may prove valuable to investors, banks, regulatory authorities, fraud prevention agencies, tax administrations, and other governmental bodies. Furthermore, they may provide a significant impetus for academic researchers to advance the development of models designed to estimate the likelihood of fraud at the national economy level.

Key words: forensic accounting, financial statements, fraud triangle, fraud detection, fraud prevention, M-score, sectoral analysis.

JEL Classification: M41, K13

Introduction

Truthful and fair reporting constitutes a fundamental imperative of the accounting profession. It underpins the credibility of the profession, reinforces the role of accounting as a guardian of the public interest, and shapes the reputation of individual accountants. Therefore, at the global, national, and corporate levels, considerable efforts are made to safeguard the public interest by ensuring access to relevant information for decision-making through the establishment and enforcement of professional and legal regulations, independent external audits, and the promotion of ethical conduct among all participants in the financial reporting chain. The fact that truthful and fair reporting is one of the key preconditions for creating an attractive business environment for the inflow of new domestic and foreign investments further underscores the critical importance of reporting quality.

Unfortunately, for a variety of reasons, including the complexity of business transactions, the intricacy of financial reporting, and the resulting discretion available to management, as well as the informational disadvantage faced by external users, it is evident that manipulations can never be fully eliminated. The numerous high-profile financial scandals reported in the media serve to confirm this. The situation is likely to be even more unfavorable given that not all scandals receive equal media attention, and that in less developed countries the transparency of fraud reporting is considerably lower. Importantly, this lack of transparency in no way diminishes the damage incurred.

Fraud prevention must be treated as a strategic priority by regulatory authorities overseeing financial reporting, institutions tasked with sanctioning fraudulent reporting, and the academic community, which must actively pursue solutions to this persistent challenge. The issue is further complicated by the inherent difficulty of proving fraud and by the fact that fraud perpetrators often differ significantly from typical offenders of other crimes. Many were diligent, committed, and reliable employees, respected and esteemed members of their communities. The majority had no criminal records. It could be argued that they were fundamentally good people who eventually engaged in wrongdoing (Romney & Steinbart, 2018, p. 133). In the context of fraud prevention, all available tools should be leveraged, from individual indicators and composite models to artificial intelligence. Our focus is on exploring the potential application of existing scoring models, as well as on developing new ones that could be employed to detect manipulations in financial reporting.

The structure of this paper is aligned with its research objectives. The study concentrates on potential manipulations in the financial statements of large companies. Specifically, through a retrospective analysis of financial reports, we aim to address three key research questions: What factors drive manipulative practices in the finan-

cial statements of large companies? How effective is the M-Score model in detecting such manipulations? Which sectors are particularly vulnerable to the risk of fraud?

1. Context of the study

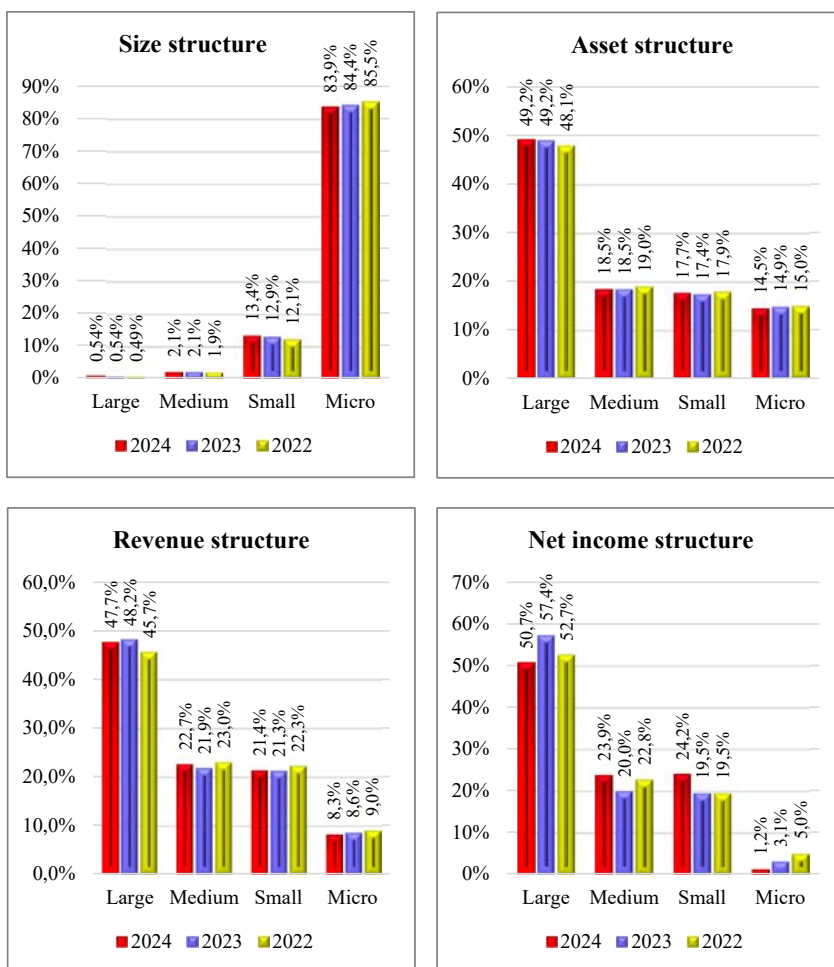
1.1. Positioning of large companies

The structure of a national economy has historically been a crucial determinant of its overall efficiency. The representation of individual sectors and industries reflects a country's existing comparative advantages, its national strategies for developing specific industries, and investors' willingness to allocate resources to particular segments. Collectively, these factors contribute to the efficient and effective functioning of both individual companies and the economy as a whole. From the perspective of legal form, companies can adopt various business structures. These differ in their methods of raising capital, the degree of founders' exposure to risk, from unlimited personal liability for obligations to liability limited to invested capital, the complexity of their management structures, and other characteristics. The overall picture of an economy's structure is further shaped by the diversity of company sizes, with clear distinctions among large, medium, small, and micro enterprises, each playing a unique role in economic activity, contributing to gross domestic product, generating employment, and defining the nature and scale of their operations. All of this provides a wide range of opportunities for investors to engage with and benefit from the functioning of a national economy.

Our research focuses on large companies in the real sector, regardless of their industry or legal form. Companies are categorized as large, medium, small, or micro enterprises according to standard criteria, including the number of employees, revenue, and total assets. Under the Law on Accounting, a company must meet at least two of these three criteria to be placed in a specific category. For example, large companies are defined as having more than 250 employees, revenue exceeding EUR 40,000,000, and total assets over EUR 20,000,000. All companies below these thresholds are classified as SMEs (Zakon o računovodstvu, 2019 and 2020). Micro, small, and medium-sized enterprises (SMEs) are distinguished by strong entrepreneurial initiative, high flexibility, and an exceptional capacity to adapt to economic changes. Recognizing their growing importance, governments in many countries provide substantial support to SMEs through measures such as reduced reporting requirements, lower training costs, tax incentives, and access to networking opportunities and digital platforms that help them overcome internal capacity constraints, gain easier access to relevant knowledge, and strengthen their resilience to unexpected disruptions. As a result, SMEs have become integral participants in global supply chains and drivers of green innovations (OECD, 2023).

The rising role of SMEs does not overshadow the relevance of large companies. Large companies are able to raise substantial amounts of capital, invest in research and development activities, and undertake major projects that are typically beyond the reach of SMEs. Their export potential and contribution to gross domestic product are often considerable. In this context, and considering the focus of our research, it is valuable to gain an overview of the characteristics of large companies in the Republic of Serbia (RS), primarily by comparing them with medium, small, and micro companies using key parameters that distinguish each of these groups (Figure 1).

Figure 1: Positioning of large companies in the RS economy



Source: Authors based on (APR, 2025)

Historically, large companies have never held a dominant position in their share of the total number of companies. Their presence in the economy of the Republic of Serbia (RS) over the past three years – when the total number of companies was 108,856 (2022), 110,808 (2023), and 112,670 (2024) – has been quantitatively negligible, ranging from 528 companies in 2022 to 613 in 2023. On average, they account for approximately 0.52% of all companies across the three years, with the remaining over 99.48% represented by SMEs. More specifically, medium-sized companies constitute, on average, 2.06% of all companies, small companies account for 12.8%, and micro companies make up approximately 84.62%. At first glance, large companies may seem relatively unimportant; however, this impression shifts entirely when additional indicators are considered. For example, an analysis of employment shows that, while large companies account for only 0.52% of all companies on a three-year average, they employ 36.39% of the workforce, compared with 21.39% in medium-sized companies, 25.53% in small companies, and 16.69% in micro companies.

The dominance of large companies becomes particularly evident when financial indicators are considered. Over the three years, large companies held, on average, 48.8% of total assets, representing nearly half of all asset investments. They also generated, on average, 47.2% of total revenues during the same period and accounted for 53.6% of total net income.

The fact is that, compared with ten or more years ago, the share of large companies across all categories has declined in relation to SMEs; nevertheless, they remain highly relevant in the structure of the economy (Malinić, Milićević, & Glišić, 2014). It should also be emphasized that all companies, regardless of size, actively participate in the country's economic activities. A substantial number of SMEs function as integral components of the supply chains of large companies. In some cases, large companies outsource segments of their production to smaller ones, thereby mitigating risks and managing costs more efficiently.

1.2. Theoretical explanation of financial statement manipulations

Given that corporate governance is most complex in large companies, that financial reporting in such firms is especially demanding in both scope and sophistication, and that some operate as publicly traded entities, these companies are particularly exposed to the risks of manipulative reporting. Indeed, many of the world's major financial scandals have involved large, well-known corporations. Consequently, large companies present a particularly compelling case for research on potential manipulations in financial reporting.

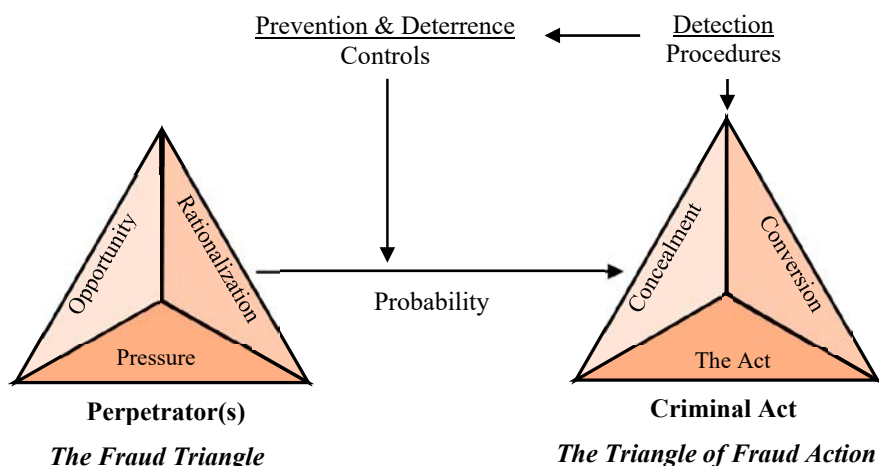
Competitive pressures, rising demands for product and service quality, increased expenditures on environmental protection, ambitious strategic objectives, and heightened investor expectations collectively place sustained pressure on management to generate value for shareholders and other stakeholders. Under such circumstances, management may resort to creative accounting practices, deliberately shaping the presentation of economic reality in financial statements to obscure actual performance and mitigate the impact of organizational or market crises. Fraud emerges when management intentionally misrepresents a company's financial position, profitability, or cash flows with the aim of misleading stakeholders who rely on financial statements for decision-making. The inherent complexity of large corporations, the sophistication of their financial reporting, and weaknesses in internal control systems further exacerbate this risk. Financial statement fraud poses significant challenges not only for companies and managers, who are the most frequent participants in such schemes, but also for those who may not be directly involved, giving rise to a wide array of negative consequences. These include reduced credibility of financial reporting, erosion of the integrity and objectivity of the auditing profession, decreased capital market efficiency, adverse effects on economic growth, increased litigation costs, substantial corporate losses, and, in extreme cases, bankruptcy, etc. (Rezaee & Riley, 2009, p. 7).

An effective fight against fraud requires a thorough understanding of its underlying causes. Agency theory provides a theoretical foundation for explaining manipulations and fraud in financial statements, offering valuable insights into the complex relationships within corporate governance structures, particularly those between owners and management (Jensen & Meckling, 1976). At its core lies the assumption that individuals act rationally and pursue self-interest, consistently seeking to maximize their personal utility in every decision-making context. In public corporations, conflicts of interest between managers and shareholders are to be expected, as managers (agents) occupy an informationally superior position relative to shareholders (principals). This informational asymmetry constrains shareholders' ability to effectively control managerial actions. Consequently, resolving such conflicts typically involves aligning managerial and shareholder interests, often through mechanisms that incentivize managers to act in the shareholders' best interest. However, when managers are willing to compromise their integrity in pursuit of personal gain, the risk of fraudulent financial reporting becomes both tangible and acute.

A theoretical explanation for fraud in financial reporting is provided by the so-called fraud triangle, a widely adopted framework for understanding the underlying causes of corporate fraud. Extending this framework, which centers on perpetrators and the conditions enabling fraud, we here introduce the

Meta-Model of White-Collar Crime, an approach that advances the fraud triangle by incorporating the triangle of the criminal act (or triangle of fraud elements) and emphasizing the specific actions a perpetrator must undertake to commit fraudulent activities (Figure 2).

Figure 2: Meta-Model of White-Collar Crime



Source: Partially adapted from (Dorminey, Fleming, Kranacher, & Riley, 2012, p. 571)

Donald Cressey's research on fraudulent behavior identified common characteristics among offenders (individuals imprisoned for "white-collar" crimes) that explain the underlying causes of fraud. These can be summarized as: (a) the presence of financial difficulties that, for various reasons, cannot be disclosed to others, creating perceived pressure or motivation to commit fraud; (b) awareness of the vulnerabilities of the company where the fraud occurs, recognizing not only the opportunities to commit fraud but also fostering the belief that it will go undetected; and (c) the creation of a perception in the perpetrator's mind that the abusive actions undertaken do not constitute criminal behavior, reflecting the rationalization of unacceptable conduct and the desire to remain "within the zone of moral comfort" (Cressey, 1950, pp. 742-743; Dorminey et al., 2012, pp. 557-558).

Managers and company owners face varying levels of pressure, opportunity, and rationalization, which explains the significant differences in both the types and intensity of fraud, even within the same organizational and managerial context (Zhu, Zeng, Wang, & Xiao, 2022, p. 2). The diversity in the manifestation of various types of pressure, opportunities, or means that can be exploited

to commit fraud, as well as the skillful rationalizations or justifications used to excuse such misconduct, is summarized in Table 1.

Table 1: Manifestations of pressure, opportunity, and rationalization

PRESSURE	
External	Internal
• Adverse economic conditions (inflation or recession) • Disruptions in supply chains • Industry-specific cyclical fluctuations • New unfavorable regulatory requirements • Intensified competition and declining profit margins • Restrictive borrowing conditions • Vulnerability to rising interest rates • Technological changes	• Management characteristics (ethical standards, relationships with owners, approach to financial reporting) • Overly ambitious strategic objectives • Substantial performance-based compensation • Operational cash flow challenges • Deterioration of financial position and profitability
Opportunities	Rationalization
• Poor corporate governance • Complexity of financial reporting • Potential for manipulations within regulatory and professional boundaries • Deficiencies in internal control systems • Limited effectiveness of internal audit functions • Hidden or incomplete disclosures • Ambiguous division of authority and responsibilities • Disordered document management • Transactions with related parties	• “I’m just borrowing; I’ll repay it quickly.” • Robin Hood syndrome: taking from those who have and giving to those who have not. • “I’m underpaid for the work I do.” • “No one will know, and I won’t get caught.” • “Everyone else does it.” • “They would understand if they knew my situation.” • “The rules don’t apply to someone in my position.”

Source: Author’s systematization

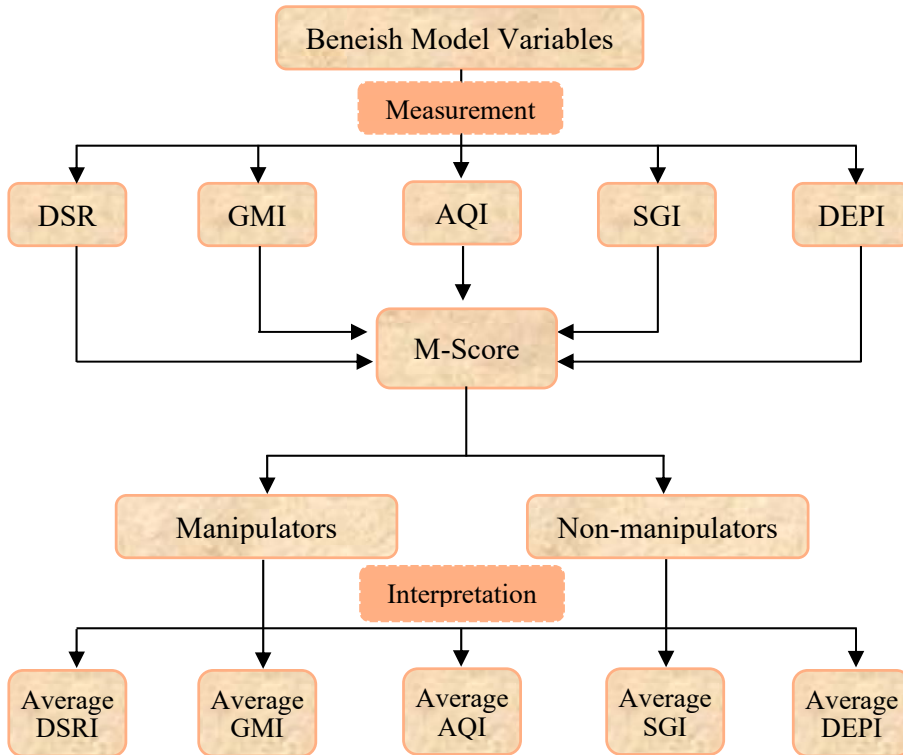
In general, financial statement fraud emerges from the interplay of all three attributes of the fraud triangle. For so-called predatory fraudsters (repeat offenders), the mere presence of an opportunity may suffice to trigger fraudulent behavior, whereas first-time offenders, or “situational” fraudsters, typically require all three components of the fraud triangle to be present (Hermanson, Justice, Ramamoorti, & Riley, Jr, 2017; Romney & Steinbart, 2018, p. 134). Moreover, individual differences in tolerance to pressure, along with the perpetrator’s skill set, can either increase or constrain the likelihood of committing fraud.

The triangle of the criminal act, forming the second component of the Meta-Model, comprises three additional elements: commission of the act, concealment, and conversion. In the context of intentionally misleading users of financial statements, the commission of the act may involve falsifying documents, recording fictitious revenues or receivables, fabricating inventory purchases, preparing financial statements without valid supporting documentation, and other similar actions. In such cases, the perpetrator seeks to conceal these activities to avoid detection and ultimately convert them into benefits. One of the key activities of any investigative process is demonstrating the intent to commit fraud. When it can be shown that the act was carried out, deliberate steps were taken to conceal it, and the perpetrator derived benefits from it, the existence of fraudulent intent becomes unequivocally clear.

The third component of the Meta-Model is equally critical, focusing on anti-fraud measures. Situated between the fraud triangle and the triangle of the criminal act, this component covers the likelihood of fraud occurring. To this end, efforts are directed toward prevention, aimed at limiting opportunities for fraud; deterrence, achieved by creating an environment that reduces the probability of misconduct; and detection and enforcement, which further discourage fraudulent behavior. It is generally recognized that the two most powerful deterrents are (1) the fear of fraud being detected and the perpetrator apprehended, and (2) the fear of consequences in the form of imposed sanctions (Dorminey, et al., 2012, pp. 570-572).

Building on our research focus on the application of the M-Score to detect potential manipulations in the financial statements of large companies, alongside theoretical insights into the causes of fraud and the necessity of prevention, deterrence, and detection, we have developed a conceptual research framework, presented in Figure 3.

Figure 3: Conceptual research framework



Source: Authors

The conceptual framework outlines the objectives of our research. First, it involves applying the Beneish five-variable model to detect fraud in the financial statements of large companies. This entails calculating all model components to derive the M-Score, which serves as a benchmark for classifying companies as either non-manipulators, with no indications of fraud, or manipulators, exposed to an elevated risk of fraudulent activity. To improve interpretative accuracy and identify financial statement items most prone to manipulation, the results will be compared with average values relevant to each model component.

2. Detecting the risk of financial statement manipulation: application of the Beneish model

2.1. The Beneish model

Numerous scholars have explored the potential for detecting manipulation in financial statements (Beneish, 1999; Dechow et al., 2011; Kaminski et al., 2004; Piotroski, 2000; Persons, 1995; Pustylnick, 2009; Roxas, 2011; Spathis, 2002, among others), with the most significant contribution made by Professor Beneish. He developed a model that produces a single result, the comparison of which against a critical threshold indicates the likelihood that a company is engaged in fraudulent financial reporting. However, such a conclusion cannot be drawn solely from the model's output; rather, the result should be regarded as guidance for further in-depth analysis.

The model is based on eight variables (M-Score 8), formulated to facilitate the detection of manipulations in financial statements (Beneish, 1999). In addition to this version, a reduced version consisting of five variables (M-Score 5) is also available, which is adopted in this study owing to its more straightforward applicability to data derived from financial statements of companies in the Republic of Serbia. Given that the Beneish model was originally developed using data based on the cost of goods sold accounting method, its application proves more complex when applied to datasets prepared under the total cost method. Therefore, this analysis employs the five-variable version of the model, calculated as follows:

$$\text{M-Score (5)} = -6.065 + 0.823 \times \text{DSRI} + 0.906 \times \text{GMI} + 0.593 \times \text{AQI} + 0.717 \times \text{SGI} + 0.107 \times \text{DEPI}$$

The model's relative simplicity, the ready availability of data required for its computation, and the presence of a clear interpretative benchmark have all contributed to its widespread popularity and application. Furthermore, it has demonstrated considerable practical efficacy, successfully identifying numerous manipulators prior to public disclosure. Its prominence was further enhanced when it detected fraudulent financial reporting at Enron a full year before the first official alerts were issued by professional analysts (Beneish, M., Lee, C., & Nichols, C., 2013).

The application of the model requires the calculation of five variables, whose formulas and corresponding explanations are presented below. All necessary data can be obtained from the balance sheet and income statement for two consecutive years.

Days' Sales in Receivables Index – DSRI

$$DSRI = \frac{Receivables_t / Sales_t}{Receivables_{t-1} / Sales_{t-1}}$$

The DSRI variable is designed to detect variations in receivables relative to sales revenues over two consecutive years. A high value of this variable may indicate that a company is manipulating its financial results by inflating revenues, thereby overstating its reported performance.

Gross Margin Index – GMI

$$GMI = \frac{(Sales_{t-1} - \text{Cost of goods sold}_{t-1}) / Sales_{t-1}}{(Sales_t - \text{Cost of goods sold}_t) / Sales_t}$$

Unlike the previous variable, GMI relates the prior year to the current year, with an increase in its value indicating a decline in gross margin. The premise underlying this variable is that companies facing diminishing profitability may be more inclined to engage in fraudulent reporting to preserve their financial position; consequently, a higher GMI value can serve as a warning that a company may be a potential manipulator.

Asset Quality Index – AQI

$$AQI = \frac{1 - (\text{Current assets}_t + PP\&E_t) / \text{Total assets}_t}{1 - (\text{Current assets}_{t-1} + PP\&E_{t-1}) / \text{Total assets}_{t-1}}$$

PP&E – Property, Plant and Equipment

The AQI variable focuses on the share of intangible assets, an item especially prone to manipulation, within total assets. An increase in this variable may signal the use of manipulative practices involving either internally generated or acquired intangible asset, aimed at artificially enhancing reported financial performance.

Sales Growth Index – SGI

$$SGI = \frac{Sales_t}{Sales_{t-1}}$$

The SGI variable, simple in its formulation, is designed to detect potential manipulations involving artificially inflated sales revenue (such as the recognition of fictitious or premature sales, etc.), aimed at enhancing or sustaining reported performance. However, interpreting this variable requires particular caution, as rising sales and higher SGI values do not automatically indicate fraudulent activity.

Depreciation Index – DEPI

$$DEPI = \frac{\text{Depreciation}_{t-1}/(\text{Depreciation}_{t-1} + PP\&E_{t-1})}{\text{Depreciation}_t/(\text{Depreciation}_t + PP\&E_t)}$$

The DEPI variable tracks changes in the depreciation rate across two consecutive years. An elevated value of this variable may suggest manipulative practices, such as reducing the depreciation rate to lower reported expenses and, consequently, present higher net income.

After calculating the variables and applying the model, the resulting M-Score is benchmarked against a threshold value that serves as the decision criterion. An M-Score exceeding this threshold indicates a high likelihood of financial statement manipulation, whereas a score below the threshold suggests absence of manipulation. In this study, the five-variable version of the model was used, with a threshold of - 2.22, consistent with the works of Corsia, C., Berardino, D. D., & Cimbrinic, T. (2015) and Mehta, A., & Bhavani, G. (2017). Since all variables in the Beneish model are formulated in a way that their higher values point to a greater likelihood of manipulation (Beneish, 2013), an elevated M-Score likewise reflects an increased probability that a company is a manipulator. Nevertheless, even a high score should not be interpreted as conclusive evidence of manipulation but rather as a *red flag* that requires further scrutiny. The model's result needs to be complemented with qualitative insights, and a reliable conclusion can only be drawn through a comprehensive analysis and consideration of the broader context.

Table 2: Average values of variables for manipulators and non-manipulators

Variable	Manipulators	Non-Manipulators
DSRI	1.465	1.031
GMI	1.193	1.014
AQI	1.254	1.039
SGI	1.067	1.134
DEPI	1.077	1.001

Source: Beneish, 1999, p. 27

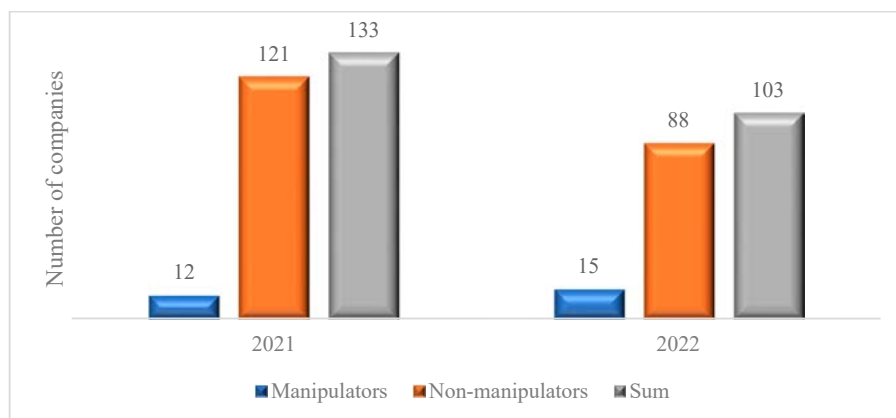
In addition to the primary decision criterion signaling potential financial statement manipulation, the individual variable values can offer valuable analytical insights. Comparing these values with the averages for manipulators and non-manipulators from Beneish's sample (Table 2) can help identify how, and through which positions, a company might manipulate its financial statements. Deviations in specific

variables highlight areas that require closer scrutiny to assess the likelihood of fraudulent activity. Nevertheless, caution is necessary before drawing conclusions, as high values of some variables may simply stem from regular business operations.

2.2. Key characteristics of the sample

The analysis in this study was conducted on a sample of large companies over the 2020-2022 period provided by *CUBE* database. Three fiscal years period was the basis for calculating the M-score for 2021 and 2022. Companies were subsequently classified as manipulators or non-manipulators based on these M-scores. To enhance the reliability of these classifications, the results were cross-checked against auditors' opinions, thereby introducing an additional validation criterion to ensure that the companies identified by the M-score were indeed manipulators or non-manipulators. The sample of manipulators consisted of companies that, in addition to recording high M-scores indicative of financial manipulation, did not obtain unmodified audit opinions (they received qualified opinions). In contrast, the non-manipulator sample comprised companies that, in both years, had M-score pointing to the absence of manipulation in financial statements and simultaneously received unmodified audit opinions. To ensure that each company was represented only once in the sample, a non-duplication procedure was applied. Specifically, for companies classified as manipulators or non-manipulators in both years, the observation corresponding to the less favorable M-score (for manipulators) or the more favorable M-score (for non-manipulators) was retained. Following this procedure, the initial dataset of 466 companies observed over two fiscal years was reduced to a final sample of 236 companies, whose structure is displayed in Figure 4.

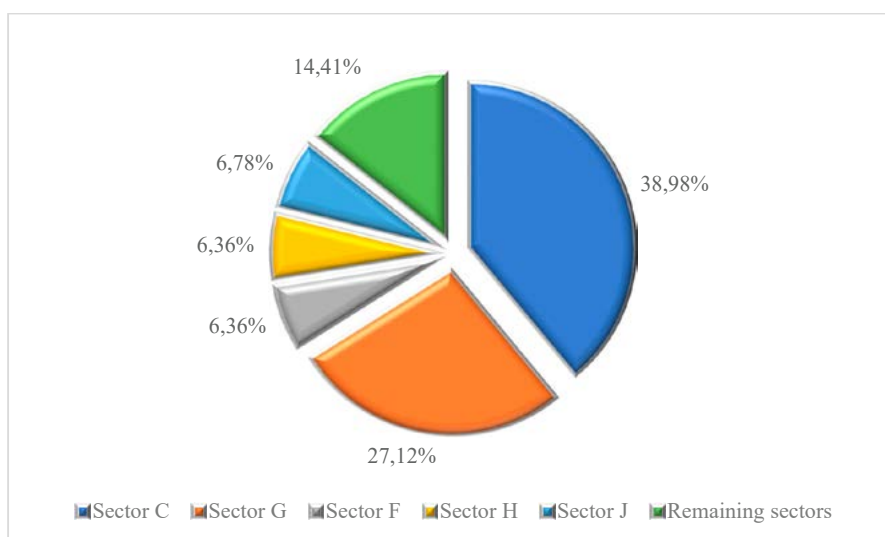
Figure 4: Structure of the final sample



Source: Authors' illustration

Since the research aims not only to assess the frequency of potential financial statement manipulations but also to analyze sectoral exposure to fraud risks, the sample was further segmented by sector. It is important to note that Sector K – Financial and Insurance Activities was excluded from the analysis, as the Beneish M-Score is not applicable to financial institutions. All other companies were classified according to their respective sectors. Sectors with a substantial number of companies are presented individually, while those with fewer companies were grouped together. Figure 5 illustrates the sectoral distribution of the sample.

Figure 5: Sectoral structure of the sample



Source: Authors' illustration

As expected for the Serbian economy, Sector C – Manufacturing accounts for the largest share of 38.98%, followed by Sector G – Wholesale and Retail Trade at 27.12%. Sectors F – Construction, H – Transportation and Storage, and J – Information and Communication show similar representation, each ranging between 6% and 7%. The remaining sectors are aggregated and collectively comprise 14.41% of the sample.

2.3. Application of the Beneish model and analysis of findings

Once the sample was structured, the Beneish M-Score was applied to the data. The analysis encompassed both the full sample and sector-specific data to identify potential patterns of financial statement manipulation within particular sectors. The results for the overall sample are presented below, followed by an overview of sectoral findings.

Table 3: Average values of variables and m-score for manipulators and non-manipulators

	DSRI	GMI	AQI	SGI	DEPI	M-Score
Non-Manipulators						
Values for companies in the sample	0.897	-0.254	0.838	1.208	1.07	-4.079
Beneish benchmark	1.031	1.014	1.039	1.134	1.00	< -2.22
Manipulators						
Values for companies in the sample	1.479	1.408	51.341	1.154	0.941	27.801
Beneish benchmark	1.465	1.193	1.254	1.607	1.077	> -2.22

Source: Authors' calculations

Table 3 presents the results for all companies in the sample, alongside a comparison with the averages reported in Beneish's study. While these averages do not allow for definitive conclusions due to the specific characteristics of the underlying companies, they provide a useful benchmark for interpreting the results. For non-manipulator companies, the M-Score values are clearly below the threshold, and the values of all individual variables are either below or only slightly above Beneish's averages. This further supports the conclusion that these companies do not engage in fraudulent financial reporting. As previously noted, a higher SGI value is not inherently negative and can, in fact, be a positive indicator. Accordingly, a slightly elevated SGI is consistent with the classification of these companies as non-manipulators. Specifically, this group exhibits a negative GMI value, reflecting negative gross margins for some companies. Although this signals weaker performance, the data suggests that these companies are not manipulating financial statements to portray enhanced results, as such practices would likely have yielded positive gross margin figures.

When examining the values for manipulators, we can see that the M-Score value is significantly above the threshold. Analyzing the individual variables reveals that the AQI largely “pulls” the M-Score upward, highlighting the need to investigate asset quality due to suspected manipulations of intangible assets. Notably, in contrast to non-manipulators, these companies exhibit a positive GMI value that exceeds the averages reported in Beneish’s sample. This suggests that these companies may have engaged in certain financial statement manipulations to present profitability as stronger than it actually is. Suspicion is further reinforced by the lower SGI value (below both the benchmark for manipulators and the average for non-manipulators), indicating that the increase in gross margin was not accompanied by corresponding sales growth, thereby calling into question the source of the reported gross margin improvement.

Table 4: Average values of variables and m-score for manipulators and non-manipulators by sector

Non-Manipulators						
	DSRI	GMI	AQI	SGI	DEPI	M-Score
Beneish benchmark	1.031	1.014	1.039	1.134	1.00	< -2.22
Manufacturing	0.847	-0.183	0.826	1.248	1.001	-4.042
Construction	0.884	0.464	0.938	1.005	1.231	-3.509
Wholesale and Retail Trade	0.924	0.715	0.789	1.199	0.964	-3.226
Transportation and Storage	1.029	-2.890	0.811	1.341	0.983	-6.290
Information and Communication	1.046	-0.170	0.921	1.095	1.047	-3.916
Other sectors	0.861	-1.891	0.919	1.188	1.526	-5.511
Manipulators						
	DSRI	GMI	AQI	SGI	DEPI	M-Score
Beneish benchmark	1.465	1.193	1.254	1.607	1.077	> -2.22
Manufacturing	<i>1.511</i>	-0.733	<i>9.329</i>	1.202	0.871	<i>1.002</i>
Construction	<i>1.408</i>	<i>2.184</i>	<i>1.277</i>	1.180	<i>1.126</i>	<i>-1.203</i>
Wholesale and Retail Trade	1.110	<i>1.921</i>	<i>402.625</i>	1.188	1.063	<i>236.311</i>
Transportation and Storage	1.104	2.289	<i>5.516</i>	1.085	0.948	<i>1.068</i>
Information and Communication	0.980	<i>2.744</i>	<i>13.483</i>	0.993	0.560	<i>5.994</i>
Other sectors	1.889	<i>2.038</i>	<i>8.051</i>	1.152	0.956	<i>3.038</i>

Source: Authors’ calculations

Similar results to those observed for the full sample are presented in Table 4, broken down by sector. For non-manipulator companies, all sectors exhibit M-Scores below the threshold, and the values of all individual variables are either below or only slightly above Beneish's averages, confirming that these companies do not engage in financial statement manipulation. The focus of the analysis is on the second part of the table, which pertains to manipulators, with values exceeding the threshold highlighted in italics. All sectors display M-Scores above the threshold, with the Construction sector recording the lowest score, while the Wholesale and Retail Trade sector stands out with a notably higher M-Score. To understand the mechanisms of manipulation within these sectors, the analysis shifted from the aggregate M-Score to the individual variable values. In all sectors, the asset quality variable (AQI) consistently registers the highest values, in line with findings obtained for the overall sample. Its exceptionally high values in certain sectors, along with deviations from benchmark values across all sectors, underscore the need for further investigation to identify the underlying causes of these discrepancies. In the Manufacturing sector, particular attention should be given to the DSRI variable, as its elevated value indicates potential revenue overstatement. When considered alongside the increased SGI value (which, although below the manipulator benchmark, exceeds the non-manipulator average), these findings raise suspicions that revenue overstatement may be occurring in this sector. The Construction sector records the lowest M-Score, partly due to its comparatively lower AQI relative to other sectors. However, it exhibits the greatest number of variables deviating from benchmark values. A higher DSRI suggests potential revenue overstatement, a concern further reinforced by the increased GMI, which reflects a decline in gross margin. Such weakening performance may create additional incentives for revenue manipulation. Although the DEPI variable is also elevated, non-manipulator companies in this sector display even higher values, indicating that a reduced depreciation rate should not necessarily be interpreted as a signal of manipulation. In the Wholesale and Retail Trade sector, an exceptionally high AQI value is accompanied by an elevated GMI, suggesting that negative results may have incentivized the manipulation of financial statements to improve reported performance. Similar patterns, though with more moderate AQI levels, are observed in the Transportation and Storage, Information and Communication sectors, as well as in the aggregated group of other sectors. The Information and Communication sector stands out with the weakest performance, as evidenced by a contraction in sales revenue. The consistency of the values of these indicators across sectors indicates that the conclusions drawn for Wholesale and Retail Trade can be meaningfully extended to all of them.

3. Limitations of the study

The limitations of this research are, to some extent, determined by the inherent constraints of the applied model, the most significant being that its output cannot guarantee precise classification; rather, it can only indicate the likelihood of fraud in financial statements. This limitation partly arises from errors intrinsic to the model itself. Specifically, two types of errors may occur, leading to misclassification: the model may classify a manipulator as a non-manipulator (Type I error), or, conversely, classify a non-manipulator as a manipulator (Type II error). To mitigate this limitation and enhance the reliability of the findings, the sample of manipulators and non-manipulators was cross-validated against audit results, providing an additional control mechanism.

In addition to potential classification errors, the model is subject to further limitations, some of which are universal, while others stem from the specific characteristics of the Serbian economy compared to the U.S. economy, where the model was originally developed. Among the universal limitations, the most important remains the aforementioned possibility of misclassification. This may also occur because certain variables can exhibit high values even in the absence of manipulation, reflecting normal business operations. This effect is particularly pronounced for the SGI variable, where high values may reflect positive performance. Rather than indicating manipulations and fraudulent behavior, elevated values can result from a company's successful expansion and growth in its customer base. Consequently, a thorough qualitative analysis of the results is essential prior to drawing any conclusions. With regard to limitations specific to the domestic context, there is the previously mentioned complexity in calculating the eight-component M-score. Moreover, for the five-component variant of the model, certain adjustments to the data are necessary for domestic companies due to differences in accounting practices. Finally, it is important to note that the model was originally developed using data from publicly listed companies, whereas the Serbian economy is characterized by a relatively small and inactive capital market.

Conclusion

The present analysis clearly indicates that suspicions of financial statement manipulation can be observed within the Serbian economy. In the analyzed sample of 236 companies, 11.44% were identified as potential manipulators. Mitigating negative consequences of manipulations requires a dual approach to fraud prevention, encompassing both practical and theoretical measures. Practically, this involves conducting more rigorous audits and implementing

stricter enforcement mechanisms. Theoretically, it entails the development of robust detection models capable of identifying fraudulent financial reporting with a minimal margin of error.

The application of the Beneish model to the selected sample revealed no significant differences in manipulation methods across economic sectors. The findings indicate that manipulations based on cost capitalization predominate in all sectors, suggesting that further analysis should focus on asset quality. Meanwhile, the Manufacturing and Construction sectors exhibit instances of revenue overstatement. Additionally, the observed deterioration in performance, reflected by declining gross margins across all sectors, points to an increased likelihood of financial statement manipulation.

In light of the aforementioned limitations of existing models, it becomes evident that there is a pressing need to develop frameworks that take into account the specific characteristics of the domestic economy. While universal solutions may be useful in serving a general purpose, they should primarily be regarded as a baseline requiring further adaptation to local contexts. Models tailored to the structural and institutional particularities of the domestic economy, specifically designed for fraud detection, could generate substantial benefits. By mitigating the risk of adverse selection, such models would contribute to the deepening of the capital market, expand access to new sources of financing for domestic companies, and support a reduction in interest rates, thereby enhancing the overall competitiveness of the banking sector. Moreover, a continued decline in interest rates would be fostered by enhanced creditor security. Additional benefits would include improvements in the business environment, increased attractiveness of the country to foreign investors, and, consequently, an expansion of economic activity as a pivotal driver of overall national progress. The implementation of these models could also help alleviate fiscal pressures at the state level. Greater efficiency of the domestic judiciary, achieved through the streamlined collection of higher-quality evidence facilitated by these models, would lead to shorter trial durations, a lower incidence of lost cases and compensation claims, and a reduction in other expenditures that place a burden on the public budget.

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USING BENFORD'S LAW TO DETECT COSMETICS EARNINGS MANAGEMENT IN THE EU

Abstract

This study employs Benford's Law to detect cosmetic earnings management (CEM) through second-digit rounding anomalies in the reported net incomes of listed firms across the 27 European Union Member States (EU-27) over the period 2008 to 2018. Rounding bias, as a form of CEM, involves strategically adjusting financial figures toward psychologically salient round numbers through small, immaterial modifications. However, such practices may exploit investors' and creditors' decision heuristics. To test our hypotheses, we analyzed 27,467 earnings observations, separately for profit and loss earnings numbers. The results reveal significant rounding behaviors in positive earnings, characterized by an excess of zeros and a shortage of eights as the second digit, consistent with upward rounding practices. Losses, however, show fewer significant anomalies. The study further examines the impact of Audit Regulation 537/2014 by comparing patterns before and after its implementation. Findings indicate that CEM, particularly in reported losses, decreased post-regulation, while some rounding tendencies appear in profits. These results provide evidence of CEM in EU-27 firms and suggest that enhanced audit regulations somewhat contribute to reducing CEM.

Keywords: earnings management, rounding up, cognitive biases, Benford's law, EU countries

JEL Classification: C46, M41

Introduction

Benford's Law is a mathematical pattern observed in naturally occurring numerical data, where smaller digits appear as the leading digit more frequently than larger digits (Newcomb, 1881; Benford, 1938). Empirical research broadly supports the claim that financial data from genuine firms usually conform to Benford's Law, while data from manipulated or fraudulent sources tend to deviate (Nigrini 2012; Durtschi, Hillison & Pacini, 2004). While conformity to Benford's Law in a dataset does not guarantee that the data are naturally

occurring, any deviation from this expected pattern should prompt a degree of suspicion and further scrutiny (Nigrini, 1996).

In this paper, we focus on the application of Benford's Law in detecting the prevalence of a special type of earnings management, commonly referred to as 'cosmetics earnings management' (hereafter CEM). This type of earnings management utilizes cognitive bias by focusing on the left-most digits as the primary anchors in number perception. The most common illustration of this tendency is related to pricing phenomena where consumers perceive a price of €1.99 to be significantly less than €2.00 (Carslaw, 1988; Thomas, 1989). Since aggregate earnings are widely regarded as the key measure of a firm's performance, managers may have incentives to make small adjustments around important cognitive thresholds (i.e., multiples of 10) to shape how users of financial statements perceive the firm's success. As argued by Thomas (1989), even slight rounding of earnings can influence perceptions, so contractual incentives may lead to disproportionately large changes in perceived profitability and firm value. Contractual provisions such as bonus schemes or debt covenants may encourage managers to engage in CEM to achieve a significant economic effect, especially when the terms are defined by round numbers (Watts & Zimmerman, 1986).

Empirical studies have consistently demonstrated that reported earnings often diverge from Benford's Law, exhibiting an unusually high occurrence of zeros and lower digits, while showing a notable deficiency of nines and higher digits as the second digit (Carslaw, 1988; Thomas, 1989; Kinnunen & Koskela, 2003; Van Caneghem, 2002; Guan, He & McEldowney, 2008; Jordan, Clark & Waldron, 2014; Stojanovic & Borovecki, 2015; Lebert, Mohrmann & Stefani, 2021). Our research contributes to the existing literature by providing evidence of earnings rounding behavior within the EU institutional environment, covering the period from 2008 to 2018. Additionally, to assess the important regulatory impact, the decade of data is segmented into pre- and post-implementation periods to evaluate how Audit Regulation 537/2014, governing statutory audits of public-interest entities (PIE), has affected the probability of CEM. Our analysis indicates that the net income of EU-27 countries reporting a profit reveals some characteristics associated with rounding up. Our findings indicate that CEM, especially for reported losses, declined following the regulation; while some rounding practices are evident in profits, the overall deviations do not reach statistical significance at the conventional 5 percent threshold.

In certain aspects, our research aligns with the work of Stojanovic and Borovecki (2015), who utilized Benford's Law to analyze quarterly earnings reports from European companies adhering to International Financial Reporting Standards (IFRS) during the 2004–2009 period, to detect CEM. They find that rounding behavior is strongest in the first quarter and decreases throughout the year,

with the fourth quarter showing the weakest evidence of CEM. This pattern is likely due to stricter audits and regulatory scrutiny at year-end. Nonetheless, their study differs from ours in terms of its temporal scope, the composition of the sample, and regulatory focus. Namely, their study includes countries outside the EU-27 regulatory framework, such as Switzerland, Norway, Macedonia, Russia, and Ukraine.

The following section provides a brief literature review and hypotheses development. Section three presents methodology, while section four analyzes the empirical findings. The final section concludes with closing observations.

1. Literature review and hypotheses development

Carslaw (1988) was the first to apply Benford's Law to detect anomalies in earnings distributions, revealing an unusual surplus of zeros and a lack of nines as the second digit in positive earnings reported by New Zealand companies. This pattern suggests that managers round earnings upwards when they are just below the key reference points denoted by $N \times 10^k$. Similar findings were reported by Thomas (1989), who separately analyzed 69,000 positive earnings numbers and 11,000 negative earnings numbers of U.S. companies. While the findings for U.S. firms' reporting profits align with Carslaw's results, Thomas identifies the opposite pattern for losses (i.e., excess of nines and lack of zeros as second digits). Thomas (1989) argues that managers round reported earnings to influence firm valuation and meet contract benchmarks, because even small changes can influence heuristically driven investor decisions. Contracts defined by round figures may further motivate earnings management, especially near key thresholds.

Niskanen & Keloharju (2000) documented rounding up CEM on a sample of Finnish companies, but found significantly fewer sixes and sevens as second digits, while eights and nines showed no anomalies. Their findings suggest that Finnish companies exaggerate earnings more extensively and do not just round nines up to zeros. Van Caneghem (2002) found the upward rounding of reported pre-tax income among U.K. companies and demonstrated that managers utilize discretionary accruals to achieve this rounding of earnings figures. Furthermore, Kiunen and Koskela (2003) conducted a comprehensive study testing for CEM in 18 countries from 1995 to 1999. They find that CEM is a prevalent international phenomenon, with its likelihood influenced by certain institutional factors. The countries in their sample with the highest occurrence of CEM were Spain, Hong Kong, and Singapore, while Norway, the U.K., and Sweden demonstrated the lowest likelihood. CEM has been documented in various countries, including Japan (Skousen, Guan, & Wetzel, 2004), Taiwan

(Guan, Lin, & Fang, 2008), China (Dang, He, & Sun, 2017), and Germany (Lebert, Mohrmann, & Stefani, 2021), but some exceptions exist. For example, Özarı and Ocak (2013) analyzed quarterly data from Istanbul Stock Exchange companies between 2005 and 2010 and found no evidence of CEM.

In the European context, the most extensive study on CEM was conducted by Stojanovic and Borovecki (2015). Using a sample of European companies reporting under IFRS, they find a pronounced tendency of companies to engage in CEM. However, they find some regional differences. Profit-related CEM is prevalent in Nordic countries, while CEM related to losses is more commonly observed in Eastern Europe. Western European countries tend to display both profits rounding up and losses rounding down CEM patterns. In this study, we reinvestigate the patterns of CEM in European countries by focusing on listed companies in the EU-27 countries. Based on prior literature and findings, we set the following hypothesis:

H1: There will be an abnormally higher (lower) than expected occurrence of low (high) digits in the second position for reported earnings.

Furthermore, prior studies provide evidence that significant accounting and auditing regulatory changes can change the likelihood of CEM. For example, after the SOX implementation in 2002, several studies tested for CEM and found evidence of CEM in pre-SOX samples but little to no manipulation after SOX, indicating SOX largely deterred this behavior (e.g., Aono & Guan, 2008; Jordan & Clark, 2011). Since our research period encompasses the introduction of important audit regulation that pertains to enhancements in PIE statutory audits (Audit Regulation 537/2014), we divided our sample into pre- and post-regulation periods to examine the potential impact on CEM. Accordingly, that set the following hypothesis:

H2: The likelihood of CEM has decreased after the introduction of the Audit Regulation in 2014.

2. Methodology

CEM studies typically apply Benford's Law as the standard for predicting the frequency distribution of certain digits within numbers. The distribution was originally identified independently by American astronomer Steven Newcomb (1881) and American physicist Frank Benford (1938), who examined various datasets including lengths of rivers, population sizes, home addresses, and atomic weights of elements. Although Newcomb was on the trail of an intriguing pattern, he did not provide a thorough theoretical explanation or robust empirical verification like Benford. As a result, his discovery remained largely unnoticed for nearly fifty years (Durtschi, Hillison & Pacini, 2011). Drawing

on this extensive empirical evidence, Benford formulated explicit mathematical expressions to calculate the probability of each digit appearing in various numerical positions. The overall expected probability of D_2 as the second-from-left-most digit can be determined using the following formula (Nigrini & Mittermaier, 1997: 54):

$$\text{Prob}(D_2 = d_2) = \sum_{d_1=1}^9 \log_D \left(1 + \frac{1}{d_1 d_2} \right) \quad d_2 \in \{0, 1, \dots, 9\}$$

The expected occurrence of digits decreases from zero to nine, meaning that numbers are more likely to have zero as their second digit than nine.

Benford's Law can be applied in many situations, but it does not hold for every set of numbers. Benford's Law does not apply to numbers generated sequentially or by specific algorithms, like postal codes, bank accounts, or invoice numbers. It also excludes numeric identifiers used as labels, data with fixed limits, and numbers manipulated to achieve psychological or marketing effects. Benford's law has been found to apply to those sets of data that are second-generation distributions or data that are composed of numbers from different sources (Hill, 1995). Accounting data tend to follow Benford's Law because such data often span several orders of magnitude and arise from combinations of numbers like quantities multiplied by prices. Hill (1998) explains that the use of Benford's Law reflects the natural logarithmic distribution of digits in data sets where values are not arbitrarily assigned or constrained but come from real-world, cumulative processes. Therefore, for Benford's Law to be effective and conclusions reliable, two key assumptions must be met: (1) the genuine data should conform to Benford's distribution, and (2) any manipulated data should deviate from this pattern.

Conformity with Benford's law can be tested using different criteria and statistical tests (Nigrini, 2012). To validate the observed frequency of digits in our dataset against the predicted frequency according to Benford's Law, we applied the Z-statistic, the Chi-square (χ^2), and the Mean Absolute Deviation (MAD). The Z-statistic tests whether individual digits significantly deviate from expected frequencies, considering sample size and expected proportions. The Chi-square tests the statistical significance of the whole distribution. High Chi-square values for different digits are typically associated with high Z-statistics, and vice versa. However, both Z-statistics and Chi-square test suffer from the excess power problem. Therefore, we also use MAD. MAD, which is favored by Nigrini (2012: 158), measures the average absolute deviation of observed proportions from expected ones and is less sensitive to sample size. However, there are no objective critical scores for the MAD test. Instead,

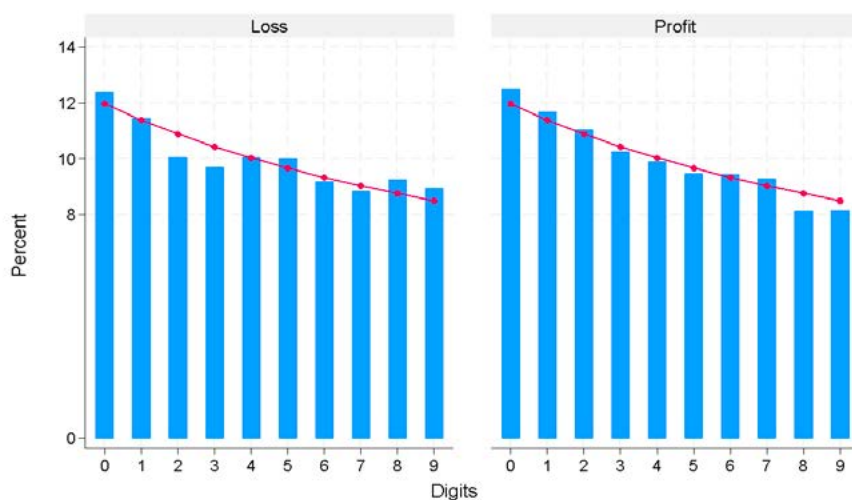
Nigrini (2012), based on experience, proposed critical MAD values to reach conformity conclusions defined as “close conformity”, “acceptable conformity”, “marginally acceptable conformity”, and “nonconformity”.

3. Findings

3.1. The patterns of CEM in the EU-27

To test our hypotheses, we used unscaled net income figures of EU-27 listed companies from the Bureau van Dijk’s Orbis database, covering the period 2008 to 2018. The initial sample included 42,141 firm-years observations. However, the final sample was reduced to 27,467 firm-year observations after dropping observations without information on net income and those with net income less than 10€. The remaining sample is further split into 19,638 (71.50%) positive net income observations (profits) and 7,829 (28.50%) negative net income observations (losses). This separation is important because manipulation patterns can differ depending on whether firms round up earnings just below the $N \times 10^k$ reference point (where the second digit from the left is a nine) or report earnings slightly above such thresholds (where the second digit from the left is a zero). The distribution of the second digits for positive and negative net income numbers is presented in Figure 1.

Figure 1: Distribution of the second digits in profits and losses



Source: Author’s research

Visual inspection of the observed digits distribution represented as bars against the expected digit distribution represented by a line indicates some deviations for both profit and loss observations. To test whether observed frequencies deviate from the expected distribution, we calculated Z-statistics (untabulated) for each digit and presented their *p*-values in the last columns of Tables 1 and 2. Namely, we expect abnormally higher (lower) than expected occurrence of low (high) digits in the second position for positive net income numbers (negative net income numbers). Table 1 presents the results of digital analysis for positive net income numbers.

Table 1: Second digit distribution of positive earnings

Second digit	Count	Percent observed	Percent expected	Diff.	<i>p</i> -value
0	2461	12.532	11.968	0.564	0.016
1	2296	11.692	11.389	0.303	0.181
2	2170	11.050	10.882	0.168	0.450
3	2017	10.271	10.433	-0.162	0.469
4	1944	9.899	10.031	-0.132	0.545
5	1861	9.477	9.668	-0.191	0.372
6	1858	9.461	9.337	0.124	0.548
7	1827	9.303	9.035	0.268	0.191
8	1600	8.147	8.757	-0.610	0.002
9	1604	8.168	8.500	-0.332	0.096
Total	19638	100.000	100.000	MAD=0.285 $\chi^2= 21.644$, <i>p</i> -value=0.01	

Source: Author's research

The results align with expectations, showing a significant surplus of zeros (*Diff.*= 0.56 percent, $z = 2.42$, $p = 0.016$) followed by a significant lack of eights (*Diff.*= - 0.61 percent) and nines (*Diff.*= - 0.33 percent). However, deviation for eights is highly significant at the 1 percent level ($z = 3.01$, $p = 0.002$), whereas the deviation for nines is only marginally significant ($z = 1.66$, $p = 0.096$). The obtained results show that sample companies tend to round up net profits by increasing the first digit by one when they are faced with an eight or a nine as the second-from-left-most digit. Observed patterns are consistent with rounding behavior.

The overall tests of the conformity to Benford's Law show different results. While the MAD of 0.29 percent indicates "close conformity" (falling within the 0.00 to 0.80 percent range), the Chi-square statistic indicates a significant deviation from the expected distribution ($\chi^2= 21.64$, *p*-value= 0.01). This indicates that while individual digit deviations might appear subtle, the overall digit

distribution significantly departs from the expected distribution, supporting the presence of CEM through rounding.

Table 2 presents the frequencies of second digits in reported loss numbers and corresponding deviations from Benford's Law.

Table 2: Second digit distribution of negative earnings

Second digit	Count	Percent observed	Percent expected	Diff.	<i>p</i> -value
0	971	12.403	11.968	0.435	0.236
1	898	11.470	11.389	0.081	0.817
2	788	10.065	10.882	-0.817	0.020
3	760	9.707	10.433	-0.725	0.037
4	788	10.065	10.031	0.034	0.910
5	785	10.027	9.668	0.359	0.284
6	720	9.197	9.337	-0.141	0.683
7	693	8.852	9.035	-0.183	0.595
8	726	9.273	8.757	0.516	0.110
9	700	8.941	8.500	0.441	0.162
Total	7829	100.000	100.000	MAD=0.373 $\chi^2=15.721$, <i>p</i> -value=0.07	

Source: Author's research

The digital analysis of reported losses (Table 2) shows a significant shortage of the digits two (*Diff.* = -0.82 percent, $z = 2.33$, $p = 0.020$) and three (*Diff.* = -0.73 percent, $z = 2.09$, $p = 0.037$). However, no significant surplus of higher digits was detected, indicating no clear loss-related pattern of CEM.

The MAD value of 0.37 again suggests close conformity to the expected digit distribution. However, the Chi-square test is now only marginally significant, so neither of the applied test statistics strongly supports the presence of CEM for negative net income numbers. Overall, the results provide evidence supporting hypothesis H1 for profit figures, whereas no evidence of CEM is found for reported losses.

3.2. The effect of Audit Regulation on CEM prevalence

To test our second hypothesis, we divided the sample of 27,467 net income observations into two groups: those from periods before 2015 ($n = 15,351$; 55.89 percent) and those from 2015 and later ($n = 12,116$; 44.11 percent) to account for the effect of Audit Regulation 537/2014.

Tables 3 and 4 present the results for the pre-implementation period separately for profits and losses following the analysis from the previous section.

Table 3: Pre-implementation period - positive earnings

Second digit	Count	Percent observed	Percent expected	Diff.	p-value
0	1326	12.341	11.968	0.373	0.235
1	1269	11.810	11.389	0.421	0.172
2	1160	10.796	10.882	-0.086	0.792
3	1145	10.656	10.433	0.223	0.449
4	1056	9.828	10.031	-0.203	0.500
5	1011	9.409	9.668	-0.259	0.369
6	1018	9.474	9.337	0.137	0.619
7	1003	9.335	9.035	0.299	0.281
8	883	8.218	8.757	-0.539	0.048
9	874	8.134	8.500	-0.366	0.177
Total	10745	100.000	100.000	MAD=0.291 $\chi^2= 11.232, p\text{-value}=0.260$	

Source: Author's research

Table 4: Pre-implementation period - negative earnings

Second digit	Count	Percent observed	Percent expected	Diff.	p-value
0	577	12.527	11.968	0.559	0.247
1	496	10.769	11.389	-0.620	0.194
2	436	9.466	10.882	-1.416	0.002
3	450	9.770	10.433	-0.663	0.148
4	464	10.074	10.031	0.043	0.922
5	462	10.030	9.668	0.363	0.397
6	438	9.509	9.337	0.172	0.685
7	421	9.140	9.035	0.105	0.797
8	437	9.488	8.757	0.731	0.081
9	425	9.227	8.500	0.727	0.081
Total	4606	100.000	100.000	MAD= 0.540 $\chi^2= 19.703, p\text{-value}=0.020$	

Source: Author's research

The results from Table 3 show that for the period before the Audit Regulation, positive net income figures largely conform to Benford's Law, with only a significant shortage of the digit eight. However, there is no strong evidence of rounding up behavior.

For negative net income figures (Table 4), more pronounced deviations exist, with a significant shortage of the digit two and a marginally significant excess of digits eight and nine. The excess of digits eight and nine offsets the shortage of digit two. Finally, given that the Chi-statistics indicates an overall significant deviation from Benford's Law, this indicates a stronger tendency for CEM in loss reporting before the regulatory changes.

Table 5: Post-implementation period - positive earnings

Second digit	Count	Percent observed	Percent expected	Diff.	p-value
0	1135	12.763	11.968	0.795	0.022
1	1027	11.548	11.389	0.159	0.628
2	1010	11.357	10.882	0.475	0.153
3	872	9.805	10.433	-0.627	0.054
4	888	9.985	10.031	-0.045	0.902
5	850	9.558	9.668	-0.110	0.747
6	840	9.446	9.337	0.108	0.716
7	824	9.266	9.035	0.231	0.448
8	717	8.063	8.757	-0.694	0.020
9	730	8.209	8.500	-0.291	0.332
Total	8893	100.000	100.000	MAD=0.354 $\chi^2=16.642$, $p\text{-value}=0.055$	

Source: Author's research

Table 6: Post-implementation period - negative earnings

Second digit	Count	Percent observed	Percent expected	Diff.	p-value
0	394	12.225	11.968	0.257	0.645
1	402	12.473	11.389	1.084	0.056
2	352	10.922	10.882	0.039	0.932
3	310	9.618	10.433	-0.815	0.134
4	324	10.053	10.031	0.022	0.953
5	323	10.022	9.668	0.354	0.493

6	282	8.750	9.337	-0.588	0.263
7	272	8.439	9.035	-0.596	0.256
8	289	8.967	8.757	0.210	0.663
9	275	8.532	8.500	0.033	0.950
Total	3223	100.000	100.000	MAD=0.400 $\chi^2= 8.601, p\text{-value}=0.475$	

Source: Author's research

After the introduction of Audit Regulation, positive net income digits show some rounding patterns, particularly the significant surplus of zeros and shortage of eights as the second digit, although the overall conformity to Benford's Law remains close with marginally significant Chi-square values (Table 5). For negative net income values (Table 6), the pattern of digit distribution no longer shows significant deviations, indicating an absence of apparent CEM behavior post-regulation. Overall, the results suggest that the regulatory changes may have reduced CEM behaviors, especially concerning losses, while some rounding behaviors appear in profits with more statistical strength and impact than before the regulation.

Conclusion

This study contributes to the literature on earnings management by applying Benford's Law to identify second-digit rounding patterns in the net income figures of listed firms within the EU-27. The findings reveal that firms reporting profits exhibit significant rounding behaviors, such as excess zeros and shortages of eights as the second digit, consistent with previous research on rounding-up practices. For losses, deviations from Benford's Law are less pronounced and largely confined to the pre-implementation period of Audit Regulation 537/2014, after which evidence of CEM in losses diminishes.

However, the study has certain limitations. The analysis is confined to net income figures reported by publicly listed companies in the EU-27, limiting the generalizability of the findings to other accounting measures, private firms, or different geographic contexts. Additionally, while Benford's Law is a powerful indicator of anomalies, it cannot definitively prove manipulation, and deviations may occasionally arise from legitimate business or reporting practices. Future research could extend these findings by incorporating additional accounting metrics, exploring firm-level or sector-specific factors influencing CEM, and combining Benford-based analysis with other forensic accounting techniques for more robust detection.

Overall, this study advances understanding of CEM dynamics in the EU and highlights the continued need for vigilant regulatory frameworks and analytical tools to safeguard financial transparency and integrity.

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ARE COMPANIES' INTERNAL CONTROL SYSTEMS IN SERBIA READY TO TACKLE FRAUD?

Abstract

Robust system of internal control tends to provide companies with reasonable assurance that their activities, processes and decisions are aligned with their goals regarding reliable reporting, efficient and effective operations and compliance with relevant laws and regulations. The importance of internal control is increasingly recognized over the past few decades due to a number of financial scandals which revealed that companies did not pay sufficient attention to internal control. This also provoked reaction of regulators around the globe requiring management and in some cases auditors to address internal control to a greater extent. These regulatory efforts together with heightened engagement of companies aim to enhance capabilities of internal control in practice. However, establishing and maintaining an effective system of internal control is a demanding task.

This paper is focused on the fraud protection as one of particular benefits that system of internal control could bring to companies. Precisely, in this study we shed light on the anti-fraud internal control in companies conducting their business in Serbia. The insight is provided through the lens of external auditors, who are perceived as knowledgeable as well as independent and competent respondents. The research uncovers both strength and deficiencies in some particular components of the system of internal control. It also shows main obstacles in developing internal control and current achievements of internal controls in preventing and detecting frauds. Based on the survey findings, we conclude the paper with some key implications relevant to management as well as to internal and external auditors.

Key words: internal control, COSO, fraud, fraud prevention, fraud detection, external auditors

JEL Classification: M42, K13, K42

Introduction

In the contemporary business environment, companies are exposed to a broad spectrum of risks that may affect their business. A landscape marked by dynamic changes presents new challenges and companies are expected to remain constantly vigilant in order to preserve their stability and reputation.

One risk that is common to all companies, no matter their industry, location or other specific characteristics, is fraud. With the aim of protecting themselves, companies implement a variety of mechanisms aimed at both preventing and detecting fraud, with the system of internal control (SIC) holding one of the central positions.

Internal control (IC), as defined by the COSO framework, is a process designed, implemented and maintained by an entity's board of directors, management and other personnel, to provide reasonable assurance regarding the achievement of an entity's objectives relating to the reliability of financial reporting, the effectiveness and efficiency of operations, and compliance with applicable laws and regulations (COSO, 2013). However, the significance of IC extends beyond merely fulfilling these objectives. An effective SIC can exert a strong deterrent effect against attempted fraud while also facilitating its timely prevention and detection.

Many academic studies and expert reports provide empirical evidence that companies with internal control deficiencies experience unfavorable economic consequences, such as higher cost of debt, decrease in profitability, investor restraint (Park et al., 2016; Kuhn et al., 2013; Church & Schneider, 2016), including incidences of fraud (Donelson et. al, 2016; Nawawi & Salin, 2018; Zakaria et. al, 2016; ACFE, 2024). On the other side, quality IC leads to better corporate financial and operating performance (Imoniana et. al, 2016; Schneider & Church, 2008; Sun, 2016). In their review of accounting literature on IC, Chalmers, Hay & Khlif (2019) conclude that quality of IC influences the decisions of stakeholders, who increasingly require companies to implement higher standards on IC. However, the frequency of IC deficiencies suggests that designing and operating SIC is not a simple task. Chalmers et. al (2019) encourage future research on IC in developed and developing countries, but notice that the latter has still remained with a relatively small number of studies. In this paper, we address such call for research on IC and contribute to a better understanding of strengths and weaknesses of SIC in companies in Serbia, with particular focus on anti-fraud IC. By studying external auditors' perceptions, we inform research and practice about the effectiveness of IC, as a whole and by its components, in preventing and detecting fraud as well as provide insight in areas of improvements in case of Serbia.

This paper is organized as follows. The first section reviews relevant literature and develops research questions. Thereafter, we describe research methodology. The subsequent section presents the study results, followed by analysis and discussion. Finally, the concluding section highlights the most important remarks of the study.

1. Literature review and research questions

The role of IC in preventing and detecting financial fraud has been recognized for a long time. Imoniana et. al (2016) explore different mechanisms useful to mitigate corporate fraud and find IC as a very effective one for all three types of financial fraud – asset misappropriation, corruption and financial report fraud. Using a case study approach, Zakaria et al. (2016) and Nawawi et al. (2018) show that IC weaknesses were major factors contributing for asset misappropriation to be committed. Consequently, improvement of IC is seen as an effective way to hinder fraudulent practices.

Similarly, IC is recognized as the first line of defense against fraudulent financial reporting. Back in 1987, in the Treadway Commission's final report, one of recommendations referred to IC which was perceived as necessary to reduce the incidence of financial report fraud (National Commission on Fraudulent Financial Reporting, 1987). Then it has been already understood that IC is a broader concept than just accounting controls, which was conceptualized later in the comprehensive COSO framework of internal control (COSO, 1992). The COSO framework is the most prevalent approach to IC among companies around the globe and it is well suited to support anti-fraud efforts in companies. However, legislators and regulatory bodies also have shown keen interest in IC. One of the most prominent examples, the Sarbanes-Oxley Act (SOX) enacted in the light of numerous financial scandals at the beginning of the 21st century in the US, emphasized the role of IC through Sections 302 and 404. Section 302 requires the chief executive officer or chief financial officer to establish and maintain IC and mandates quarterly reports on the results of the assessment of IC effectiveness, including significant identified deficiencies. Section 404 goes a step further by requiring that these assessments be audited annually by external auditors. Accordingly, Bedard, Hoitash R. and Hoitash U. (2009) argued that the obligation imposed by Section 302 alone is insufficient to motivate management to improve internal controls. Empirical research by these authors showed that greater involvement of external auditors, especially in the fourth quarter, is positively correlated with the rate of reported IC deficiencies. Donelson et. al (2016) examine companies with disclosed material IC weaknesses and find a strong association with future fraud revelation.

The Report to the Nations, periodically published by the Association of Certified Fraud Examiners, provides strong empirical support that deficiencies in IC make fertile ground for fraud. According to the 2024 edition, as many as 32 percent of fraud cases occurred due to the lack of IC, while in 19 percent of cases existing controls were overridden (ACFE, 2024). After fraud was de-

tected, over 80 percent of affected organizations recognized the reinforcement of control mechanisms as a primary corrective measure, with 27 percent of implemented changes to SIC being rated as highly effective in preventing similar fraud in the future. An empirical study by Moyes, Young, and Din (2013), based on auditors' views, further confirms the importance of IC in this context. Specifically, their findings show that external auditors often identify weaknesses in SIC, such as inadequate segregation of duties, deficiencies in accounting and information systems and the dominance of a single individual within the governance structure, as factors that create a favorable environment for perpetrating fraud. This is in line with fraud triangle theory, which links incidence of fraud with three factors: pressure, opportunity and rationalization. Internal controls are particularly linked to the opportunity component, since weaknesses in IC open the door to fraud, but poor control environment as part of IC could also contribute to wrong incentives and improper justification of fraudulent behavior.

Considering the importance of IC in preventing and detecting frauds, but also challenges in its establishment and maintenance, this study aims to reveal the current state of anti-fraud controls in companies conducting their business in Serbia. As an emerging market with still undeveloped business practices in many areas, Serbia is an interesting setting for studying companies' IC. Although some broader efforts exist to raise awareness of IC and prompt its implementation in the Serbian environment, there is a need for empirical research of current practices in companies with regard to IC. Such study could illuminate some common issues and help focusing management and auditors on deficient areas.

At first, we intend to explore fraud prevention and detection performance of the SIC as a whole. Such research could confirm the effectiveness of IC or warn of its unsatisfactory level. Consequently, we formulate the following research question:

RQ1: How effective is the system of internal control in companies in Serbia with regard to the prevention and detection of fraud?

However, in order to get deeper insight into those aspects of IC that are well developed and those which could be weak and need improvement, we further employ the analytical approach of the COSO framework with five components. Each of these components is of great importance and contributes to anti-fraud efforts. The control environment sets the tone at the top. In other words, those responsible for corporate governance and management should send a clear message to employees about the importance of ethical behavior, directly influencing rationalization as a fraud risk factor, since employees

become less prone to justify fraudulent conduct. Conversely, according to Hermanson, Smith and Stephens (2012), a lax attitude toward companies' politics and procedures can create a favorable environment for fraud. Within the risk assessment process, it is desirable for companies to specifically consider fraud risk, which impacts the design of other system elements, primarily control activities. This approach reduces opportunities for committing fraud and accelerates its detection. However, without an efficient information and communication system, even the strongest control mechanisms may not be sufficient. The tone at the top could be spread throughout the company through well-established communication channels, ensuring that all employees are aware of their responsibilities. Finally, despite the benefits that companies derive from a robust SIC, monitoring remains an essential part of ensuring continuous adaptation to changing conditions and timely detection and correction of deficiencies. In 2023, COSO & ACFE developed five fraud risk management principles which are linked with five components of IC framed by COSO and in that way they provide valuable approach to companies in building IC capable of fighting fraud in an integrated manner (COSO & ACFE, 2023).

Prior research addresses the relative importance of IC components and their impact on combating fraud. The study conducted by O'Leary, Iselin and Sharma (2006a) aimed to determine which elements practitioners consider most critical in the evaluation of ICs. The control environment took first place, particularly the quality of management. The accounting and information system ranked second, followed by control activities in third place. In addition to the aforementioned study, the authors conducted an experimental study involving 94 external auditors. The results once again highlighted the control environment as the most significant element of the internal control system, as weaknesses in this component had a notable impact on the evaluation of the remaining elements, and consequently the entire system (2006b). This effect was not observed with the other elements. It is important to note that at the time these studies were conducted, the SIC in Australia comprised only three elements. Based on the opinions of approximately 500 internal auditors in North America, Hermanson et al. (2012) analyzed the strength of ICs across various companies. Authors focused on the control environment, the risk assessment process and monitoring as key components for improving the quality of financial reporting. Interestingly, although the overall results suggest that respondents perceive most controls as relatively strong, the control environment received the lowest rating due to an inadequate tone at the top. Unfortunately, some other studies in different settings assess effectiveness of IC as fairly low. Zheng (2016), analyzing a sample of small and medium-sized enterprises in China,

revealed that ICs in many of these firms are often only a formality, with significant weaknesses throughout all components of the system.

In this paper we want to shed light on IC components in companies in Serbia. It could be beneficial for managers and auditors to get such insight and devote attention to areas of potential weaknesses. To study the effectiveness of IC components, we formulate the following research question:

RQ2: What are the strengths and weaknesses of the anti-fraud internal controls in companies in Serbia?

Although the need for IC has become particularly notable over the past few decades, Hackett and Mobley (1976), in their analysis of the historical development of IC, emphasize that the generation of early profits called for some level of control to mitigate fraud risks. Despite the increasing contribution of IC to corporate operations, auditors largely marginalized them in their practice until the growing scale and complexity of business activities led to the recognition of their impact on the scope of audit testing. However, nowadays the consideration of IC serves as an indispensable element of the external audit process.

In the scope of external audit, consideration of IC includes special focus on anti-fraud ICs. It is in line with the fact that auditing standards recognize auditor's responsibilities relating to fraud. These responsibilities are not new, but concerns about fraudulent financial statements have constantly led to more stringent professional regulations. Specifically, International Standard on Auditing 240 (ISA 240) *The auditor's responsibilities relating to fraud in an audit of financial statements* has been recently revised and a new version becomes effective on or after December 15, 2026. It introduces more explicit requirements than its previous version regarding the identification and assessment of relevant controls designed to prevent or detect fraud, particularly those related to revenue manipulation, unusual transactions, and the potential for management override of internal controls. To be precise, auditors are required to assess the design and operating effectiveness of such controls while applying professional skepticism and a fraud-lens approach, meaning that auditors evaluate all controls through the prism of potential fraud. Moreover, the advantage of revised standard also lies in its recognition of varying entity complexities, requiring auditors of smaller entities to consider informal controls in situations where formal mechanisms have not been established.

This insight into ICs, and particular anti-fraud ICs, among a wide range of companies, underscores the crucial importance of auditors' perspectives for the purpose of evaluating effectiveness of internal control in mitigating fraud,

which is the main theme of the research in this paper. Additionally, we want to explore to what extent external auditors contribute to the improvement of the SIC of their client companies. It depends on auditors' capabilities to identify and communicate deficiencies in IC, but also on the readiness of companies' management to correct deficiencies. Hence, we pose our third research question in the following manner:

RQ3: Is external auditing instrumental in the improvement of companies' systems of anti-fraud internal control?

By addressing the research questions, we aim to contribute to the academic literature and inform practice by shedding light on the state of anti-fraud internal controls in companies in Serbia. We complete our analysis regarding ICs by providing evidence for the role of external auditing in improvement of audit clients' systems of anti-fraud internal control.

2. Research design

In order to address research questions, we rely on the survey of external auditors with regard to their experience with ICs in companies in Serbia. According to Hermanson et al. (2012), using survey as research method should be encouraged in the context of IC, especially due to the fact that detailed information about IC and particularly about specific components of IC is commonly not publicly available. Chalmers et al. (2019) also emphasize that survey methodology is widely used in IC research, especially in emerging countries where there is a lack of mandatory IC disclosures similar to SOX in the US. In this paper, external auditors are chosen as relevant respondents for two main reasons. First, they are informed and competent to provide insight into companies' ICs, since they consider the ICs of their audit clients during performing external audits. Specifically, professional standards on auditing require external auditors to obtain an understanding of client's SIC, including all five components promoted by COSO framework, as well as to assess ICs in their process of risk assessment. Furthermore, they perform tests of controls and communicate significant deficiencies in IC to those charged with governance. Second, external auditors are independent from their clients, which gives them an advantage over companies' internal staff as respondents, since the latter might be biased to provide a better picture of their companies or their own work. External auditors are not exposed to such bias nor have incentives to give "sound good" answers. We also encourage honest answers by assuring anonymity.

Responses were collected during July and August 2025, using a web-based Google Forms survey tool in Google Drive. The email invitation to participate in

the study was sent directly from authors to auditors and audit firms they cooperate with as well as by the Chamber of Authorized Auditors of Serbia. Given that this method of collecting responses was used, it is not possible to determine the response rate to the survey. The final number of auditors who filled out the questionnaire is 40.

Participants were informed that the objective of the survey was to obtain their experiences with audit clients' anti-fraud ICs, and hence there are no right or wrong answers. The first part of the questionnaire deals with demographic data. As shown in Table 1, the majority of respondents (55 percent) have more than 5 years of auditing experience, while almost one third of all respondents (30 percent) have experience of more than ten years. The vast majority of respondents (85 percent) are in senior positions. However, over one third of them (37.5 percent) are managers or partners. The participants worked dominantly in international or regional audit firms (75 percent), while those employed by Big 4 audit firms represent 55 percent of all respondents. Threequarters of all respondents are mainly engaged in auditing of entities in non-financial sectors.

Table 1: Survey respondents and their firms

Years of experience in external auditing	
More than 10 years	12 (30%)
5 to 10 years	10 (25%)
Less than 5 years	18 (45%)
Job title	
Partner	5 (12.5%)
Manager	10 (25.0%)
Senior Auditor	19 (47.5%)
Junior Auditor	6 (15.0%)
Type of audit firm	
Big 4	22 (55.0%)
Other international or regional audit firm	8 (20.0%)
Domestic audit firm	10 (25.0%)
Industry	
Financial industry	10 (25.0%)
Non-financial industry	30 (75.0%)

Source: Authors' presentation

The questionnaire is further designed to cover determined research questions. Respondents had to provide answers to all questions, because it was technically impossible to return an incomplete questionnaire. We used different types of questions, but mostly employed a five-point Likert Scale. In order to avoid central tendency bias, we asked respondents not to follow the rule of giving neutral („middle”) option, nor to give “socially desirable” answers.

The survey first requested that the respondents rate the system of internal control as a whole along several dimensions (e.g., fraud prevention, fraud detection). Afterwards, the questionnaire includes 16 statements that relate to constituent elements of each of five components of the SIC. All statements were formulated favorably (e.g., “Management consistently demonstrates commitment to integrity and ethical values”) and respondents evaluated the strength of these IC elements on a scale from 1 to 5. The last part of the questionnaire addresses external auditors’ perceptions about their contribution to efforts in improving internal control. Some obstacles to the development of companies’ anti-fraud ICs in Serbia are also tested with external auditors. Through an open-ended question, external auditors shared their views of issues and recommendations for companies in Serbia.

3. Results and discussion

As already highlighted, the first set of survey questions was designed to assess external auditors’ evaluation of the effectiveness of existing ICs in companies in preventing and detecting frauds. The results indicate that auditors perceive ICs as moderately effective in both observed aspects, with mean scores of 3.45 for fraud prevention and 3.38 for fraud detection. The responses were also analyzed according to different categories – the type of audit firm and job title. The aim of this was to determine whether there are statistically significant differences among the respondent groups. For this purpose, the Kruskal-Wallis test was used, as it represents a nonparametric alternative to one-way analysis of variance (ANOVA). This test was chosen because the data collected through Likert scale are ordinal and the relatively small sample size compromise the assumptions of normal distribution.

In this context, we explored whether auditors’ attitudes differ depending on the type of audit firm in which they are employed. The rationale for this analysis stems from the argument of Bedard et al. (2009), who claim that larger audit firms tend to serve higher-quality clients. Accordingly, it may be expected that clients of larger audit firms have more robust ICs, which

could shape auditors' perceptions of their effectiveness. Contrary to this expectation, the results of the Kruskal-Wallis test in our study provide no evidence of statistically significant differences across groups. This finding indicates that auditors, regardless of the type of firm in which they are employed, share a similar perception of the effectiveness of ICs in both observed dimensions. On the other hand, when examining differences in the perceived effectiveness of ICs according to respondents' positions within the audit firm, the results indicate the existence of statistically significant variation. The Kruskal-Wallis test shows that auditors' responses differ significantly with respect to both, fraud prevention ($p = 0.017$) and fraud detection ($p = 0.025$). As presented in Table 2, partners on average assign lower effectiveness scores to ICs across both dimensions compared to other respondents, suggesting that perceptions of control effectiveness are influenced by the hierarchical level auditors occupy within the audit firm.

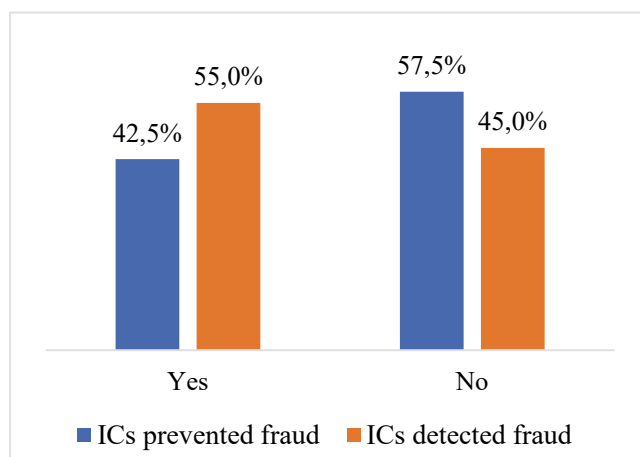
Table 2: Assessment of ICs effectiveness by auditors' position

Job title	Mean	
	Effectiveness of ICs in preventing frauds	Effectiveness of ICs in detecting frauds
Partner	2.80	2.80
Manager	3.30	3.10
Senior	3.53	3.47
Junior	4.00	4.00

Source: Authors' presentation

To further evaluate the practical role of IC in fraud prevention and detection, respondents were asked two additional questions. The first question concerned whether they had ever been informed that an attempted fraud had been prevented due to the functioning of IC. Out of 40 respondents, 17 (42.5 percent) answered positively, while the remainder reported having no such knowledge. The second question asked whether they had been ever informed that IC had contributed to the detection of fraud, with 22 respondents (55 percent) responding positively. These results are illustrated in Figure 1.

Figure 1: Auditors' responses on receiving information that ICs prevented or detected fraud



Source: Authors' presentation

It should be noted that these responses do not necessarily imply that the controls are ineffective. It is possible that, for some clients, no fraud attempts occurred, meaning that the controls were not tested in this regard. Additionally, external auditors receive such information indirectly, which further limits the ability to fully assess the controls' contribution. Therefore, these findings should be regarded as encouraging, as they demonstrate that SIC can play a role in supporting fraud prevention and detection.

Considering the variation in client size, it was important to assess the extent to which respondents perceive large companies as having more robust SIC for fraud prevention and detection compared to smaller companies. The results indicate that 90 percent of respondents agreed with this statement (mean = 4.37). This finding aligns with the study by Doyle, Ge and McVay (2007), who found that material weaknesses in SIC are more likely in smaller firms, which often face challenges in maintaining a strong control environment. Similarly, Krishnan and Peytcheva (2017), examining whether the risk of fraud is higher in family firms compared to non-family firms, note that family firms generally have weaker ICs, making them more exposed to fraud.

Before proceeding to a detailed analysis of the strength of individual control elements, respondents were asked to rank components of SIC based on their perceived importance in fraud prevention and detection. A large number of respondents identified the control environment as the primary element in preventing fraud, followed by control activities. The importance

of these elements in fraud prevention has also been highlighted by Ghanem and Awad (2023). However, when considering only the responses of partners, a slightly different ranking emerges. Partners perceive the risk assessment process as more important for fraud prevention than control activities. This perspective can be explained by their strategic viewpoint, which emphasizes proactively identifying high-risk areas before applying control activities. These results again confirm that respondents' perception may vary depending on hierarchical position and, consequently, their responsibilities within the audit process. Regarding the perceived role of individual elements in fraud detection, most respondents ranked monitoring as the most important element, followed by control activities and information and communication in second and third place, respectively.

By analyzing respondents' level of agreement with 16 statements related to elements of the SIC, we drew conclusions regarding the strength of both individual components and the system as a whole. All 16 statements were grouped according to respective components and the results are presented in Table 3. The overall mean score of the system (3.50) indicates that the system is neither weak nor sufficiently strong to fully prevent and detect fraud. Moreover, when examining these ratings by hierarchical position, partners perceive systems as weaker compared to other respondents (mean = 3.17). This is consistent with Wehrhahn and Velte (2024) who argue that more experienced and competent auditors are more likely to identify weaknesses in ICs. Also, these findings may help explain the differences observed earlier regarding auditors' perceptions of IC effectiveness in fraud prevention and detection.

Table 3: Auditors' assessments of IC components

Components	Mean	Std. Deviation
Control environment	3.29	0.5175
Risk assessment	3.11	0.6840
Control activities	3.79	0.6143
Information and communication	3.80	0.7230
Monitoring activities	3.49	0.7182
System of internal control	3.50	0.5213

Source: Authors' presentation

Given the differences observed in mean scores among individual components, it is useful to establish gradations that highlight which components are stronger and which are weaker. The lowest ranked component of SIC is the risk assessment and the item that contributes most to this assessment relates to low consideration of fraud risk factors (mean = 2.97; 37.5 percent of respondents rated this item 1 or 2). Similar results were reported by Hermanson et al. (2012), where around 20 percent of respondents noted that companies do not consider all three fraud risk factors during risk assessment. Although no statistically significant differences were observed based on audit firm type, it is notable that respondents from domestic audit firms assigned a slightly lower mean score (2.60) compared to other firm types. This may be partly explained by the client portfolios of domestic firms, which are primarily oriented toward smaller clients. The second weakest component is the control environment and deeper analysis indicates that particular challenge lies in creating an environment that encourages employees to report fraud and protects them from retaliation (mean = 2.85). Nearly one-third of respondents assessed this control element as ineffective. This is concerning finding given its role due to ACFE (2024) who reported that 43 percent of fraud cases were uncovered through whistleblowing.

Control activities were rated relatively high (mean = 3.79). Based on their audit engagement experience, auditors assessed that clients generally have an adequate system for transaction authorization, established procedures for data access and effective physical controls. In these areas, between 65 percent and 75 percent of respondents gave ratings of 4 or 5. However, the statement *Clients have clearly defined and consistently applied segregation of duties, significantly reducing the risk of committing and concealing fraud* received the lowest rating. Following the approach of Hermanson et al. (2012), which considers a weakness in IC if more than 15 percent of respondents assign low rating to an item, segregation of duties emerges as a potentially high-risk area in our study. This approach was applied because a relatively high overall mean for the component can obscure specific weaknesses.

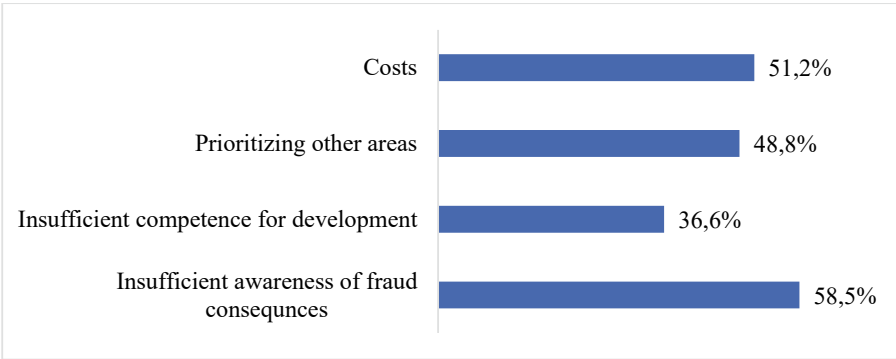
Although the average ratings of individual components of the SIC are moderately high, deeper analysis through individual elements indicates that the system has certain deficiencies and leaves room for improvement. In this regard, it is essential to consider not only the current state of ICs but also clients' willingness to implement external auditors' recommendations to address identified weaknesses. More than 60 percent of respondents assigned ratings of 4 or 5 to this item (mean = 3.70). However, the proper implementation of auditors' recommendations also requires mechanisms for

systematically monitoring their execution. Responses indicate that about 17.5 percent of auditors recognize shortcomings in this area.

When considering opportunities to improve SIC, auditors were also asked to evaluate the extent to which their profession can contribute to strengthening controls in the area of fraud prevention and detection. More than 70 percent of respondents acknowledge the role of external audit in reinforcing SIC (mean = 3.72). Wehrhanh and Velte (2024) argue that the impact of SIC is heterogeneous. In line with this, Brandão et al. (2021) emphasize that identifying deficiencies can have a positive effect to the extent that auditors are able to exert sufficient pressure on clients to remediate those weaknesses.

Respondents then were asked to identify the factors that, in their view, most constrain the establishment of stronger ICs for fraud prevention in companies (Figure 2).

Figure 2: Factors limiting the establishment of stronger ICs for fraud prevention



Note: Since the question allowed multiple responses, the total exceeds 100 percent.

Source: Authors' presentation

The most frequently cited obstacle, recognized by nearly 60 percent, is the lack of awareness about the consequences of fraud. This is followed by the cost of implementing such controls (51.2 percent). Almost half of the auditors (48.8 percent) pointed out that companies often give priority to other areas instead. Finally, insufficient competence for developing IC was recognized as a limiting factor by just over one-third of respondents (36.6 percent).

Conclusion

The primary responsibility for establishing, maintaining, and operating IC lies with management. However, considering that managers may be prone to opportunistic behavior, Wehrhahn and Velte (2024) emphasize the necessity for the SIC to be monitored by internal auditors, the audit committee and external auditors. Moreover, the success of ICs in fulfilling their purpose depends on numerous factors, both internal and external, and their influence may vary from one company to another (Chalmers et. al, 2019). Nevertheless, SIC is an inevitable part of companies' fight against fraud and deficiencies in any of its components could limit its anti-fraud capacities. Although there are some optimistic views that fraud will be reduced in the future (Karpoff, 2021), the pervasiveness of financial frauds and associated losses and reputation damages for companies underscores the need for strong IC.

However, relatively little is known about the effectiveness of IC in developing countries, since the vast majority of IC studies focuses on developed countries. This paper contributes to IC research by examining SIC in companies in Serbia. Through the lens of external auditors, we explore SIC as a whole as well as its components and elements and find that the IC effectiveness in preventing and detecting fraud is largely at moderate level, which implies room for improvement. This is especially the case with risk assessment and control environment, which is an important observation since both are entity-level controls and hence influence the whole SIC. Further analysis shows that particular attention should be devoted to consideration of fraud risk factors as well as to the whistleblowing process. This insight could be useful for managers, but also auditors. In addition, it appears that there is insufficient awareness about the consequences of fraud in companies in Serbia, what is perceived as the biggest obstacle in the establishment of anti-fraud SIC. Raising awareness is a serious challenge that requires collective efforts of all interested parties, including government, companies, educators and professional associations.

Our results are derived from a survey among external auditors. Although the survey methodology has its limitations (Bloomfield, Nelson, & Soltes, 2016), it is the common approach to research ICs and offers useful insights. For future studies, it would be interesting to collect the views of managers and internal auditors on this issue. Further research could also address the determinants and consequences of IC deficiencies in developing countries.

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Abstract

This paper takes a behavioral ethics approach to examine why attitudes differ in the characterization of ‘greenwashing’ from other forms of fraud where the aim is to misrepresent the ‘facts’ with the intention of misappropriating resources. A false and misleading ‘green’ claim in a sustainability report has typically not attracted the same level of regulatory sanction as overstating financial figures in the statutory accounts. Both are morally ‘wrong’, either from a deontological or utilitarian perspective, but from a social psychology perspective the choices people make are more nuanced and malleable. This has implications for accounting and auditing practices and in the way in which corporations and their governing bodies establish and evaluate the effectiveness of internal control environments. This paper establishes a framework for developing empirical research to further explore how these decisions manifest in practice and what actions are needed to minimize fraud risk.

Key words: fraud, greenwashing, sustainability reporting, behavioral ethics, governance and controls

JEL Classification: M41, D91

Introduction

At 6:30 am on 12 Feb 1994, the same day as the opening ceremony of the Olympics, the museum’s alarm went off. The alarm immediately alerted a guard who called the police. Although the police arrived at the gallery in minutes, they were too late. Security camera footage showed two men climbing a ladder, smashing a gallery window, cutting The Scream off the wall with wire cutters and subsequently fleeing with the painting. The heist took a mere 50 seconds. The thieves left a postcard behind in the gallery. It said “Thanks for the poor security.” The Gallery considered their security cameras and alarm system to be sufficient to protect their national treasures. Unfortunately, they were mistaken. (“Stealing the Scream: 1994 theft,” n.d.)

One of the most valuable paintings in the world “The Scream” by Norwegian artist Edvard Munch is iconic and a national treasure for the people of Norway. Despite this it proved very easy to steal so much so that the thief left a thank you note behind. It is common in fraud, where the preparators are exploiting

new opportunities to not be caught by control systems. Greenwashing is a yet another frontier which is providing new opportunities for fraudsters. It is that discomfort that we have about labelling greenwashing as ‘wrong’ that this paper explores. The title is deliberately provocative because it aims to test the assertion that from a moral and ethical perspective fabricating material results on Scope 1 Greenhouse Gas Emissions is no different from inflating the revenue figure in the income statement. The later by any measure would constitute financial statement fraud, falsifying GHG Scope 1 numbers in the Management Report (part of the legal filing in the EU) is less clear. Sustainability information usually fails to get the boards attention, it is only subject to limited assurance (if at all) (IFAC & AICPA, 2025) and there is little regulatory enforcement, suggesting that it would be difficult for any claim against a company to succeed. Even the proposed Green Claims Directive 2024/825 only deals with misleading claims to consumers.

This moral dilemma is important because the relevance of ‘greening’ business activities to make them more sustainable has increased significantly over the last decade and has become relevant in assessing the financial prospects by investors. That has led to a shift from sustainability claims being a marketing activity to promote the legitimacy of the firm to information relevant for investor decision-making. The preponderance of unsubstantiated claims has led policy makers to act to stem the tide of ‘greenwashing’. In the European Union (EU), the Green Deal represents a comprehensive package of reforms to put sustainability at the center of business practices in the EU (European Commission, 2023). A significant part of these reforms has been mandating reporting on sustainability matters particularly those related to the externalities and other impacts of business activities on people and planet.

The Corporate Sustainability Reporting Directive (CSRD 2022/2464) introduced mandatory reporting against a common set of corporate reporting standards namely the European Sustainability Reporting Standards which introduced significant reporting obligations for a new section of the Management Report referred to as the ‘Sustainability Statement’. This was in response to the relatively poor quality of reporting under the previous Non-financial Reporting Directive (NFRD). The NFRD was hampered by the lack of standardization in disclosure requirements and the patchwork of implementation by EU member states which resulted in reported information that the EC itself conceded was not fit-for-purpose (European Parliament, 2020). The onset of requirements under the CSRD has led to sharp increase in interest by regulators in the quality of sustainability information reported by companies (ESMA, 2025)

and its relevance and importance to the financial stability of the EU economy (European Central Bank, 2025).

Even the Association for Certified Fraud Examiners (ACFE) reflecting on a US context, recently noted that “Greenwashing straddles the line between marketing malpractice and outright fraud.” (Association of Certified Fraud Examiners, 2025). Although not specifically called out in the ACFE’s ‘fraud tree’ which offers a classification of different forms of fraud, making unsubstantiated claims about sustainability performance is a powerful illustration of the changing nature of what constitutes ‘fraud’. It is well-established that fraud is constantly being redefined and therefore requires a reassessment of the opportunities for fraud in practice. The purpose of this paper is to provide a framework to understand the dynamics of ‘fraud’ as it shifts over time, drawing on the existing literature in ethics, philosophy and psychology. In that sense this study is preliminary and more research is need to provide an empirical foundation for the analysis in this paper.

1. Setting out the co-ordinates

1.1. Defining “Greenwashing”

The arguments in this paper rely on two terms that have complex and unstable meanings – namely what constitutes ‘greenwashing’ and when does that qualify as ‘fraud’? There is no universally accepted definition of ‘greenwashing’ although there are legal doctrines around false advertising and securities fraud that provide useful insights (Cherry, 2014). The other challenge with defining greenwashing is that whilst there are a significant number of studies, it remains complex and reflects a still emerging phenomenon (Mehta et al., 2025). Moreover, greenwashing is challenging to recognize and evaluate because of its many dimensions, manifestations, and nuances:

The absence of a unified framework or criteria for evaluating environmental, social, and governance concerns, the dispersion of non-financial information across many sources, and the unavailability of trustworthy and complete data sets complicate the quantification of particular elements of the situation. (Poiriazi et al., 2025, p. 2)

The phenomenon of greenwashing is often traced back to 1986 when Jay Westerveld, an environmental activist, is understood to have coined the term in response to a hotel promoting towel re-use being driven by cost saving rather than concern for the environment (Feghali et al., 2025). However, since the

inception of the corporation the practice of misstating or falsifying claims has been a constant source of distrust in the reported information.

It is important to note that not all forms of greenwashing are likely to have the intent to qualify as fraud. One study notes:

ESG reporting currently lacks the same degree of rigor, even while financial statement reporting complies with standards and employs stringent controls to guarantee the consistency, accuracy, and comparability of data and disclosures. As a result, a divergence may occur between a company's activities and its assertions. This mismatch, sometimes unintended, adversely affects investors, consumers, workers, and anyone reliant on this information for decision making. (Poiriazi et al., 2025, p. 13)

What is problematic and usefully highlighted here is that greenwashing is “sometimes unintended” – if that is the case, information may be misleading but that can be more a product of lack of developed accounting and measurement techniques for environmental matters rather than a deliberate attempt to deceive. Typically, a lack of precision of accounting measurements such as the valuation of financial instruments in the financial statements would not be considered ‘fraud’ and the test is about the reasonableness of the judgements made (Kirk, 2006).

There is much more attention by regulators to prevalence of greenwashing and the potential risks to investors. In tandem with the rise in regulatory activity, academic research has been increasing particularly for non-financial firms (Birindelli et al., 2025). ESMA notes that are regulations already in place that deals with all facets of greenwashing. While ESMA does not directly define ‘greenwashing’ they do provide the following clarification:

Greenwashing risks refer to the risks of misleading sustainability claims occurring and misleading investors in their decisions. Sustainability-related claims refer to statements, declarations or communications provided either to comply with disclosure requirements or as part of voluntarily communications (e.g., advertisements), while the narrower concept of sustainability-related disclosures refers only to statements, declarations or communications provided to comply with disclosure requirements. (ESMA, 2024, p. 8)

The courts have taken a similar approach noting that while there can be a range of characteristics that are common in cases of fraud, as one US court noted: “the law does not define fraud; it needs no definition; it is as old as falsehoods and as versatile as human ingenuity” *Weiss v. United States*, 122 F.2d 675 (5th Cir. 1941). According to the Cornell Law School:

Fraud is both a civil tort and criminal wrong. In civil litigation, allegations of fraud might be based on a misrepresentation of fact that was either intentional or negligent. For a statement to be an intentional misrepresentation, the person who made it must either have known the statement was false or been reckless as to its truth. The speaker must have also intended that the person to whom the statement was made would rely on it. The hearer must then have reasonably relied on the promise and also been harmed because of that reliance. (Legal Information Institute, n.d.)

At an EU level the focus has been on protecting consumers against false product claims as set out in the Green Claims Directive (Directive 2023/85). The principle of fair and balanced content in corporate reports has been well-established under EU law in the Accounting Directive 2013/43, Article 19 states:

The management report shall include a fair review of the development and performance of the undertaking's business and of its position, together with a description of the principal risks and uncertainties that it faces. The review shall be a balanced and comprehensive analysis of the development and performance of the undertaking's business and of its position, consistent with the size and complexity of the business.

This requirement as transposed into national laws sets a clear requirement that the sustainability claims made by a company should be 'fair' in other words free of material misstatement. This is reinforced in the assurance provision set out in the CSRD for an auditor to provide limited assurance on the sustainability statement within the management report (Directive 2022/2464). Accordingly, from a compliance point of view, the legal requirements for the quality and truthfulness of sustainability content is on par with that of the financial statements, and there is a basic legal threshold that it is free from material misstatements.

For the purposes of this paper it is not necessary to construct a comprehensive definition of 'greenwashing' or 'fraud' –merely to establish working definitions of phenomena to assess the moral implications presented by greenwashing that bears the characteristics of fraud. In other words, why is misstating sustainability information considered of less consequence than the same actions with respect to the financial statements?

1.2. Lessons from moral philosophy

Philosophers have long wrestled with complex moral questions in establishing what is ethical or more plainly the difference between 'right' or 'wrong'. There are two approaches that are often cited and they are broadly a utilitarian

perspective which focus on the consequence of an action and a deontological one which is more principles based. Philosophers, such as Bentham, have focused on the utility of actions and those that served the greatest number for greatest good (Ross, 1994). In other words, if an action, such as ‘greenwashing’, have no material consequences then according to Bentham it would not be morally wrong and should be seen as a byproduct of achieving a positive end for the majority. Anscombe (1958) challenged this view by pointing to the subjectivity of determining the common good:

Now the consequentialist has no footing on which to say “This would be permissible, this not”; because by his own hypothesis, it is the consequences that are to decide, and he has no business to pretend that he can lay it down what possible twists a man could give doing this or that; the most he can say is: a man must not bring about this or that; he has no right to say he will, in an actual case, bring about such-and-such unless he does so-and-so. Further, the consequentialist, in order to be imagining borderline cases at all, has of course to assume some sort of law or standard according to which this is a borderline case. Where then does he get the standard from? In practice the answer invariably is: from the standards current in his society or his circle...(p. 13)

Against this backdrop, arguments considering greenwashing to be ‘wrong’ could be swayed by facts such as current norms about standards of behavior amongst peer companies or general attitudes to the balance of economic growth and environmental protection. If the majority believe that the consequences are in the interests of the greater good then greenwashing could be considered a venial sin and clearly not as consequential as financial statement fraud.

The alternative approach is a deontological one favored by philosophers such as Kant with his ‘categorical imperative’. Kant argued that we should be guided by what we ought to do rather than what we assess using our judgment about what might be the right thing to do. A Kantian view would hold that markets are by their nature morally negative because self-interest drives decision-making and “morality is crowded out by the presence of self-interest” (Santori, 2024, p. 240). For Kant, morality is about one’s duty and not about what a person may like to do: “act only according to that maxim through which you can at that same time will that it become a universal law” (Kant, 2017, p. 34). Accordingly, even in market transactions such as informing investors about performance against sustainability objectives, Kant argues that subjective ends (e.g. profit for a business) are inverted by individuals to objective ends as rationality is the compass that drives all behaviors. We see echoes of this thinking in the current debates about the purpose of the corporation where the maxim

that ought to drive business behavior is that the corporation should seek to solve problems of people and planet and not add to them whilst also achieving a profit (Hsieh et al., 2018). That is a noble ideal but as Sandel (2012) suggests, the logic of markets just do not operate that way and that the subject ends of market participants take precedence over what reason might dictate as being the ‘right thing to do’. But as Arendt (2003 cited in Dunn, 2025) argues, the flaw in the Kantian approach to guiding actions is the assumption that one’s reason is consistent with their will such that my actions can become a universal law. The consequence of this according to Arendt is the needs of others and the ability to pivot our understanding to see things from their perspective is not possible (Dunn, 2025). The logical extension is that one can claim that following orders, of doing one’s duty could lead to actions such as greenwashing being pursued as a means to discharge the duty of maximizing returns for shareholders.

1.3. Turning to behavioral ethics

This leaves us with the dilemma that resolving greenwashing behavior by appealing to moral reasoning leads to a lack of clarity about making judgments within business contexts. To that end, behavioral ethics offers an alternative framework for analyzing issues like greenwashing where doing what ‘right’ may be unclear. Bazerman and Gino (2012) define behavioral ethics as:

the study of systematic and predictable ways in which individuals make ethical decisions and judge the ethical decisions of others, ways that are at odds with intuition and the benefits of the broader society. As this definition suggests, we are interested in examining not only the decisions that people make but also their judgments of the decisions of others. We are interested in examining the systematic ways that we humans depart from our intuitive expectations and the goals of broader society. (p. 90)

They argue that ‘morality’ is dynamic and malleable rather than something fixed and universal as proposed by Kant. The role of situational influences is often the reason for morality being redefined by circumstances (Monin & Jordan, 2009). What is particularly insightful about a behavior ethics approach is that it breaks down the complexities and sheds light on seemingly contradictory behaviors and actions. The research shows the disconnect between a desire to be good and seen as ethical by others and actual unethical behavior (Bazerman & Gino, 2012). There are two major strands to the behavioral ethics literature: the first focuses on the psychology of self and the second on the distinction between intentional and unintentional unethical behavior. Importantly, how we view ourselves interacts with our ethical behavior and they are

both co-dependent (Tenbrunsel & Chugh, 2015). In terms of intentionality, the issue is less about motive and more about the decision-making process and the field of vision. The research shows unethical decision-making seems to result from either a too shallow assessment or an overly complex one. More ethical decisions appear to result from ‘just enough’ information being considered in the decision-making process (Moore & Tenbrunsel, 2014).

2. Constructing a theoretical framework

fraud risk identification and treatment is contingent on having a comprehensive understanding of all the opportunities within corporate reporting where misstatements can occur. The literature is replete with models describing how we assess gaps in what we know and what remains unknown, popularized by so-called Rumsfeld Matrix used to describe and justify the Iraq war (Loxdale et al., 2016). It is particularly salient in the domain of fraud where it is often ‘knowns’ that control systems fail to capture:

The Wirecard scandal presents a shocking tapestry of allegations of corrupt business practices and fraudulent financial reporting, which rocked the financial world and led to the downfall of Germany’s fintech darling, Wirecard. The scandal is a narrative of alleged economic corruption on an unprecedented scale, marking one of the most significant criminal cases in Germany’s economic history (*The Wirecard Scandal*, n.d.).

A critical lesson from the Wirecard Fraud is that controls systems within the company alerted individuals both within it and those charged with its supervision and yet the warning signs were ignored. This suggests that we do not only need to understand what drives unethical behavior (because by that stage it may be too late) but to more importantly consider what facilitates ethical behavior in the first place (Tenbrunsel & Chugh, 2015). The reason and conditions under which people follow rules and do the right thing is not well understood (Gächter et al., 2025). Evidence from experiments suggest that:

23% of people conform with the rule unconditionally, that is, independent of social expectations, and ~30% of people are conditional rule-followers. The 23% rate of unconditional rule-following is substantial when compared to the extent to which conformity with varying social expectations and extrinsic incentives shift rule-following (by 20–25 percentage points)...The reason is that intrinsic respect for rules is arguably required for social order in many situations in which extrinsic incentives—which provide self-interest-based reasons for rule-following—are weak or absent, and consequences for others are not salient. (Gächter et al., 2025, p. 8)

The notion that we experience gaps between what we believe ourselves to be and what we actually are is related to the problem of bounded awareness, which can be defined as “the common tendency to exclude important and relevant information from our decisions by placing arbitrary and dysfunctional bounds around our definition of the problem” (Bazerman & Tenbrunsel, 2011, p. 7). This can manifest in many ways such as overclaiming credit for group work without realizing it, implicitly discriminating within a group, diminishing future impacts when harming the environment or being over-confident about your ability (Bazerman & Gino, 2012).

2.1. Moral attentiveness

There have been many drivers of the recognition of moral situations which include biological, psychological and socio-cultural factors and when these interact with specific circumstances can yield unexpected results suggesting that much more research is needed (Reynolds & Miller, 2015). Moral attentiveness has two facets: a perceptual aspect where information is adjusted as it is encountered and a reflective mode where the individual uses morality to reflect on a situation (Reynolds, 2008). It follows that if an individual perceives environmental issues to be unimportant then it is unlikely that she will consider moral standards to have been breached. Norms play an important role in guiding behavior and deeming what is acceptable and what is not. Norm confusion arises from the distinction between descriptive norms which refers to ‘what is’ and prescriptive norms which refer to ‘what ought to be’. When groups of people behave in the same manner or approve of such behaviors, they often believe they are acting ethically. Similarly, moral behavior is more a function of intuition and social conditioning than moral reasoning (Scharding & Warren, 2024). The reason we do not question the behavior of others is that our attention is focused on other things where there are rewards. Employees are typically not rewarded for paying attention and calling out the unethical behavior of their co-workers. As Bazerman and Tenbrunsel (2011) note “our focus on one set of tasks can blind us to other readily available information in our environment” (p.78). There are several important reasons why we effectively dismiss evidence that would otherwise compel us to check unethical behavior.

2.2. Motivated and indirect blindness

motivated blindness refers to a situation where we have a vested interest in a situation and it would harm us to call out such behavior. That can be seen in the case of greenwashing where incentives to promote the sustainability

of the organization may overwhelm how the actual performance is represented. The result is a bias against action and there are many significant cases where auditors who have a statutory duty to be independent turn a blind eye to unethical behavior. Major corporate scandals demonstrate failings where the watchdog was incentivized not to look too hard. The source of this bias can come from fear, incentives, organizational loyalty and culture. Research is showing that large numbers of individuals are capable in routinely engaging in massive harm without realizing what they are doing. This is evident in some of the major scandals such as Enron and World Com where many insiders and external advisors were complicit in the committing fraud on such a grand scale that very successful companies met their demise. The consequential harm was not only the loss of money by shareholders but for all stakeholders including customers who were exploited as part of these unethical practices (Bazerman & Tenbrunsel, 2011)

In some cases, moral judgements may be even more difficult because of diffuse responsibility. This blindness can be indirect which makes it even harder to spot. For example, to avoid unfavorable labor conditions, a company can outsource production by passing the poor practice to a supplier making the accountability of the organization somewhat removed. It can be difficult for most to hold others to account for indirect unethical behavior because it is easier not to acknowledge it: “behavioral ethics research has provided abundant evidence that outsiders overlook the unethical actions of actors who work through indirect parties” (Bazerman & Tenbrunsel, 2011, p. 91).

2.3. Ignoring gradual decline and focusing on outcomes

The behavioral ethics literature points out that the unethical actions such as fraud are a sequence of acts over time such making it easier for the perpetrators to test what they can get away with. Scientific studies of change blindness focused on visual perception indicates that people often fail to notice incremental changes in their environment which can lead to significant errors in decision-making. Accordingly, we are less likely to see the gradual decline in ethical behavior (Bazerman & Tenbrunsel, 2011).

In a culture where senior management require results without attention to methods employed to achieve them, an outcome bias can conceal unethical behavior. Often disproportionate blame is given to individuals that have followed a thorough process and made sound decisions that have unfortunately not resulted in a positive outcome. This stems from a tendency to focus on identifiable victims and not a statistical impact or a group of unidentifiable individuals. Where a negative outcome impacts an entire community or a general

group of individuals it becomes easier to diminish or ignore unethical behavior. In a similar vein, harm from inaction seems to less salient than harm through actions. This means that even if an individual is responsible for an outcome they will tend to avoid making a decision and not take any action than to act and face the consequences (Barak-Corren & Bazerman, 2020).

3. Implications for fraud in the form of greenwashing

The theoretical framework outlined above suggests that a fraud theory and reliance on heuristics like the fraud triangle are useful but insufficient in understanding the factors that drive individual to transgress ethical boundaries (Maulidi & Ansell, 2021). As Reynolds (2008) notes:

The marketplace has awakened to the potential dangers of immoral behavior, and for that reason it seems increasingly prudent for organizations to hire those people who are cognitively inclined toward moral behaviors. (p.1039)

For those charged with the oversight of enterprise-wide control systems greenwashing should be considered within the frame of fraud risks for the following reasons:

Table 1: Greenwashing Fraud Markers

Greenwashing Characteristic	Potential Fraud Marker
Weak sanctions	Overstating sustainability claims or other material misstatements in sustainability reports tends to attract few sanctions from regulators because of the subjectivity of the data and the lack of standardization.
Unclear social norms and beliefs	Belief systems and perception play a significant role in ignoring information that is not deemed important for decision-making, especially where the culture within an organization places little emphasis on it.
Lack of moral awareness	Where general attitudes in society discount the relevance and weight of sustainability matters, they can remain novel and not considered relevant to mainstream decision-making.

Simplistic or overly complex decision-making	Decision-making that fails to take into account the evidence and simplifies the context or the converse where so much complexity overwhelms the decision-maker.
Insufficient attention to process	Process is what provides safeguards to assembling high-quality information if the these are compromised and attention is only on the final product (such as a sustainability report) these can be bypassed.

Source: Author

Behavioral ethics provides an understanding of how individuals and groups are inclined to behaviors that are questionable and expose the organization to fraud risk. Whether it is recruitment, the design of control systems, the testing of controls or scrutiny of decision-making, there are valuable insights to be gained from moving away from simplistic and generic approaches to sustainability reporting and to bring the same robust set of values and discipline that are afforded to the financial statements. Even in terms of the financial statements despite controls and external assurance there are still too many instances of fraud taking place in organizations today.

Conclusion

Greenwashing in corporate reporting is an emerging threat for fraud which inevitably harms capital providers but also stymies the transition to a more sustainable global economy (Poiriazi et al., 2025). For that reason, it not only deserves the attention of those charged with governance of the corporation and its financial regulators but also policy makers more generally. Sustainable development demands that the transformation of the economy to promote well-being in a jurisdiction is not only relevant for governments but for all economic agents including corporations. The combination of widespread sustainability reporting by companies and the lack of moral awareness about the importance of such information for capital providers and other stakeholders creates the ripe opportunities for fraud in form of greenwashing to go unchecked. The robust controls typically applied to data for the production of financial statements are often absent in reporting on sustainability coupled with the lack of oversight and scrutiny by the governing body and the absence of third-party assurance means that fraud risk is heightened.

This paper begins to sketch out how behavioral ethics can offer insights to combat greenwashing and the potential for fraud. It is not without its limitations as with any initial study and further research is needed to apply the conceptual framework set out in this paper to test and evaluate its efficacy and establish what practical steps need to be taken to safeguard against fraud. It is not a matter of ‘borrowing’ techniques from controls and processes used for the financial statements, but broader consideration is needed to better understand what is needed to promote ethical behavior in the first place.

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THE ROLE OF FINANCIAL STATEMENT ANALYSIS IN DETECTING CORPORATE FRAUD

Abstract

Financial statements still represent the only complete and verified source of information about a company's financial position and profitability. Regulations in the field of financial reporting, the professional ethics of accountants, and auditing procedures are key mechanisms that are intended to ensure the credibility and reliability of financial statements. However, the emergence of numerous financial scandals has rightfully heightened the vigilance of analysts, who are increasingly focusing on financial-analytical procedures aimed at assessing the quality of financial statements and the information contained within them. Extensive experience in financial statement analysis has been accumulated over the years in various areas, such as the assessment of short- and long-term investment risk, the efficiency of asset and capital management, and the revenue-generating and earning capacity of a company. Nevertheless, the broad practical value of carefully designed financial ratios undoubtedly opens up other analytical possibilities. Specifically, tracking trends and deviations in the values of certain indicators, when linked into a coherent whole, can have an important diagnostic function in the context of identifying potential corporate fraud. Therefore, this paper is dedicated to exploring the scope and limitations of financial statement analysis in defining and monitoring early warning signals for various corporate fraudulent activities.

Key words: financial statements, financial statement analysis, ratio indicators, corporate fraud

JEL Classification: M41, K13

Introduction

The successful detection of corporate fraud undoubtedly requires broad knowledge on the part of analysts, knowledge that must exceed the capabilities of those inclined toward manipulative practices. In addition, the effective execution of this task necessitates the use of multiple sources of information, none of which should be disregarded—even when they only partially illuminate a potential issue. In this context, financial statements undoubtedly emerge as a relevant source of information, as they arise from the accountability of

management to a broad spectrum of interested stakeholders. Financial statements differ in many respects from other sources of information, primarily due to their accessibility. They represent official and widely accepted sources of business information whose use entails virtually no additional costs. At the same time, it should not be overlooked that financial statements remain the only comprehensive and verified source of information, the formal and substantive accuracy of which is attested by the auditor's opinion. Admittedly, the occurrence of major financial scandals has taught us that financial statement analysts should not blindly trust audit opinions, but rather apply their own knowledge and experience to assess the quality of the financial reports they are examining.

Over many years, both academia and business practice have accumulated substantial knowledge on the use of financial statements for assessing a company's financial position and profitability. A recognizable methodology has been developed, accompanied by a wide range of indicators, techniques for their interconnection, and the analytical skills needed to interpret and compare calculated values from different perspectives. This body of knowledge has been institutionalized through the certification of professionals engaged in such work. Undoubtedly, the knowledge and experience gained in financial statement analysis may serve as a valuable foundation for those engaged in investigating fraudulent activities within firms. As previously noted, financial statements represent only one among several sources that must be triangulated with many others. In this sense, professionals involved in fraud investigation must be aware of both the potential and the limitations of financial statement analysis in this domain. What is important to understand is that a meaningful and focused analysis of financial statements can reveal early warning signals of fraud that warrant further investigation, relying on all other available sources of information—both internal to the firm and external, from its environment. In other words, fraud investigators should not expect to determine the full scope or value of fraudulent activities solely from financial statements. Rather, such analysis may point them toward the path that requires closer examination. At the same time, it would likely not be mistaken to assert that financial statement analysis can uncover major frauds, but not necessarily minor ones—yet these smaller irregularities, when aggregated, may represent substantial amounts of misappropriation. There is no doubt that research into the role of financial statement analysis in detecting corporate fraud can be framed in very broad terms. This is particularly true given that virtually every line item in financial statements may be subject to significant manipulation or fraudulent practices. Bearing in mind the character of this study

and the space constraints initially set, our intention is to focus specifically on the potential of financial statement analysis in the early detection of fraud in the areas of inventories, accounts receivable and accounts payable. These components of the financial statements warrant our special attention primarily because they represent some of the most frequent sources of corporate fraud in business practice.

1. General overview of financial statements

financial statements serve as a source of information on a company's operations in the current and previous accounting periods. If they are viewed merely as a simple set of data expressed in monetary terms, they do not reveal much about the company's performance. However, with even a modest degree of analytical engagement, the extent of insights that can be obtained is limited only by the analyst's experience and analytical skills. According to Hogan, Rezaee, Riley & Velury (2008) analytical procedures consist of developing expectations and assessing whether account balances and related information are reasonable, and they are frequently applied as supplementary inputs in fraud risk evaluation. Research indicates that financial ratios offer a simple and practical approach for uncovering fraudulent reporting in financial statements (Kanapickienė & Grundienė, 2015). For the purposes of detecting early warning signals of fraudulent activity, we proceed by analyzing the case of one company, for which a condensed overview of its basic financial statements—namely, the balance sheet and the income statement—is presented below.¹

The initial step any analyst can take with basic financial statements is to attempt to uncover the reasons for variations in the share of individual items within a characteristic total (typically, operating revenues, total assets, or total sources of funds). This can be done either by calculating absolute and relative changes compared to a base or the previous year, or across multiple consecutive periods when such data are available. By comparing the dynamics of items that are fundamentally interrelated, the analyst may, even at this preliminary stage, identify relationships that lack economic rationale and instead point toward potential fraudulent practices.

1 This case has been reconstructed based on Kranacher & Riley (2023, p. 243). It should be noted that the presented financial statements of this company have been further adjusted to conform to local accounting formats.

Table 1: Balance sheet and Income statement

BALANCE SHEET	VERTICAL ANALYSIS				HORIZONTAL ANALYSIS	
	2022.	%	2023.	%	Change	% Change
I FIXED ASSETS	180,000	18%	180,000	14%	0	0%
II CURRENT ASSETS	810,000	82%	1,095,000	86%	285,000	35%
1. Inventories	225,000	23%	450,000	35%	225,000	100%
2. Accounts receivable	450,000	45%	600,000	47%	150,000	33%
3. Cash	135,000	14%	45,000	4%	(90,000)	-67%
TOTAL (I+II)	990,000	100%	1,275,000	100%	285,000	29%
I EQUITY	525,000	53%	450,000	35%	(75,000)	-14%
1. Ordinary shares	75,000	8%	75,000	6%	0	0%
2. Contributed capital	225,000	23%	225,000	18%	0	0%
3. Retained profits	225,000	23%	150,000	12%	(75,000)	-33%
II LONG-TERM LOANS	180,000	18%	180,000	14%	0	0%
III ACCOUNTS PAYABLE	285,000	29%	645,000	51%	360,000	126%
TOTAL (I+II+III)	990,000	100%	1,275,000	100%	285,000	29%
INCOME STATEMENT	VERTICAL ANALYSIS				HORIZONTAL ANALYSIS	
	2022.	%	2023.	%	Change	% Change
I Operating revenues	750,000	100%	1,350,000	100%	600,000	80%
II Operating expenses	688,750	92%	1,430,000	106%	741,250	108%
1. Materials, fuel, and energy	200,000	27%	300,000	22%	100,000	50%
2. Depreciation	28,000	4%	65,000	5%	37,000	132%
3. Wages	200,000	27%	500,000	37%	300,000	150%
4. Production and sales services	192,500	26%	288,900	21%	96,400	50%
5. Other expenses	68,250	9%	276,100	20%	207,850	305%
III Operating profit (I-II)	61,250	8%	(80,000)	-6%	(141,250)	-231%
IV Interest	5,000	1%	5,000	0%	0	0%
V Pre-tax profit (III-IV)	56,250	8%	(85,000)	-6%	(141,250)	-251%
VI Tax - 20%	11,250	2%	0	0%	(11,250)	-100%
VII Net profit (V-VI)	45,000	6%	(85,000)	-6%	(130,000)	-289%

Source: Adapted from Kranacher & Riley (2023, p.243)

The preceding simple analysis of structure and trends enables analysts to detect changes that warrant closer attention. In what follows, we highlight only some of these changes that allow us to pursue the objectives set forth in this paper.

In principle, vertical analysis of financial statements sends an unambiguous message: any significant change in the share of individual items constitutes a potential red flag. At first glance, what becomes apparent is the continuous increase in accounts payable, which rose from about 29% to as much as 51% in the current year. On the other hand, it is interesting to note that the share of inventories increased from 23% to 35%, but at a considerably slower pace compared to the growth of accounts payable, with which this position is closely related. A simultaneous increase in both items could typically be justified by a rise in production volume and/or sales volume. Consequently, it is necessary to investigate in greater depth whether such correlations exist. If they do, the observed increases may indeed be attributed to the company's operations. However, in the absence of such correlations, the identified changes are indicative of fraudulent activities. It should be emphasized that the magnitude and value of such fraud can only be inferred from financial statement analysis. To go beyond this requires detailed examination of original documentation, including unrestricted access to invoices and other supporting records, in order to gain a reliable understanding of the actual extent of fraudulent activities related to the aforementioned positions.

In contrast, the income statement reveals another noteworthy pattern: the share of production and sales service costs in operating revenues declines, while their absolute value, measured year-on-year, increases by as much as 50%. Although such a decline in relative terms could be explained by higher sales volumes and the degression of fixed costs, it may also point to potential fraud. For example, a more detailed investigation could reveal the existence of fictitious purchases that artificially inflated accounts payable without the corresponding rise in production and sales service costs. In practice, such schemes often involve phantom services that were never actually rendered to the company. The scale of such fraud can be considerable, particularly if it also involves phantom purchases of material resources.

Horizontal analysis of financial statements reveals additional insights that could not be observed through vertical analysis alone. This type of analysis requires equal attention to both absolute and relative changes in items, measured against the previous year as the base index. In this context, it becomes clear that a 5% change in a position with a high monetary value is far more significant than, for instance, a 50% change in a position with a low monetary value. As with the earlier observations, drastic increases or decreases in individual items cannot always be justified by business conditions. Such changes frequently raise suspicion of fraudulent practices that warrant deeper investigation. A compelling example in our case is the inventory position, which doubled in the current year. Since this increase is clearly not grounded in higher opera-

ting activity, the question arises as to whether it reflects earnings concealment and/or other fraudulent practices. This will certainly be of particular interest in the subsequent analysis. Although accounts receivable maintained virtually the same share in total assets, they grew by 33% in the current year. The nature of the change in accounts payable is now even clearer: these obligations increased by 126%, a development that undoubtedly requires thorough examination. At the same time, it should be noted that operating revenues rose by 80%, whereas operating expenses grew much faster, by 108%. Within this, it is particularly noteworthy that depreciation expenses increased by 132%, despite the absence of significant changes in fixed assets, while other operating expenses surged by more than 300%. This dramatic increase in other operating expenses is likely the most striking finding here, given that in practice this position often serves as a repository for numerous fictitious costs arising from fraudulent activities.

2. Selection and calculation of indicators for detecting corporate fraud

Since we initially set out to demonstrate, through this paper, the potential of financial statement analysis in identifying early warning signals of fraudulent activities in the areas of inventories and accounts receivable, on the one hand, and in detecting supplier-related abuses, on the other, the selection and calculation of the indicators presented below represents a fully logical approach.

Table 2: Overview of ratios

RATIO NAME	FORMULA	VALUES	
		2022.	2023.
CURRENT RATIO		2,84	1,7
QUICK RATIO		2,05	1,0
INVENTORY TURNOVER RATIO		4,44	3,99
AVERAGE No. DAYS INVENTORY IN STOCK		82	91
ACCOUNTS RECEIVABLE TURNOVER RATIO		2,03	2,57

AVERAGE No DAYS RECEIVABLES COLLECTION PERIOD		180	142
ACCOUNTS PAYABLE TURNOVER RATIO		1,73	1,46
AVERAGE No. DAYS PAYABLES OUTSTANDING		211	250

Source: Malinić, Milićević & Stevanović, 2024, pp.87-109

In calculating the aforementioned indicators, we relied on the following information which, particularly in the previous year, is not explicitly visible from the balance sheet:

Additional information:	2022.	2023.
Average inventories	169,000	337,500
Change in inventories of materials and goods	40,000	90,000
Average accounts receivable	370,000	525,000
Average accounts payable	250,000	465,000

In the following section, our focus is primarily on linking, comparing, and interpreting the indicators that may serve as early warning signals of fraud in the company's inventory position.

3. Detecting fraud related to inventories

when it comes to corporate fraud, one of the positions frequently exposed to such activities is inventories. Inventories are a heterogeneous category, and their structure varies primarily according to the nature of the company's operations. In general, they include raw materials, goods, work-in-progress and finished goods. Companies aim to improve their performance by maintaining optimal inventory levels. Maintaining unwanted products in inventory may necessitate write-offs, whereas having too few high-demand items frequently causes lost sales opportunities (Schilit, Perler & Engelhart, 2023).

The previously presented vertical analysis of our company's financial statements indicates that the share of inventories in total assets increased from 23% to 35%. Extending this structural analysis with horizontal analysis (trends) of this position's values reveals a substantial increase in inventories, which at

the end of the current year compared to the previous year rose by as much as 100%. Based on available information regarding average inventory values during 2022, we can also conclude that a similar percentage increase occurred in that year. While this growth is indeed significant, it does not necessarily result from manipulative actions, as the increase in inventory value can be justified by higher procurement and production, i.e., the need to timely respond to rising market demand. Nevertheless, as noted earlier, it is necessary to examine the existence of such correlations, since their absence could indicate irregularities or manipulative practices behind the observed growth. If inventory growth substantially exceeds expected sales growth, the accumulation of inventories is likely unjustified and should raise concerns for investors (Schilit et al., 2023). In our company's case, operating revenues grew by 80% over the two observed years. Although available information limits our ability to determine prior trends, or whether there is continuous annual growth, we may tentatively conclude that part of the inventory value increase is indeed attributable to higher sales volume. Such a conclusion is reasonable under the assumption that no fictitious sales or similar manipulations are included in the reported revenues, which will be further addressed in the following section. Concurrently, it is possible to identify a certain disproportionality between inventory value growth and operating revenues, which could indicate inventory accumulation or, alternatively, manipulations in inventory valuation. According to Hastuti & Gozali (2015), companies facing financial difficulties typically record declines in growth, profitability, and the value of fixed assets, along with an increase in inventory levels relative to healthy companies. As suggested by Kanapickienė & Grundienė (2015), managers may be driven to commit fraudulent acts due to financial pressures.

To gain a more immediate insight into the previously identified relevant relationships, we rely on the interpretation of two earlier mentioned indicators: the inventory turnover ratio and the inventory holding period (average number of days inventory in stock). The inventory turnover ratio, as an efficiency measure of managing this asset category, shows how many times on average a company sells its inventory during the year. From this perspective, a higher turnover, i.e., higher calculated values of this metric, is desirable. Values from our company's example suggest a decrease in inventory management efficiency, given that the average inventory value increased proportionally more than the growth in operating revenues. Lower turnover, in turn, indicates that the average inventory holding period in the company rose from 82 to 91 days. These results prompt us to question whether the sharp increase in inventory value is truly justified. It should also be noted that, for forensic financial statement analysis purposes, inventory management efficiency indicators should ideally

be broken down into partial turnover ratios for different inventory components to more precisely determine the direction of further investigation.

We previously emphasized that a significant increase in inventory value can result from inventory accumulation—a manipulative technique if not justified by expected demand growth—or, alternatively, from overvaluation. Based on this, Afrifa et al. (2021) point out that, according to the speculative motive theory—which predicts a positive relationship between higher inventory levels and company performance—some companies purchase goods at lower prices under inflationary conditions to sell them at significantly higher prices in the future. It is important to remember that inventory accumulation incurs substantial costs, primarily related to storage, control, inspections, interest, and other expenses tied to tied-up, often borrowed, funds. Maintaining higher inventory volumes also carries increased risks of obsolescence, depreciation, additional borrowing, and so forth. Thus, for this strategy to be effective, the anticipated price increase must offset these additional costs.

Moreover, Roychowdhury (2006) notes that managers of some companies, in order to manipulate reported results upward, may stimulate production beyond what is necessary to meet expected demand. This can be further facilitated through absorption costing systems, which allow a larger portion of fixed production costs to be deferred in the balance sheet as inventory value, while a smaller portion is recognized as the cost of goods sold in the income statement. It is also important to note that inventories are a key component in liquidity ratio calculations, specifically the current ratio; therefore, increasing this position's value, given typical movements in other elements, may present liquidity as stronger than it truly is. This is one reason why inventories are excluded from the calculation of the reduced liquidity ratio. Regardless of which manipulative motive underlies abnormal inventory value increases, it is certain that it will negatively affect the company's financial performance in subsequent accounting periods. Consequently, for a more informative forensic analysis of financial statements, it is important to examine a series of statements across multiple accounting periods, allowing previously outlined possibilities to be either supported or dismissed.

Another major reason for inventory value increases in financial statements may be manipulations related to valuation. Failing to write down impaired assets is one technique for deferring current expenses to later periods. According to International Accounting Standard 2, if inventories are damaged, obsolete, or their selling price has fallen, their cost price may not be recoverable, implying that the inventory value must be reduced to net realizable value. One common method of overestimating profits is precisely to delay

the write-down of obsolete inventory. While this temporarily inflates inventory value and profit, it will inevitably affect future accounting periods. In addition, one of the most prevalent methods of inventory overstatement is fictitious (phantom) inventory (Kranacher & Riley, 2023), i.e., recording inventory that does not exist. This, of course, usually involves a corresponding account, such as accounts payable; given that horizontal analysis indicated a significant increase in these liabilities, this could signal the need for further investigation in this area as well.

Conversely, situations may arise opposite to the example presented, such as an increase in inventory turnover. In such cases, caution is required, as not every increase results from improved inventory management efficiency. Potential fraudulent practices can also lead to higher turnover, for example through theft or unlawful appropriation of assets, abnormal write-offs of obsolete and slow-moving inventory, and so forth. Moreover, turnover ratios may rise due to revenues increases that do not correspond to actual sales but result from manipulations such as premature revenues recognition or recording fictitious revenues. Regardless of the scenario, abnormal inventory value changes are a clear alert for analysts and fraud investigators to closely examine the structure and content of the inventory position, as well as original documentation, including purchase and sales invoices, contracts, delivery notes, requisitions, work orders, warehouse and control lists, etc.

4. Detecting fraud related to accounts receivable

accounts receivable represent a balance sheet item particularly susceptible to manipulative actions, as it can be used to influence the presentation of a company's liquidity and profitability to appear more favorable than they actually are.

In the case of our company, vertical analysis of the financial statements showed a relatively stable share of accounts receivable in total assets, while a 33% increase was observed over the two examined years, which is somewhat lower than the previous increase of 55%.² To gain deeper insight into the efficiency of receivables management, it is necessary to analyze the calculated values of the accounts receivable turnover ratio and collection period and relate these results to similar measures for inventory and accounts payable management.

In principle, the accounts receivable turnover ratio shows how many times on average the company collects its receivables from customers during the year. In our company's case, the ratio increased from 2.03 to 2.57, which at first glance might suggest a positive trend and improved efficiency in receivables manage-

² Calculated based on information about the average value of receivables in 2022.

ment. This conclusion can be further supported by considering the corresponding collection period (average number of days receivables collection period), which indicates the average time elapsed from the sale—or the creation of receivables—until collection. Fraud investigators can use this ratio as an initial step in detecting schemes involving fictitious receivables, theft of recorded inflows, and theft of unrecorded inflows (Kranacher & Riley, 2023). Since this period represents interest-free financing for customers, it can also be interpreted as the average duration of such financing. As the receivables turnover increased, the collection period decreased from 180 to 142 days. Despite this positive trend, it must be noted that the achieved collection periods are still significantly longer than typical payment times in the company's industry. Although extended payment terms may be part of a sales incentive policy, they should be approached cautiously in analysis, as they can indicate collection problems. Longer collection periods generally suggest that customers pay more slowly or, worse, that management may manipulate profits to artificially inflate revenues and earnings (Schilit et al., 2023). Under pressure or motivated by performance-related bonuses, managers may push sales even to customers known to have liquidity issues. While this technique temporarily achieves the desired outcome of increased operating revenues and reported profit, delays or failures in collection will soon negatively impact the income statement and cash flow report.

It is also noteworthy, in the context of forensic analysis, that despite the company apparently tightening credit terms and improving receivables collection efficiency, operating revenues still increased by 80%. In practice, companies often adopt the opposite strategy to stimulate sales, relaxing payment terms. These trends legitimately raise the question of whether some revenue items might stem from premature recognition or fictitious sales, contributing to the higher accounts receivable turnover ratio not due to actual performance, but as a result of manipulations. A range of techniques, as noted by Schilit et al. (2023) may be classified into the following categories: recording revenue before material obligations are fulfilled under contracts, overstating contractually executed work before customer acceptance, transactions lacking economic substance or reasonable agreement, payments from non-revenue transactions, or revenue overstatement. Indicators of such revenues further support earlier concerns that the sharp inventory value increase may be driven by manipulative motives rather than real activity growth.

Another determinant of the accounts receivable turnover ratio concerns the receivables' actual amount. Companies must timely adjust account balances to reflect amounts expected to be realistically collected, which impacts expenses in the income statement. Analysts and investors must be vigilant regarding

drastic changes in expenses related to uncollectible or doubtful receivables. An increase in turnover and a reduction in accounts receivable collection periods may also result from fraudulent practices related to the unreasonable write-off of uncollectible receivables, which simultaneously leads to an artificial increase in expenses, a decrease in net income, and the avoidance or reduction of corporate income tax. It should be recognized that such adjustments have short-term effects and are difficult to maintain over extended periods without detection by astute analysts.

The analysis conducted so far has undoubtedly provided guidance on the direction for further investigation of revenue-related manipulations. As mentioned earlier, it is essential for forensic accountants to have access to original documentation, primarily sales contracts, outbound invoices, delivery notes, etc., to substantiate the suspicions raised. Additionally, a more in-depth analysis of the structure and development of operating revenues, accounts receivable, written-off receivables, and cash inflows over multiple accounting periods can provide stronger support for some of the previously noted concerns, while potentially disproving others.

5. Supplier-related manipulations

Commenting on the results of vertical and horizontal analysis of the financial statements of our company, we noted a drastic increase in accounts payable of 126% in the current year. Since operating revenues, at the same time, increased significantly more slowly at 80%, this indicates that the company has substantially extended the payment terms to its suppliers. The calculated values of the accounts payable turnover ratio and the average time the company takes to settle obligations to suppliers show that this period increased from 211 to 250 days. In other words, the company currently pays its suppliers, on average, every eight months or more, which is an unusually long period and indicates significant supplier abuse. This is particularly evident in our company, as such extended payment periods are not typical in its industry. Normally, the average payment period in our economy is far below the 60-day term prescribed by regulations governing contractual obligations. Since a company's liquidity cannot be prescribed, it is essentially determined by the skill of aligning cash flows. The perception of liquidity can be artificially "improved" if debts are shifted from one supplier to the next in the supply chain, while those at the end of the chain often bear the consequences.

Thus, situations like the one in our company are quite common in practice, even among companies that maintain modest inventory levels and receive cash for a large portion of their products and services. Extending payment terms to

suppliers has, in effect, become a common practice. Many companies, when seeking to preserve cash, resort to deferred payments, postponing certain due obligations to the next month, quarter, or even year. This creates a false impression that the company has generated more cash from operating activities, as the increase in accounts payable represents a cash inflow. However, companies cannot indefinitely improve cash flows by postponing supplier payments. Extending such payments provides only a temporary benefit, and ongoing deferment increases obligations, creating a “snowball effect” that becomes increasingly visible. Suppliers, meanwhile, cannot ignore such practices, as their own liquidity will be seriously affected.

All of this indicates that growth in cash flows driven by the accumulation of accounts payable is neither healthy nor sustainable, as it is unrelated to actual sales growth. Poor treatment of suppliers and slower payment of obligations may temporarily inflate cash flows, but the following year will reveal that these improvements were merely temporary, ultimately leading to deterioration in cash flows from operating activities. The true capacity of the company to generate sustainable cash surpluses from operating activities becomes apparent only after this temporary embellishment.

The extent of supplier abuse becomes even clearer when considering the operating and cash conversion cycles. The operating cycle represents the time required to convert inventory into cash, and it is equal to the sum of inventory holding period and accounts receivable collection period. Every company seeks to shorten the operating cycle, reducing the need for short-term borrowing, which typically finances part of the cycle. Greater scope for shortening the cycle lies in inventory management rather than receivables, because drastically reducing collection periods can quickly deplete receivables, resulting in lower sales, revenues, and cash inflows. Companies must carefully manage capital invested in receivables while balancing effects on revenue, costs, inflows, and outflows. Extending receivable collection periods without achieving planned revenues and cash inflows ultimately transfers liquidity risk from customers to the company.

During the conversion of inventory into cash, companies require adequate financing. Part of this can be provided by spontaneous sources, i.e., interest-free financing from suppliers, while the remainder is typically financed through short-term borrowing. The portion of the operating cycle not covered by interest-free supplier financing is known as the cash conversion cycle. To maintain liquidity, the cash conversion cycle—the period when the company lacks funds to finance operations—must be as short as possible. Shortening the cash conversion cycle can be achieved in two ways: first, by shortening the operating

cycle through more efficient inventory and/or receivables management; second, by deferring payments to suppliers, which is acceptable only if suppliers tolerate it. Otherwise, pressure from suppliers to make timely payments exposes the company to high financial risk due to illiquidity. This risk is particularly pronounced if the cash conversion cycle is negative, as is the case in the current year for our company.

Table 3: Cash conversion cycle calculation

Indicator	2022	2023
Average No. Days Inventory in Stock	82	91
Average No Days Receivables Collection Period	180	142
Operating Cycle (1+2)	262	233
Average No. Days Payables Outstanding	211	250
Cash Cycle (3-4)	51	(17)

Source: Authors' calculation

Our company managed to shorten the operating cycle, i.e., the time to convert inventory into cash, by nearly 30 days, primarily through faster collection of receivables, while inventory holding period increased. At the same time, by extending accounts payable by over a month, the company achieves a negative cash conversion cycle, reflecting the scale of supplier abuse, whereby suppliers even finance portions of long-term assets.

A further dimension of abuse arises when companies employ “supplier financing” involving banks. Instead of paying suppliers directly, a bank settles the supplier’s invoice, and the company repays the bank after a deferred period. This converts accounts payable into bank debt, and in the cash flow statement, this is classified as financing activity. Consequently, cash used to purchase inventory is not reported as operating outflow, creating a false impression of the company’s cash-generating ability. In practice, many cases confirm the management’s discretion in classifying cash flows from direct transactions. Analysts or forensic accountants must not limit attention solely to operating cash flows, as cash flows from financing and investing activities are often misused to hide cash movements that should appear within operating activities. Recognizing such reclassifications often signals corporate fraud.

Fraudulent practices related to suppliers may also include the incorrect recording of discounts granted to a company by its suppliers. When a company purchases

goods from a supplier, cash typically flows from the company to the supplier. However, cash can also flow in the opposite direction when suppliers grant so-called volume discounts. Recording supplier discounts as company revenue is clearly improper, as such discounts represent a reduction in the purchase price. On this basis, many companies in practice overstate their profits. Some do so by prepaying their suppliers in order to record the cash returned in the form of discounts as revenue. Some even highly prominent global companies have gone so far that their top executives created enormous fictitious discounts to overstate revenues, artificially inflate profits, achieve targeted earnings, and secure rights to substantial bonuses. Their appetites for such practices grew year after year, and when the fraud was finally uncovered, the companies' share prices collapsed, causing significant turmoil in the capital markets.³ The creativity of those inclined toward fraudulent activities is further confirmed by practical examples of companies that engaged in similar schemes with fictitious "loans" allegedly received from suppliers. These loans were recorded in accounting as reductions in the cost of goods sold, artificially increasing profits. Since these loans existed only in the accounting entries, companies never actually received the corresponding cash inflows. While these practices allowed companies to improve apparent profitability, their negative operating cash flows were highly concerning and provided clear evidence of fraud.

In fact, perhaps the most desirable and straightforward method of concealing liabilities is simply not to record them. A clear illustration of this today can be seen in multimillion-dollar court judgments against companies. Instead of reflecting the outcomes of these judgments in the liability accounts, they are often deliberately left unrecorded while awaiting updated documentation. Similarly, certain supplier invoices may simply be discarded or neglected in someone's drawer. After an extended period, copies of these invoices may be requested once the originals are lost. It goes without saying that in such cases, the net income will be artificially increased by the amount of the neglected invoices or liabilities. Likewise, in retail, credit memos are often issued in the name of refunds to suppliers for allegedly approved rebates or discounts. These same memos are sometimes issued solely to create additional revenue. Such transactions may or may not be properly recorded in the subsequent accounting period; however, this does not diminish the fraudulent nature of the financial statements for the current period.

Interestingly, perpetrators of fraud do not need to exert much effort to increase net profit in the current period by concealing costs or unrecorded liabilities.

3 This concerns the well-known retail chain Tesco. Information according to Schilit et al. (2023), pp. 63-64.

Far more effort is required to falsify transactions. Since omitted obligations are easy to hide, they represent the most difficult form of fraudulent financial reporting to detect, leaving virtually no trace. However, unrestricted access to files, detailed review of transactions and supporting documentation, aided by computer-assisted search and analysis, can significantly help identify hidden invoices and unrecorded liabilities.

Conclusion

In this paper, we aimed to demonstrate how the careful selection of financial ratio indicators, combined with their proper interpretation, enables the identification of potential avenues of manipulative behavior, particularly regarding balance sheet items such as inventory, accounts receivable, and accounts payable, which are most susceptible to managerial manipulation. To this end, our focus was on inventory turnover, accounts receivable turnover, and accounts payable turnover, along with their corresponding temporal indicators. Based on the trends observed in these ratios over two consecutive years, as well as a general analysis of the financial statements, we sought to identify any signs of fraudulent activity and the potential direction of such practices.

Monitoring trends and deviations in individual ratios, considered as an interconnected and coherent system, can play a key diagnostic role in detecting potential corporate fraud. This approach allows not only the detection of unusual patterns in financial statements but also the assessment of their implications for the overall financial performance of the company.

It is clear that financial statement analysis has its limitations in the context of detecting corporate fraud. In particular, it should be emphasized that analyzing financial statements alone is not sufficient to prove the occurrence of fraud. As demonstrated in this paper, its primary role lies in uncovering early warning signals of manipulative behavior. Further analysis and a thorough investigation of the extent and magnitude of such activities require additional information, both financial and non-financial, with direct access to the company's source documentation being essential. Moreover, this approach is more likely to reveal significant, material frauds, while smaller-scale manipulations—though still important—may go undetected by financial analysts. Consequently, it would be unrealistic to assume that financial statement analysis alone can fully capture the scope and total value of financial fraud.

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IDENTIFYING RED FLAGS IN PUBLIC PROCUREMENT: A COMPREHENSIVE ANALYSIS OF CORRUPTION INDICATORS IN SERBIAN STATE-OWNED ENTERPRISES

Abstract

Public procurement is recognized as a critical domain highly susceptible to corruption within the Republic of Serbia. Throughout various stages of the procurement process, numerous circumstances can activate corruptive mechanisms, thereby facilitating the commission of criminal acts. In this context, the primary focus of this research is a comprehensive analysis of key red flags across all phases of public procurement procedures. To systematically identify and categorize the most prevalent indicators of irregularities, an extensive review of audit reports issued by the State Audit Institution was conducted. These reports encompass compliance audits related to public procurement activities within public sector entities, specifically state-owned enterprises, covering the period 2023–2024. Unlike previous studies of this nature, which primarily focused on identifying red flags associated with the second phase of the public procurement process, the research design employed in this study enables the identification of red flags across all stages of the procurement procedure. This represents a significant contribution of this work. By focusing on public procurement processes within state-owned enterprises, the study provides valuable insights into corruption indicators specific to this type of entity, which constitutes a significant segment of the Serbian economy. The overarching objective of the paper is to identify critical indicators that facilitate early detection of corruption, enable proactive financial investigations, and support the development of effective preventive measures. These measures aim to strengthen internal control systems and inform regulatory reforms, ultimately serving to reduce corruption risks and enhance transparency in public procurement.

Key words: corruption, occupational fraud, fraud investigation, public procurement, state-owned enterprises, state audit institution, forensic accounting.

JEL Classification: D73, H83, M49

Introduction

Corruption is commonly viewed as the improper use of entrusted power for personal or associates' benefit, causing harm to organizations or the public. Its multifaceted nature has led to diverse definitions across disciplines, reflecting legal, criminological, and political perspectives. According to Tickner (2017), corruption involves coordinated actions aimed at causing financial harm to taxpayers or misappropriating public funds. Similarly, Banerjee, Mullainathan, and Hanna (2012) emphasize its rule-breaking character, often involving public officials or bureaucrats pursuing personal gain. While traditionally associated with government officials, corruption's scope now extends to private entities, highlighting its pervasive nature in both sectors (Passas, 2020).

Building on these perspectives, corruption can be defined as the abuse of authority or influence within an entrusted position, leading to organizational harm through financial loss, reputational damage, or compromised integrity (Nye, 1967; Kranacher & Riley, 2019; Barrington, Dávid-Barrett, Power & Hough, 2022). This often involves transactional exchanges with external parties, distinguishing corruption from other forms of corporate fraud. Recent reports estimate that nearly half of all fraud cases involve corruption, underscoring its ubiquity (ACFE, 2024).

The literature provides diverse classifications of corruption (Klitgaard, 1988; Rose-Ackerman, 1999; Jain, 2001; Lambsdorff, 2007). Within this broad spectrum, the Association of Certified Fraud Examiners (ACFE) identifies four principal categories: bribery, conflict of interest, economic extortion, and illicit gratuities. Among these, bribery is generally considered the most frequent form of corruption, often materializing through practices such as kickbacks or bid rigging.

This paper will focus on identifying indicators of irregularities and corrupt mechanisms within public procurement process that may signal bid rigging. The subsequent sections provide a comprehensive overview of corruption's fundamental characteristics and attributes within the context of public procurement. This includes a review of relevant empirical research and an analysis of current practices at both global and national levels. The paper outlines potential indicators of irregularities in public procurement procedure, emphasizing the underlying corrupt mechanisms and their effects. The concluding section presents findings from an empirical research of public procurement practices in Serbia, aiming to identify and categorize prevalent irregularities that could serve as early warning signals of corruption.

1. Corruption in public procurement: Issues and implications

Public procurement has historically received limited attention in academic education and research, despite being recognized as a core function of government. Although government agencies, policymakers, and procurement professionals have shown significant interest in implementing reforms and improving procurement practices, the academic focus on this area remains relatively underdeveloped.

Public procurement is a process that is highly vulnerable to corruption due to the extensive discretionary powers granted to public officials, politicians, and legislators. This vulnerability is particularly acute in developing countries, where legal, regulatory, and institutional frameworks tend to be weaker (Ware, Moss, Campos & Noone, 2007). In such contexts, dependence on public procurement is often disproportionately high, with government contracts accounting for more than 20% of GDP. Given the large sums involved, public procurement should ideally be driven by intense competition among firms, many of which depend solely on government contracts for their survival. However, the combination of large financial flows, unchecked discretionary powers, and dependence of suppliers on these contracts creates an environment prone to corrupt practices.

Most researchers agree that structural factors such as monopoly of power, broad discretionary authority, weak accountability, and limited transparency significantly increase the risk of corruption (Klitgaard, 1988; Rose-Ackerman, 1997; Ware & Noone, 2003). A paradox in public procurement is that officials and politicians often favor selecting suppliers offering the highest bribe rather than the most cost-effective bid (Søreide, 2002). Bribery can secure contractual advantages or help establish *de facto* monopolies, enabling firms to retain contracts, access confidential information, justify poor quality or inflated prices, or generate demand for goods that would otherwise remain unpurchased. Many countries have adopted strategic procurement practices, often relying on annual procurement plans as a central planning tool. However, corruption remains a significant threat, especially in contexts where it is deeply embedded and driven by powerful vested interests (Mahmood, 2010).

Public procurement is inherently complex due to its broad scope, covering various goods and services, and the multiple steps involved, each with distinct risks. As a result, literature suggests that the likelihood of corruption depends on the type of procurement and the specific stage in the process, though these hypotheses require empirical validation. Government procurement is highly

vulnerable to corruption because of its unique features and participants. It involves handling taxpayers' money and has the potential to divert funds from other government programs and initiatives, creating opportunities for misuse (Neu, Everett & Rahaman, 2015).

Indicators of unusual behavior in public procurement, known as red flags, are widely used to reduce the risk of financial crimes, including corruption (Ferwerda, Deleanu & Unger, 2017). These indicators help investigators assess the likelihood of corruption and support a more evidence-based approach to combating it (Ware et al., 2007; Ferwerda et al., 2017). According to Søreide (2002), key factors influencing corruption risk include the size of the budget, the complexity of the technology involved, and the urgency of the procurement or project. Transparency International's analysis shows the highest risks are linked to large-value procurements such as capital investments and infrastructure projects. Rose-Ackerman (1999) notes that even smaller procurements, such as consumables and office supplies, can pose significant corruption risks. Despite this, much of the literature using risk indicators to predict criminal behavior is limited by methodological biases, mainly due to biased sample selection. Predictions are often based only on cases with criminal charges or convictions for corruption-related crimes, making it difficult to distinguish red flags indicating corruption from those linked to other legal violations. As a result, current research has limited ability to accurately forecast corruption risks in public procurement.

While these broad conceptualizations offer a general understanding, their practical implications become evident when examining specific national contexts. In the Republic of Serbia, corruption in public procurement remains a persistent challenge that undermines transparency and efficiency. Recent empirical data and reports, including the Corruption Perceptions Index, reveal a concerning trend of declining rankings and scores. Serbia ranked 105th in 2024 with a score of 35, marking its worst performance since 2012 (Transparency Serbia, 2025). The government's National Anti-Corruption Strategy aims to improve the score from 36 in 2023 to 43 by 2028, aligning with the global average. Currently, Serbia remains eight points below this target. Serbia's CPI score is among the lowest in Europe, with only Bosnia and Herzegovina scoring lower. In contrast, Albania has made notable progress, increasing its score from the same level as Serbia two years ago to 42 today (Transparency Serbia, 2025).

According to the European Commission's Progress Report on Serbia (2024) and the OECD's SIGMA Monitoring Report for Serbia 2024 (OECD, 2025), Serbia has made progress in aligning its public procurement legal framework

with EU standards, notably through amendments to the Law on Public Procurement. However, this progress is hindered by ongoing issues, such as the need for further adjustments to the Law on Public-Private Partnerships and Concessions. Concerns also remain regarding exemptions granted through intergovernmental agreements, particularly for politically prioritized projects like solar power plants and Expo Belgrade 2027. Institutionally, capacity building is necessary within the Public Procurement Office and the Committee for Public-Private Partnerships. Although monitoring and transparency have improved, the procurement market continues to face limited competition, as evidenced by a high proportion of tenders receiving only one bid. Irregularities continue to be detected in a significant percentage of audited contracts, and there has been a notable rise in the use of intergovernmental agreements, which now represent a substantial share of the total contract value.

It is crucial to recognize that developing effective public procurement processes extends beyond mere legal reform. Particular attention must be given to implementation challenges and observable indicators of abuse within public procurement practices. Accordingly, recent research suggests that combating corruption in this domain requires a primary focus on the practical application of procurement procedures (Bosio, Djankov, Glaeser & Shleifer, 2022).

2. Red flags in public procurement: Indicators of potential corruption risks

Corruption risks can be triggered at various stages of the public procurement process, including planning, tender procedure, and contract execution. Identifying critical points and unusual behaviors at each phase is essential, as red flags serve as early warning signals of potential corruption. These indicators should be continuously monitored and thoroughly investigated to prevent abuse.

In the planning phase, the contracting authority undertakes key activities such as defining procurement requirements, estimating the procurement value, and developing the annual procurement plan. Accurate and objective evaluation of procurement needs is vital. However, practices such as acquiring goods, services, or works without legitimate requirements, or involving inappropriate quantities, technical specifications, or quality standards, are common. Such practices can lead to inefficient resource allocation and may serve as signs of corrupt intent. Properly defining the procurement object is essential. This involves determining all items within a single tender procedure, dividing the

procurement into lots, and accurately forming these lots. Defining the object to favor a particular supplier, improperly combining different goods or works, or demanding unnecessary items or exclusive rights can restrict competition and constitute abuse (Varinac, 2012, p. 16). During the public procurement announcement, the type of procurement procedure is established. While open procedures promote broad competition, the law permits restricted and negotiated procedures. Unjustified and frequent reliance on negotiated procedures, justified by urgency or additional needs, may indicate abuse, leading to higher costs, lower quality, and distorted competition.

In the second phase of the public procurement process (tender procedure), the quality of tender documentation is crucial. Deficiencies, ambiguities, or contradictory information can favor certain bidders and foster suspicions of corruption, undermining transparency. This may lead to subjective judgments and restrict fair participation. Eligibility conditions must be logically related and proportionate to the procurement item, covering financial, economic, technical, and business capacity. Unnecessary conditions or those only satisfiable by a single bidder constitute discrimination and may indicate corrupt intent. During bid submission, responsiveness checks, and technical evaluations, several irregularities may occur, such as unjustified deadline extensions, incomplete or post-closure opening records, acceptance of inadequate bids, or rejection of compliant bids. Additionally, failing to verify bidders' claims regarding qualitative criteria can compromise the process (Varinac, 2012, p. 49; Nikolić & Pantelić, 2024, p. 25).

The tender procedure is essential for awarding and signing the contract, which must strictly adhere to the conditions outlined in the tender documentation and the selected bid (Law on Public Procurement, 2019, Art. 154). Amendments to the contract are only permitted in accordance with the law (Arts. 156–159). However, the third phase, involving contract implementation, poses significant risks of abuse, such as illicit annexes or unauthorized modifications, which may indicate unlawful arrangements between the contracting authority and the bidder. These vulnerabilities are further heightened by the potential for corruption, particularly when penalties for non-compliance are not enforced, undermining the principles of equality and integrity. Allowing contract execution to deviate from what was originally offered and contracted increases these risks, eroding transparency and fairness in the procurement process.

Empirical research by Ferwerda et al. (2017) shows that the number of red flags correlates with corruption risk. In their study of 192 cases, corrupt cases averaged 4.6 red flags, grey cases 4.5, while clean cases only 1.8. These differences

were statistically significant, indicating that more red flags suggest higher corruption risk. Grey cases closely resembled corrupt ones, whereas clean cases demonstrated higher transparency. In one of the few studies focused on analyzing corruption red flags in public procurement within the Republic of Serbia, Pantelić & Živanović (2024) found that most irregularities and potential corruption indicators occur during the second phase of the procurement process. Key issues included unclear or contradictory tender documents, discriminatory conditions favoring specific bidders, and deliberate amendments after bid opening to favor certain suppliers or sabotage competition. Discriminatory requirements, such as unnecessary certification or brand-specific specifications, often serve to advantage particular suppliers and heighten corruption risk. These findings underscore the need for systemic improvements in procurement oversight, transparency, and fair competition. Further research with improved methods is essential to strengthen understanding of integrity issues in Serbia's public procurement system.

3. Data, sample and findings

This study aims to systematically identify and classify the most frequent indicators of irregularities in public procurement in the Republic of Serbia. To achieve this, a comprehensive review of audit reports issued by the State Audit Institution (SAI) was conducted, covering compliance audits of public procurement activities within public sector entities, particularly state-owned companies, for the period 2023 to 2024. Unlike the study by Pantelić & Živanović (2024), which focused mainly on red flags identified during the second tendering phase by relying on decisions of the Republic Commission for the Protection of Rights in Public Procurement Procedures, this research examines red flags across all stages of the procurement cycle. This broader analytical perspective represents a key contribution of the study.

The State Audit Institution (SAI) plays a crucial role in ensuring transparency and accountability in public sector spending. The SAI conducts three main types of audit: financial statement audits, compliance audits, and performance audits (Dimitrijević, Janjić & Conić, 2019). Auditing public procurement is a central part of compliance audit, as it allows the SAI to verify that public funds are used lawfully and for their intended purposes, and to detect irregularities or fraud even when procedures are formally followed. Audit entities include not only public companies but also publicly linked companies, meaning those established by or partly owned by entities that directly or indirectly use public funds. For this study, all entities in the sample are state-owned companies.

The initial sample consisted of compliance audit reports for 81 state-owned enterprises. However, since not all compliance audit reports contained a section on public procurement, the final sample comprised 31 compliance audit reports related to 31 state-owned enterprises. The absence of public procurement sections in certain reports can be attributed to several factors. Some audited entities are not subject to the Public Procurement Law, which makes the review of this area inapplicable. Moreover, the law itself provides for specific exemptions, including procurements in the fields of defense and security, confidential procurements, and certain services such as arbitration, legal, and financial services. Finally, even when an entity is subject to the law, the SAI may, during audit planning, prioritize other areas of operations, such as employee expenditures, asset management, or the use of subsidies, which can result in public procurement not being included in a particular audit report.

Using the methodology described above, a total of 217 red flags were identified, indicating that multiple risks can be observed in individual public procurements. The average number of red flags per case is seven, substantially higher than previously reported (Pantelić & Živanović, 2024). None of the cases are free of red flags; only three exhibited a single red flag, while all others displayed multiple. Over half of the cases involved more than five red flags, and in 23% of cases, more than ten red flags were recorded per state-owned enterprise. Considering the findings of Ferwerda et al. (2017), it can be inferred that nearly half of the cases may represent corruption, 16% are likely clean cases where red flags do not indicate corruption, and the remaining 33% fall within a grey area.

Table 1: Number of red flags

Number of Red Flags	Share (%)	Probability of Corruption
0	0%	very low
<= 2	16%	low
> 5	49%	high
> 10	23%	very high

Source: Author's calculation

Among all red flags detected, 37% were associated with the first phase – planning, 51% with the second phase – the tendering procedure, and 12%

with the third phase – contract execution. This distribution differs substantially from the findings of Pantelić and Živanović (2024), where nearly 94% of indicators were linked to the second phase, reflecting their research design, which focused exclusively on requests for the protection of bidders' rights submitted to the Republic Commission for the Protection of Rights in Public Procurement Procedures. The results of the present study underscore the advantages of a research design based on the analysis of State Audit Institution (SAI) reports, which encompass all three phases of the procurement process. Nevertheless, the second phase still accounted for the highest number of red flags, although the proportion was considerably lower than in the previous study.

Table 2: Red flags across public procurement phases

Public Procurement Phase	Number of Red Flags	Share (%)
Planning phase	81	37%
Tender procedure phase	112	51%
Contract execution phase	24	12%

Source: Author's calculation

Focusing now on the analysis of red flags across the individual phases of the public procurement process, the following findings emerge.

The planning phase

In the planning phase, 75% of state-owned enterprises exhibited a red flag related to *the frequent and unjustified application of exemptions from the Law on Public Procurement*. Audit reports revealed several recurring patterns. Services and works were procured without legal grounds for exemption. In procedures where the procurement process was exempted, enterprises failed to disclose the value and type of procurements on the Public Procurement Portal, despite being required to do so. This was observed, for example, in procurements conducted under international agreements concluded by the Republic of Serbia, in accordance with rules established by international organizations or financial institutions, as well as in cases governed by specific *lex specialis* provisions. Large categories of works and goods, including road construction, maintenance of public lighting and energy facilities, and office supplies, were acquired without applying procurement procedures, even though no valid exemption existed. Furthermore, goods and services were procured

without conducting a public procurement procedure, although they were not exempt from the law. Finally, even when exemptions were applied correctly, the basic principles of public procurement, which must be observed regardless of the exemption, were not respected.

In about 58% of SOEs, red flags were identified related to the *deliberate setting of unrealistic estimated values of the procurement item or the failure to document the objectivity of their determination*. Enterprises did not demonstrate that the estimates were based on prior market research, including price, quality, warranty, and maintenance, nor that they were valid when the procurement process was initiated. These practices violate the Law on Public Procurement.

Non-compliance regarding the procurement plan was observed in 45% of SOEs. These mainly involved the absence of internal procurement policies or the existence of policies inconsistent with the Law on Public Procurement. Furthermore, enterprises failed to properly record or document actions undertaken during the planning phase.

Tender procedure phase

In the second phase, 77% of SOEs exhibited red flags related to *irregularities in procurement announcements and contract awards*. Common issues included non-compliance with deadlines and inadequate justification of urgency, with some shortening deadlines without proper documentation. Delays in publishing award notifications and late or missing publication of calls, amendments, and procurement plan updates on official portals and enterprise websites undermined transparency. Other deficiencies involved deviations from model contracts, delays in delivering contracts to bidders, execution without written agreements, or awarding contracts despite unacceptable bids. Additionally, delays in approving award decisions highlighted weaknesses in internal control and compliance mechanisms.

In 61% of cases, red flags involved *discriminatory conditions for bidder participation*, highlighting systemic challenges in ensuring fair access to public procurement. Key irregularities included excessive or misaligned personnel and technical requirements contrary to the Law on Public Procurement, which mandates proportionate criteria. Tender documentation frequently included irrelevant requirements, such as ISO 14001 and OHSAS 18001 for software procurements or owning storage facilities, discriminating against bidders with alternative arrangements and exceeding necessary contract conditions. Furthermore, the imposition of excessively high financial requirements above legally

prescribed thresholds, further constrained bidder participation and disproportionately affected smaller or otherwise capable enterprises.

In the second phase, 58% of enterprises had red flags related to *unclear and contradictory tender documentation*. Key irregularities included unspecified criteria for equivalent bids, with no clear rules for awarding contracts when bids are equal after evaluation. Frequently, instructions for bid preparation and submission are vague, eligibility requirements are omitted, and discrepancies exist between the public notice information and tender documentation such as mismatches between procurement descriptions and technical specifications. Additional issues involve incomplete or poorly defined selection criteria, leaving evaluation standards unclear, and insufficient evidence requirements for bidder eligibility, such as the way to demonstrate personnel capacity. These deficiencies undermine transparency and fairness in the procurement process.

Finally, discriminatory criteria for selecting the most advantageous bid were found in 40% of cases, such as using conditions for bidder participation as evaluation criteria.

Contract execution phase

Regarding the third phase of the public procurement process, the most frequently observed red flag is *implementing contract differently than agreed*. This irregularity was identified in slightly more than half of the enterprises (55%). Many organizations fail to maintain detailed records of contract timelines, making it difficult to verify adherence to delivery schedules or identify issues during execution. Contract records often report only financial values, lacking quantitative data on goods, services, or works delivered. Monitoring and control procedures based on quantities and values are frequently inadequate, impeding timely oversight and corrective action. Additionally, numerous contracts were executed in breach of the original procurement terms, with contract modifications often unpublished or unreported to relevant authorities. Delegation of contract execution to subcontractors not listed in bids or contracts further complicates oversight and accountability.

By contrast, red flags related to *delays or irregularities in reporting to the Public Procurement Office* and *failure to apply sanctions for non-compliance by the selected bidder* were far less frequent, appearing in only 10% and 12% of the analyzed enterprises, respectively.

Table 3: Red flags in public procurement processes for state-owned enterprises

Public Procurement Phase	Red Flag Type	Number of SOEs with Red Flags	Share of SOE's (%)
Planning phase	Procurement of unnecessary items (in terms of content, quantity, or quality)	1	3%
	Deliberate setting of unreal estimated value or undocumented objectivity.	18	58%
	Unauthorized splitting of procurement to apply the small-value procurement procedure	9	29%
	Creating a procurement item that only a specific supplier can perform	10	32%
	Frequent and unjustified use of law exceptions	23	74%
	Frequent and unjustified use of negotiated procedure with a specific supplier	2	6%
	Frequent and unjustified use of the negotiated procedure „due to urgency”	2	6%
	Frequent and unjustified use of the negotiated procedure for additional procurements	2	6%
	Non-compliance regarding the procurement plan	14	45%
Tender procedure phase	Conflict of interest — no signed statements by Committee members	3	10%
	Unclear and contradictory content of tender documentation	18	58%
	Discriminatory conditions for bidder participation	19	61%
	Discriminatory technical specifications	7	23%
	Discriminatory criteria for selecting the most advantageous bid	12	39%
	Irregularities concerning the procurement announcement and the awarding of contracts	24	77%
	Irregularities during bid opening and technical evaluation	4	13%
	Failure to implement decisions of the Republican Rights Protection Commission	4	13%
Contract execution phase	Irregularities related to submitting reports to the Public Procurement Office	3	10%
	Implementing contract differently than agreed (unauthorized contract annexes)	17	55%
	Not enforcing sanctions for bidder non-compliance	4	13%

Source: Author's calculation

Conclusion

The analysis of audit reports on public procurement in Serbia reveals widespread irregularities across all phases of the procurement cycle, particularly among state-owned enterprises. The high number of red flags indicates systemic issues that threaten transparency, fairness, and effective use of public funds. Key problems include improper application of exemptions, unclear tender documentation, discriminatory practices, and inadequate contract oversight. Many organizations lack proper records on timelines and deliverables, complicating the monitoring process and increasing the risk of breaches. Furthermore, frequent contract amendments and delegations to unlisted subcontractors weaken accountability. These deficiencies suggest a need for stronger oversight, more transparent procurement procedures, and clearer legal guidelines. Enhancing the capacity of procurement and audit officials through targeted training is vital. Additionally, stricter enforcement of sanctions and mandatory reporting requirements are essential to ensure compliance. Finally, promoting fair competition by eliminating discriminatory and unnecessary criteria will help improve procurement integrity. Overall, these measures are crucial to safeguarding public resources, increasing transparency, and fostering a more accountable procurement system in Serbia.

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TRACING THE EVOLUTION OF FORENSIC ACCOUNTING AND FRAUD RESEARCH: A QUANTITATIVE LITERATURE REVIEW

Abstract

This study offers a thorough bibliometric review of the academic literature on forensic accounting and fraud examination. Its goal is to trace the field's development, identify its key contributions, and highlight emerging trends. A dataset of 979 peer-reviewed publications related to forensic accounting and fraud was collected from Scopus (as of May 31, 2025). Using a transparent selection process, including a PRISMA flow protocol, along with bibliometric techniques, we examined publication patterns, citation impact, co-authorship networks, and keyword co-occurrence to understand the intellectual structure of the field. The analysis shows significant growth in forensic accounting research over the last twenty years, coinciding with rising global awareness of financial fraud. The results highlight a core set of highly cited works and influential authors that have shaped the development of the field, especially in fraud theory, risk assessment, and detection methods. Network visualizations of keyword co-occurrence identify established central themes—such as fraud detection, financial statement fraud, and auditing—and emerging topics like digital forensic analytics and the role of forensic accounting in governance and sustainability. The findings demonstrate that forensic accounting has matured into a distinct academic discipline within accounting, with an expanding scope and international influence. This bibliometric review provides an objective, data-driven synthesis of the literature, offering insights into how the field has evolved and where it is heading. It lays the groundwork for researchers and practitioners to understand current research directions and to identify future paths in the ongoing effort to combat fraud.

Keywords: forensic accounting, fraud examination, bibliometric analysis, financial crime, research trends, emerging technologies.

JEL Classification: M41, K42, C88.

Introduction

Forensic accounting and fraud examination are closely related disciplines concerned with detecting, investigating, and preventing financial fraud and misconduct. Forensic accounting is broadly defined as the application of accounting expertise, auditing techniques, and investigative skills to examine financial activities in a manner suitable for legal review (Hopwood, 2012). Fraud examination, in turn, refers to the process of resolving fraud allegations from inception to disposition – involving the gathering of evidence, interviewing of suspects, reporting of findings, and, if necessary, providing testimony in court (Wells, 2014). According to the founder of the Association of Certified Fraud Examiners, fraud examination draws on a specialized body of knowledge from accounting, law, investigation, and criminology to bring fraud cases to resolution (Wells, 2025). In practice, the two terms often intersect: historically, *forensic accounting* was sometimes used interchangeably with fraud investigation, but over time its scope has expanded beyond fraud-specific issues to encompass a wider range of financial forensics (Wells, 2014). Both forensic accounting and fraud examination have gained prominence in the accounting profession as essential tools for combating financial crime. In fact, global surveys indicate that organizations lose significant revenue to fraud each year, roughly 5% of annual revenues on average, underscoring the economic importance of effective antifraud measures (Wells, 2025). This context has elevated the demand for forensic accounting expertise to investigate malfeasance and strengthen financial accountability (Rezaee & Riley, 2010; Hogan et al., 2008).

Over the past two decades, the field of forensic accounting and fraud examination has undergone considerable growth and development in response to high-profile corporate scandals and regulatory reforms. The early 2000s, marked by events such as the Enron and WorldCom collapses, proved to be a turning point that heightened regulatory scrutiny and public awareness of financial fraud. Subsequent legislation (e.g., the Sarbanes–Oxley Act of 2002) and corporate governance reforms created a stronger mandate for fraud detection and prevention efforts within organizations. Academic research responded in tandem: what was once a relatively niche or nascent area of study prior to the 2000s has since expanded exponentially. The annual volume of publications on forensic accounting and fraud topics climbed sharply in the 2000s and 2010s, reflecting the surge in scholarly interest documented in our analysis. Alongside this quantitative growth, the knowledge base of the field has deepened through influential works that established key theories and methodologies. For example, foundational concepts like the *fraud triangle*, which explains fraud occurrence through the interplay of pressure, opportunity, and rationalization, have been revisited and

extended by contemporary researchers (Dorminey et al., 2012; Free, 2015). The fraud triangle, originally proposed by Cressey in the mid-20th century, remains a touchstone in the literature, though studies have proposed new frameworks (such as the “fraud diamond” and other models) to capture additional factors like capability and collusion in fraudulent behavior (Cressey, 1953; Dorminey et al., 2012). Scholars have also improved fraud risk detection techniques by introducing data-analytic and non-financial approaches; for instance, one highly cited study demonstrated the use of non-financial performance measures to flag fraud risks in financial statements. Comprehensive reviews of fraud research have periodically synthesized these developments – e.g., a 2013 auditing journal review integrated findings on fraud risk factors, auditor detection capabilities, and fraud prevention strategies across prior studies. Collectively, such contributions have helped to mature the field and broaden its scope. Today, forensic accounting research spans a diverse array of topics, including financial statement fraud detection (Skousen et al., 2009), corporate governance and internal controls to deter fraud (Rae & Subramaniam, 2008), the psychology and motives of fraud perpetrators (Free & Murphy, 2015), and the incorporation of technology and data analytics into fraud examination (Amani & Fadlalla, 2017). The frequent appearance of terms like “forensic accounting” in academic discourse itself reflects the consolidation of this area as a distinct and recognized domain within accounting scholarship. Moreover, the community of forensic accounting scholars has become increasingly global and interdisciplinary, drawing expertise from accounting, auditing, criminology, finance, and information technology (Ozili, 2023).

Given the growing volume and breadth of the literature, there have been calls for systematic syntheses to take stock of the field’s evolution (Trompeter et al., 2013; Free, 2015). Recent efforts to review and map the literature illustrate this trend. For example, Kaur et al. (2023) conducted a systematic review focusing on how forensic accounting contributes to fraud detection and prevention. Their narrative analysis highlighted the role of forensic accounting in strengthening internal controls and supporting anti-fraud mechanisms in organizations. In another recent study, Al-Raggad et al. (2025) applied bibliometric methods to analyze the landscape of forensic accounting research, providing quantitative insights into publication trends and thematic focus areas. These studies signal a recognition that, as the field expands, it is beneficial to periodically delineate its knowledge structure and major contributions. However, prior reviews have either been qualitative in nature or limited in scope (for instance, centered on specific sub-topics or time frames) and thus do not fully capture the comprehensive development of forensic accounting and fraud examination research as an integrated whole. There remains a need for a *holistic* overview that can objectively map the intellectual architecture of this domain, identifying its seminal works, research clusters, and

temporal evolution, and thereby inform both academics and practitioners about where the field stands today. Bibliometric analysis is well-suited to this purpose, as it allows for an evidence-based aggregation of research outputs and the detection of patterns across large datasets (Donthu et al., 2021).

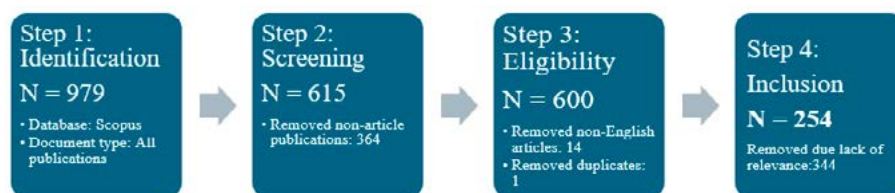
In light of the above, the present study undertakes a thorough bibliometric review of the forensic accounting and fraud examination literature. Using a robust dataset of 254 relevant publications, we employ quantitative analysis techniques to address several key questions: How has the volume of research in this field grown and shifted over time? What are the most influential works, and who are the leading authors and journals driving this field? Which themes and topics – as revealed by keyword co-occurrence and clustering – form the core of the literature, and which new themes are emerging at the research frontiers? By answering these questions, our study provides a panoramic assessment of the academic landscape of forensic accounting and fraud examination. This work not only documents the field's historical trajectory and current state of development, but also offers insights into its future directions. The bibliometric approach adds value by overcoming biases inherent in purely qualitative reviews, instead leveraging publication and citation data to objectively highlight which topics and contributions have been most central. Ultimately, this review aspires to serve as a reference point for researchers, educators, and practitioners, synthesizing what is known about the evolution of forensic accounting scholarship and pointing toward areas where further investigation is warranted as the field continues to respond to the ever-evolving challenges of financial fraud.

1. Methodology

This study adopts a bibliometric approach to analyze the literature on forensic accounting and fraud examination systematically. The dataset was assembled through a comprehensive search of the Scopus database (as of May 31, 2025), focusing on peer-reviewed publications related to “forensic accounting” and “fraud detection”/“fraud examination.” This targeted search yielded 979 documents, all of which were journal articles in English, ensuring a consistent and high-quality set of sources. Bibliographic information (including titles, authors, affiliations, publication years, and citation counts) was exported for quantitative analysis. The decision to use a bibliometric method is appropriate for this field because it enables an objective aggregation of research outputs across a broad, interdisciplinary domain, uncovering publication trends and influential contributions that might not be apparent in a traditional narrative review (Donthu et al., 2021). By quantitatively examining the structure of the literature, we can distill insights on how forensic accounting and fraud research have developed over time and

identify core themes and contributors in the field. A PRISMA-based screening protocol was applied to ensure a transparent and reproducible selection of literature (Moher et al., 2009). Figure 1 presents the PRISMA flow diagram summarizing the four stages of identification, screening, eligibility, and inclusion.

Figure 1: PRISMA protocol visualization



Source: Authors' elaboration

In the identification phase, records were collected from the database using the specified keywords, and obvious duplicates or non-relevant document types were removed. Given that the search was restricted to a single database and peer-reviewed journal articles, no significant de-duplication across sources was necessary. The initial search results were then screened by titles and abstracts to verify topical relevance to forensic accounting or fraud; studies outside the scope (e.g., those merely mentioning “fraud” metaphorically or not addressing accounting/financial contexts) were excluded at this stage. Next, in the eligibility phase, the remaining articles were assessed in more depth (including full-text when needed) against the inclusion criteria – namely, a clear focus on forensic accounting, fraud examination/detection, or closely related topics (such as fraud auditing or financial crime investigation in accounting). Any papers that did not substantially relate to these themes were omitted. After this rigorous filtering, a total of 254 publications met all criteria and were included in the final bibliometric dataset. The PRISMA-guided process ensured that only the most relevant and reliable studies were retained, minimizing selection bias and providing a clear audit trail of how the literature was narrowed down. This structured approach enhances the reproducibility and validity of the review by systematically documenting why each exclusion or inclusion was made (Moher et al., 2009). For the analytical phase, we employed VOSviewer (version 1.6.19) to map and visualize bibliometric networks within the dataset, particularly keyword co-occurrence patterns. VOSviewer is a specialized software for constructing and displaying bibliometric maps (Van Eck & Waltman, 2014). In this study, it was used to process the keywords from the 254 publications and generate a network map illustrating how frequently certain keywords appear together across the literature. This helps to identify prominent research themes and their interrelationships within forensic accounting and fraud scholarship. The tool’s capability to cluster

related terms graphically was valuable for structuring the dataset and understanding the intellectual structure of the field, although the detailed cluster analysis results are beyond the scope of the present section. In addition to network mapping, we conducted descriptive bibliometric analyses using the metadata: these include examining publication counts by year, citation counts, leading journals, and authors' geographic affiliations. Such indicators illuminate the evolution and spread of research in this domain. By combining the PRISMA selection protocol with bibliometric mapping and descriptive statistics, our methodology provides a rigorous and multifaceted approach well-suited to synthesize the forensic accounting and fraud examination literature. This approach is appropriate because the field encompasses a diverse and growing body of work; hence, a quantitative mapping method enables us to capture broad trends, influential works, and the global reach of the research in a systematic, unbiased manner. All analyses were performed with an aim for academic rigor and transparency, laying a reliable foundation for the results presented in the next section.

2. Results and discussion

2.1. Descriptive analysis

The forensic accounting and fraud examination literature has expanded significantly over time. Figure 2 illustrates the yearly output of publications, showing a clear upward trajectory.

Figure 2: Number of publications by year



Source: Authors' elaboration

Early in the timeline (before the 2000s), there were relatively few publications per year, reflecting the nascent stage of the field. However, since the mid-2000s, the volume of research has grown markedly. In particular, the aftermath of high-profile corporate scandals (such as Enron and WorldCom in the early 2000s) and increased regulatory focus on fraud appears to coincide with a surge in academic interest. The annual publication count rose from only a handful of papers in the 1990s to dozens per year in the 2010s, and it peaked in the late 2010s and early 2020s. For example, there were only a few relevant articles around 2000, but by 2021–2022, the output had grown to well over 50 publications per year (based on the Scopus-indexed data). This sharp growth underscores the rising importance of forensic accounting and fraud topics in scholarly discourse. The trend is one of steady acceleration, with minor plateaus that often correspond to broader economic events or shifts in regulatory emphasis. Overall, the 254 relevant publications in the dataset span several decades, but more than half have been produced in the last ten to fifteen years, indicating that this is a rapidly developing field.

The impact of publications in this domain can be gauged by citation counts, which highlight a set of seminal works that have shaped the discipline. Table 1 lists the top-cited publications in the dataset.

Table 1. Top Publications by number of citations

	Authors	Title	Year of publication	No. of citations	Country
1	Dorminey J.; Scott Fleming A.; Kranacher M.-J.; Riley R.A., Jr.	The evolution of fraud theory	2012	260	United States
2	Hogan C.E.; Rezaee Z.; Riley R.A.; Velury U.K.	Financial statement fraud: Insights from the academic literature	2008	232	United States
3	Brazel J.F.; Jones K.L.; Zimbelman M.F.	Using nonfinancial measures to assess fraud risk	2009	178	United States
4	Trompeter G.M.; Carpenter T.D.; Desai N.; Jones K.L.; Riley R.A., Jr.	A synthesis of fraud-related research	2013	167	United States

5	Rae K.; Subramaniam N.	Quality of internal control procedures: Antecedents and moderating effect on organisational justice and employee fraud	2008	129	Australia
6	Amani F.A.; Fadlalla A.M.	Data mining applications in accounting: A review of the literature and organizing framework	2017	126	Qatar
7	Free C.; Murphy P.R.	The ties that bind: The decision to co-offend in fraud	2015	118	Canada
8	Skousen C.J.; Smith K.R.; Wright C.J.	Detecting and predicting financial statement fraud: The effectiveness of the fraud triangle and SAS No. 99	2009	107	United States
9	Albrecht W.S.; Albrecht C.; Albrecht C.C.	Current trends in fraud and its detection	2008	96	United States
10	Free C.	Looking through the fraud triangle: A review and call for new directions	2015	81	Australia

Source: Authors' elaboration

The most highly cited paper is “The evolution of fraud theory” by Dorminey et al. (2012), which has received 260 citations. This work is often referenced for its thorough analysis of fraud theories and frameworks, highlighting its importance in establishing the theoretical basis for fraud examination. The second most cited publication is the review “Financial statement fraud: Insights from the academic literature” by Hogan et al. (2008), with 232 citations. It synthesizes prior research on detecting financial statement fraud and has become a key reference in the field of audit and fraud risk assessment. Close behind, Brazel

et al. (2009)’s study “Using nonfinancial measures to assess fraud risk” (178 citations) is another influential work, notable for introducing innovative methods to predict fraud using non-financial indicators. Other highly cited works include Trompeter et al. (2013)’s comprehensive review of fraud-related research (167 citations), which provided auditors and researchers with a roadmap of current knowledge, and Rae & Subramaniam (2008), who examined internal control quality and its impact on employee fraud (129 citations). These top five publications all have over 125 citations, marking them as major contributions that have significantly influenced subsequent research. Notably, they cover a variety of themes—from theoretical frameworks and literature reviews to empirical detection techniques and internal control studies—reflecting the multifaceted nature of forensic accounting and fraud research. The dominance of these works also emphasizes that foundational concepts (such as the fraud triangle and fraud theory) and comprehensive reviews tend to attract the most academic attention. It is also worth noting that most of the top-cited studies were published in the late 2000s and early 2010s, indicating that key contributions in this field peaked during that period. This trend could be attributed to being early movers in a growing field and benefiting from more than a decade of citations since publication. Each of these influential works has helped shape the direction of forensic accounting scholarship, and their high citation counts highlight their role in guiding both research and practice in fraud examination. The body of literature on forensic accounting and fraud is disseminated across a variety of academic journals, but a few outlets stand out for their volume of relevant publications and their academic impact.

Table 2: Top journals

Journal name	No. of publications	IF	SJR	h-index	CiteScore
Journal of Financial Crime	26	2.25	0.383	33	3.1
Issues in Accounting Education	10	1	0.525	32	/
Deviant Behavior	9	1.7	0.564	65	3.7
Journal of Business Ethics	7	5.9	2.624	253	10.8
Cogent Business and Management	6	3	0.524	44	4.4

Auditing	6	3.076	2.08	4	4.4
Journal of Financial Reporting and Accounting	6	3.3	0.488	30	2.5
Accounting Horizons	5	2.2	0.997	91	3.5
Managerial Auditing Journal	4	2.8	0.764	23	/
International Journal of Accounting Information Systems	4	5.95	1.127	65	/

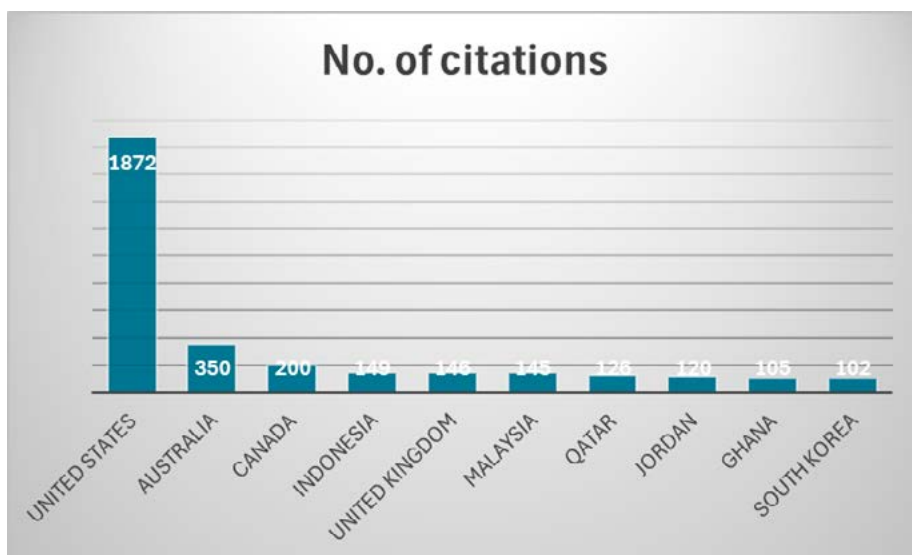
Source: Authors' elaboration

The following discussion is based on the data presented in Table 2, which highlights the leading journals by number of publications and key bibliometric indicators. The body of literature on forensic accounting and fraud is disseminated across a variety of academic journals, but a few outlets stand out for their volume of relevant publications and their academic impact. The Journal of Financial Crime is the most prolific in this domain, contributing 26 articles to our dataset. This journal's focus on financial crime and fraud makes it a natural home for forensic accounting research, and its prominence here underscores the specialized venues addressing these topics. Following this, Issues in Accounting Education (10 publications) has also been a significant outlet, which may reflect the pedagogical and curricular interest in teaching forensic accounting as the field has matured. The journal Deviant Behavior (9 publications) appears as well, indicating an interdisciplinary crossover where fraud is examined through the lens of deviance and criminology. Additionally, the influence of high-impact mainstream journals is evident: for instance, the Journal of Business Ethics (7 publications) has featured research on fraud, likely in the context of ethical issues and corporate governance. Notably, the *Journal of Business Ethics* carries a high Impact Factor (around 5.9) and a very large h-index (over 250), signifying that fraud-related studies have penetrated top-tier outlets concerned with ethics and management. Other important journals with multiple contributions include Cogent Business & Management (6 publications), Auditing: A Journal of Practice & Theory (6 publications), Journal of Financial Reporting and Accounting (6 publications), and Accounting Horizons (5 publications). These journals, while varied in scope, have provided platforms for key studies in the field. It is also informative to consider their impact metrics: for example, *Auditing: A Journal of Practice & Theory* and *Accounting Horizons* are well-regarded accounting journals (each with Impact Factors in

the ~2–3 range), which lend credibility and visibility to the fraud research published there. Meanwhile, *Journal of Financial Crime*, despite a more moderate Impact Factor (around 2.3), serves as a niche journal highly relevant for this community. In summary, the dissemination of forensic accounting research spans both specialized and generalist journals. The presence of specialized journals with numerous publications indicates a consolidated scholarly community, whereas appearances in high-impact general journals indicate that fraud and forensic accounting topics have broad relevance and appeal in the wider academic discourse. This blend of outlets reflects the interdisciplinary and practical importance of the field, engaging audiences in accounting, finance, ethics, and criminology.

The contributions to forensic accounting and fraud examination research are globally distributed, though not evenly. Figure 3 depicts the number of publications by country of the authors' affiliations, and Figure 4 shows the total citations by country.

Figure 3: Number of publications by country



Source: Authors' elaboration

The United States clearly leads in both volume of publications and citation impact. A substantial portion of the 254 studies were authored by researchers based in the U.S., which aligns with the fact that the concept of forensic accounting has strong roots in the U.S. accounting profession and many of the field's high-impact studies (including those top-cited works mentioned above) have

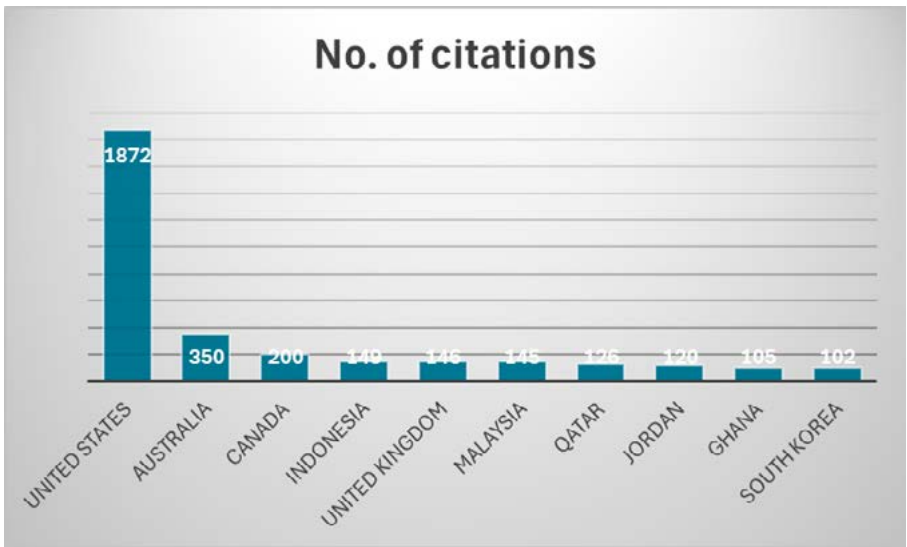
American authors. The U.S. dominance is also reflected in citation counts, suggesting that U.S.-affiliated research not only publishes more but is also widely cited, potentially due to strong research funding and established academic programs in this area. Following the United States, other English-speaking and developed economies feature prominently.

The United Kingdom and Australia form the next tier of contributors, each hosting active research communities in fraud examination. For instance, Australian scholars have made notable contributions (e.g., the work by Rae & Subramaniam (2008) on internal controls came from Australian institutions), and the UK's presence is bolstered by journals like the *Journal of Financial Crime*, which often attract UK and European researchers.

Canada also appears as a significant contributor, reflecting its engagement in accounting ethics and fraud topics (as evidenced by studies like Free & Murphy (2015) on co-offending in fraud, originating from Canadian and Australian academia). Beyond these, several other countries contribute to the literature to a lesser but still notable extent.

These include European countries (such as Italy, Spain, and the Netherlands), parts of Asia (notably China, India, and Malaysia, where interest in fraud and forensic accounting has been growing alongside corporate governance reforms), and regions of the Middle East (e.g., Qatar, which is the affiliation of authors Amani & Fadlalla (2017), indicating research interest in data mining for fraud in that region). The presence of diverse countries in the dataset indicates that fraud examination is a globally relevant topic, though the intensity of research is concentrated in a few key nations. The patterns in Figure 3 suggest that about a dozen countries account for the majority of publications, implying that capacity and expertise in forensic accounting research are developed primarily in those regions. Correspondingly, Figure 4 shows that the citation impact mirrors publication volume: the United States, for example, not only produced the most papers but also garnered the highest citations in aggregate, pointing to a high influence of U.S.-based research on the field worldwide. In sum, the geographic analysis reveals a predominantly Western (especially U.S.) footprint in the forensic accounting literature, with important contributions from other Anglophone and developed countries, and an emerging engagement from a broader set of countries as the field internationalizes. This insight highlights opportunities for wider international collaboration and knowledge transfer, as countries with fewer publications might benefit from the expertise developed in the leading regions. It also underlines that fraud is a universal concern, prompting scholarly responses across different jurisdictions and economic contexts.

Figure 4: Number of citations by country



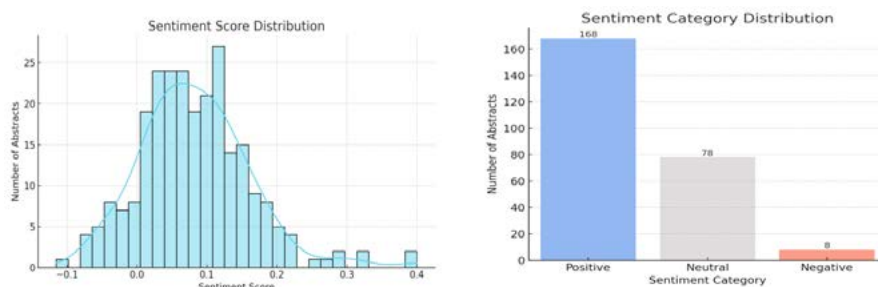
Source: Authors’ elaboration

In this descriptive overview, we observe that the literature on forensic accounting and fraud examination has grown rapidly in recent decades, is anchored by a few highly influential studies, is disseminated through both specialized and high-impact journals, and is driven largely by research communities in the United States and other English-speaking countries. These descriptive findings set the stage for deeper analysis (in subsequent sections of the full review) into the thematic structure of the field, such as co-occurring keywords and research clusters, which are mapped using bibliometric tools. By establishing the basic contours of when, where, and how the research has progressed, the descriptive analysis provides a foundation for understanding the knowledge architecture of forensic accounting and fraud scholarship. Each of these facets – temporal trends, citation landmarks, publication venues, and geographic spread – offers valuable context for interpreting the evolution of the field and identifying areas for future inquiry. The clear upward trend in publications and the engagement of multiple disciplines suggest that forensic accounting research will continue to mature and diversify, responding to the evolving challenges of fraud in a global and digital financial environment. This comprehensive descriptive snapshot underscores the vibrancy of the domain and the collaborative efforts of an international community of scholars dedicated to advancing the understanding of fraud detection and prevention in accounting.

2.2. Sentiment analysis

Sentiment analysis, also referred to as opinion mining, is a computational method for assessing the polarity of textual data—categorizing content as positive, negative, or neutral—based on lexical and syntactic features (Liu, 2012; Hutto & Gilbert, 2014). In bibliometric research, sentiment analysis is increasingly employed to uncover the affective dimensions of scholarly communication, offering insights that go beyond traditional citation and co-authorship metrics (Thelwall et al., 2010). Its relevance in the present study lies in its ability to reveal how researchers frame the discourse around forensic accounting and fraud examination, topics often associated with high-stakes financial and ethical implications. By evaluating the tone of academic abstracts, sentiment analysis provides a complementary perspective on the field's intellectual climate, highlighting whether scholars adopt an optimistic view of technological and methodological progress or emphasize the persistent risks and institutional shortcomings. This interpretive layer enhances our understanding of the epistemological posture of the literature and reflects the evolving balance between critique, neutrality, and constructive engagement in the domain. To complement the quantitative and structural findings, sentiment analysis was performed on the abstracts of 254 peer-reviewed publications in the domain of forensic accounting and fraud examination. The analysis employed the VADER sentiment scoring tool (Hutto & Gilbert, 2014) in Python, which assigns a sentiment score ranging from -1 (most negative) to $+1$ (most positive) based on lexical features. Abstracts were classified into three categories: positive (score > 0.05), neutral ($-0.05 \leq \text{score} \leq 0.05$), and negative (score < -0.05), as illustrated in Figure 5.

Figure 5: Sentiment analysis results



Source: Authors' elaboration

Contrary to expectations, given the inherently serious nature of the topic, the prevailing tone across the literature was predominantly positive, with

168 abstracts (66.1%) falling into this category. These abstracts typically reported constructive outcomes such as improvements in fraud detection methods, successful implementation of forensic tools, or policy reforms enhancing audit effectiveness. Such expressions are often associated with terms like “improved,” “effective,” or “strengthened,” reflecting scholarly optimism toward the utility of forensic interventions.

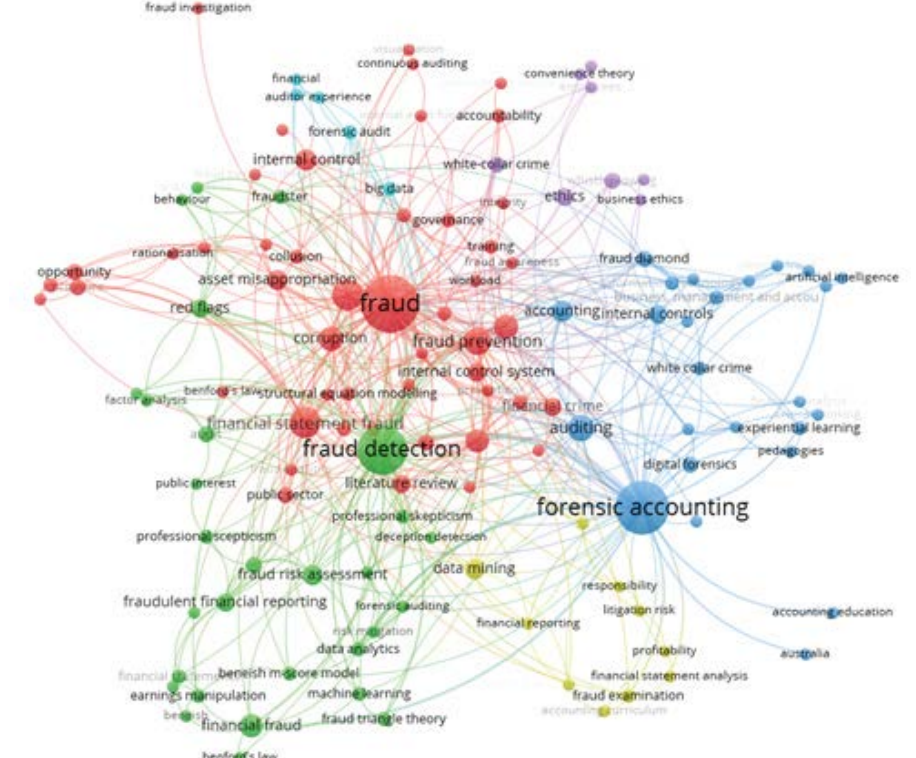
A significant portion of the abstracts (78, or 30.7%) were neutral, consistent with the conventions of academic discourse, which prioritize objectivity and descriptive accuracy over emotional language. Neutral abstracts focused on conceptual discussions, methodological frameworks, and empirical findings without adopting an overtly positive or negative stance. This neutrality is indicative of the field’s scientific maturity and its reliance on evidence-based reporting.

Only 8 abstracts (3.1%) exhibited negative sentiment, generally emphasizing the severity and persistence of fraud, the inadequacy of existing systems, or the ethical failures within certain institutional settings. These abstracts employed language highlighting limitations, misconduct, or systemic vulnerabilities, which resulted in low sentiment scores.

Overall, the sentiment distribution reveals that the scholarly literature on forensic accounting conveys a cautiously affirmative outlook. Despite addressing inherently adverse phenomena, researchers often frame their findings in terms of progress, innovation, and potential impact. This suggests that the academic community views forensic accounting not only as a tool for retrospective investigation but also as a proactive mechanism for institutional improvement and fraud deterrence.

2.3. Keyword analysis

Using VOSviewer, a keyword co-occurrence analysis was performed to map the thematic structure of the forensic accounting and fraud examination literature. The author-provided keywords of the 254 publications were examined, resulting in a network visualization map with six distinct thematic clusters, each represented by a different color. These clusters group together commonly co-occurring terms, indicating subfields or research themes that have developed within the broader forensic accounting field.



Source: Authors' elaboration

These clusters, derived from 126 frequently occurring keywords, illustrate the field's topical diversity as well as its interdisciplinary and methodological evolution. Interpreting each cluster by key terms and themes reveals core concepts, emerging priorities, and research gaps:

Cluster 1 (Red - Fraud Prevention, Governance, and Control Systems): The largest cluster (49 keywords) centers on “fraud” and related terms—“fraud prevention”, “internal control”, “governance”, “audit quality”, “bribery”, “corruption.” It emphasizes preventive mechanisms and organizational responses, linking corporate governance, ethical leadership, and regulation to reduced fraud. Tools such as “Benford’s law”, “internal audit function”, and “risk management” highlight resilience against misappropriation and collusion, while “accountability”, “public sector”, and “organizational corruption” extend the focus beyond firms to public interest and transparency. Overall, the cluster underscores forensic accounting’s role in strengthening control environments and shaping

anti-fraud strategies aligned with governance reform and compliance (Munandar & Honggowati, 2025).

Cluster 2 (Green - Financial Statement Fraud and Analytical Detection Techniques): Comprising 29 terms, this cluster features “fraud detection”, “financial statement fraud”, “fraud risk assessment”, “deception detection”, “earnings manipulation”, and “machine learning.” It reflects a strong methodological orientation that couples “data analytics”, “factor analysis”, “Benford’s law”, and “Beneish M-score” with theory-“fraud triangle”, “red flags”, and “professional scepticism.” The prominence of “auditor” and “external auditors” signals persistent concerns about audit quality and the limits of traditional audits. Positioned at the intersection of accounting, audit practice, and computational forensics, it calls for combining investigative techniques with modern data-driven approaches.

Cluster 3 (Blue - Forensic Accounting, Education, and Technological Integration): This 25-item cluster revolves around “forensic accounting” and includes “accounting education”, “digital forensics”, “cybersecurity”, “experiential learning”, “critical thinking,” and “artificial intelligence.” It captures the institutionalization of forensic accounting in curricula and professional training, emphasizing technological literacy and investigative skills for modern fraud contexts. Keywords such as “information technology” and “artificial intelligence” reflect adaptation to data-intensive environments and the need to equip the next generation of practitioners.

Cluster 4 (Yellow – Litigation, Risk, and Financial Reporting Responsibility): With 10 terms: “litigation risk”, “responsibility”, “fraud examination”, “financial reporting”, “profitability”, this cluster sits at the legal–accountability interface. It focuses on forensic roles in evidence evaluation, liability, reputational risk, and financial outcomes, with overlap to education (“accounting curriculum”, “forensic accounting education”). It bridges technical analysis and legal processes, highlighting stakeholder accountability.

Cluster 5 (Purple - Ethical Considerations and Organizational Behavior): Including 8 terms-“ethics”, “business ethics”, “professional commitment”, “convenience theory”, “whistleblowing”-this cluster addresses moral and psychological drivers of fraud and reporting. It examines ethical climates, motivations, and institutional influences, with “convenience theory” and “whistleblowing” pointing to mechanisms for understanding and mitigating misconduct via culture and professional norms.

Cluster 6 (Turquoise - Auditor Experience and Big Data): The smallest cluster (5 keywords: “auditor experience”, “external auditor”, “forensic audit”, “financial”, “big data”) highlights the human-technology interface. It considers how large-scale, unstructured data reshape forensic audits and how auditor intuition and experience complement automated analytics and evolving skill sets.

To elucidate the temporal evolution of research priorities within the domain of forensic accounting and fraud examination, an overlay visualization was constructed using VOSviewer. In this map, keywords are color-coded based on the average publication year of the documents in which they appear, ranging from dark blue (older) to yellow (more recent). This temporal coding facilitates an assessment of how scholarly attention has shifted across themes over time and enables the identification of emerging research fronts.

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Early Research Themes (2017–2019): Keywords displayed in darker blue and purple hues—such as “fraud triangle,” “fraud risk factor,” “internal auditor,” “fraud risk assessment,” “public sector,” and “corporate governance”—reflect the foundational focus of early studies. These earlier works emphasized the conceptual grounding of fraud typologies and the institutional mechanisms required to detect and prevent financial misconduct. Seminal frameworks such as the Fraud Triangle and its derivatives (e.g., the Fraud Diamond) were widely adopted to explain the behavioral antecedents of fraud—pressure, opportunity, and rationalization (Dorminey et al., 2012; Kranacher et al., 2011). The prominence of “internal auditor,” “board,” and “director” underscores the attention given to governance structures in the wake of corporate failures and the implementation of risk management reforms in both public and private sectors.

Mid-Stage Developments (2019–2020): Green-coded keywords indicate mid-period developments. Terms such as “manipulation,” “financial statement,” “corporate fraud,” “regulation,” and “red flag” suggest a transition toward more operational concerns, including the detection of earnings management and fraudulent financial reporting. This stage witnessed growing academic interest in identifying early warning signals of fraud and evaluating the effectiveness of control systems and compliance frameworks. The recurrent appearance of “technology,” “cost,” and “challenge” during this period further signals an evolving discourse around the scalability and resource implications of forensic techniques in organizational settings.

Recent and Emerging Trends (2021–2022): Keywords in yellow tones reveal the most recent research hotspots. These include “data mining,” “data analysis,” “fraudster,” “investigator,” “transaction,” “pattern,” “occupational fraud,” “educator,” and “forensic accounting education.” These terms reflect a clear shift toward computational forensics, pedagogy, and professionalization. The rise of “data mining” and “pattern” analysis reflects the integration of big data analytics and AI tools into fraud detection methodologies, consistent with recent literature highlighting the efficacy of machine learning in identifying complex fraudulent schemes (Abdulrahman, 2019; Kaur et al., 2023). The clustering of “transaction,” “fund,” and “money” as newer terms also indicates growing interest in transactional forensics, particularly in tracing illicit flows in digital or decentralized financial systems.

Of particular note is the emergence of education-related terms such as “forensic accounting education,” “educator,” and “profession.” These suggest a rising scholarly interest in the pedagogical aspects of forensic accounting, pointing to curriculum development, training needs, and ethical standards for practitioners. As the field matures, this emphasis on education is vital for cul-

tivating competencies that match the increasing complexity of modern financial crimes (Munandar & Honggowati, 2025).

Cross-Cutting Intersections: The network also reveals dense interconnections among behavioral, institutional, and technological nodes. For example, keywords like “motivation,” “rationalization,” “pressure,” “act,” “willingness,” and “convenience” represent continued engagement with behavioral fraud models, while their proximity to “data analysis” and “investigator” nodes illustrates a hybridization of psychological theory and computational technique.

The overlay thus captures a dynamic transformation in the research landscape: from early conceptualizations rooted in behavioral theory and audit procedure to a contemporary agenda characterized by digital innovation, interdisciplinary integration, and practical application. Moreover, the movement from “fraud triangle” to “pattern,” from “internal auditor” to “data mining,” and from “financial statement” to “transaction” underscores a paradigmatic shift toward proactive, data-intensive approaches to fraud detection and forensic inquiry.

3. Directions for future research

The insights from this bibliometric investigation reveal persistent gaps and emerging trajectories in forensic accounting and fraud examination. Synthesizing keyword co-occurrence, cluster segmentation, and overlay maps, we outline research avenues aligned with practice and regulation in a digital, globalized financial environment.

Technological Integration and Innovation in Forensic Accounting: Keywords such as blockchain, machine learning, data mining, and digital forensics signal a decisive turn toward technology-enabled methods, yet methodological depth and implementation frameworks remain thin. Future work should rigorously test AI/ML models across fraud contexts—procurement, insider trading, and digital assets—with attention to explainable AI for legal and audit admissibility (Alshurafat, 2022; Ozili, 2023). Blockchain forensics needs standards for cryptocurrency tracing, ledger auditability, and smart-contract verification (Al-Raggad et al., 2025). Research on robotic process automation for real-time anomaly detection is limited; studies should assess control, audit, and sectoral implications. Interdisciplinary approaches—data science, law, and behavioral economics—are essential to build robust, context-sensitive solutions.

Industry-Specific Fraud Typologies and Forensic Responses: Although clusters emphasize public sector, healthcare fraud, and financial services, tailored empirical frameworks are scarce. Scholars should develop sector-specific models

that reflect risk factors, control challenges, and regulatory nuances; in the public sector, forensic audits can mitigate procurement corruption and increase transparency (Alshurafat, 2022). Comparative evaluations, eg, healthcare claims analytics versus bank trade surveillance, can establish best practices and benchmarks. With fintech and digital lending, new fraud patterns demand inquiry, including digital microfinance, peer-to-peer lending, and crowdfunding. Cross-industry comparisons should examine governance, enforcement, and ethical climates to inform targeted risk-management designs.

Strengthening Governance, Regulation, and Institutional Support: The prominence of corporate governance, internal control, audit committee, and compliance (Clusters 1 and 2) underscores institutional design in fraud prevention, yet evidence on operationalizing forensic expertise is limited. Research should test whether audit committees with forensic specialists improve detection or reduce misconduct (Alzoubi, 2023). Comparative legal analyses can evaluate anti-fraud regimes (e.g., Sarbanes–Oxley, UK Bribery Act, EU AML directives) and their integration with forensic functions. Public-private collaboration models—joint investigations, intelligence sharing, cross-border enforcement—warrant study to advance harmonized standards (e.g., IFAC, FATF). Finally, curricula and CPD should prioritize cybersecurity, international taxation, and digital compliance; work on skill gaps and pedagogy is needed.

Global and Comparative Forensic Accounting Research: Geographic patterns remain uneven. Cross-country studies should relate institutional quality, legal traditions, corruption indices, and market maturity to forensic adoption and effectiveness (Ozili, 2023). Jurisdictional contrasts—civil vs. common law—may shape evidence admissibility and litigation outcomes; case studies of Wirecard, 1MDB, or Petrobras can illuminate context-specific interventions. Capacity-building in underrepresented regions (e.g., sub-Saharan Africa, Southeast Asia) should diagnose infrastructural and regulatory barriers and propose scalable, low-cost solutions to strengthen anti-fraud efforts.

Impact Evaluation and Value Proposition of Forensic Accounting: Despite proliferating methods, rigorous evaluations of efficacy and return on investment are scarce. Future work should estimate effects on fraud incidence, asset recovery, and reporting quality using quasi-experiments, field studies, or matched-firm designs (Guellim et al., 2024). Researchers should also test deterrence effects from the mere presence of forensic capability. Finally, the cost-effectiveness of advanced technologies (e.g., continuous monitoring) in resource-constrained settings requires analysis to guide optimal allocation across organizational sizes and sectors.

Conclusion

This bibliometric review demonstrates that forensic accounting and fraud examination have evolved into a well-defined and multifaceted field of scholarly inquiry. The significant growth in academic output over the past two decades corresponds to heightened global awareness of financial misconduct, increased regulatory scrutiny, and the demand for more sophisticated fraud detection and prevention mechanisms. Foundational theories, particularly the fraud triangle and its extensions, have provided an essential theoretical base, while highly cited studies on fraud risk indicators and forensic methodologies have shaped both academic research and professional standards.

Our analysis reveals a diversification of research themes. While classical topics such as financial statement fraud, internal control systems, and auditor responsibilities continue to be widely explored, more recent literature increasingly focuses on emerging technologies, sector-specific risks, and interdisciplinary integration. Topics such as blockchain forensics, AI-driven anomaly detection, and cybercrime investigations reflect the field's responsiveness to technological and institutional change. This thematic expansion signals the field's transition from a niche domain to a broader discipline with relevance across sectors and geographies.

Despite these advances, several gaps warrant further scholarly attention. The need for more empirical validation of forensic interventions, exploration of the psychological and organizational dimensions of fraud, and cross-national comparisons remains pressing. Future research must also examine the effectiveness, cost-efficiency, and practical implementation of advanced forensic techniques, especially in resource-constrained settings. As fraud schemes grow in complexity and scope, addressing these gaps will be essential to ensure that forensic accounting keeps pace with evolving threats.

In sum, this review has mapped the intellectual contours of forensic accounting, highlighted its foundational contributions, and identified critical avenues for future inquiry. The field is poised for further advancement through greater interdisciplinarity, methodological innovation, and global engagement. Strengthening the evidence base and enhancing the practical applicability of forensic accounting research will be vital to supporting transparency, accountability, and trust in financial systems worldwide.

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Abstract

Corporate sustainability has moved from a peripheral concern to a strategic imperative. However, many organizations continue to struggle with the effective implementation of sustainability strategies. While sustainability goals are often clearly articulated, their translation into operational and measurable outcomes remains inconsistent. This paper explores the critical role of integrated systems - particularly management control, performance measurement, and sustainability reporting - in closing the gap between strategic intent and actual performance.

Companies face growing external pressure to disclose sustainability performance in a transparent, comparable, and standardized manner. However, too often internal systems for management control and performance measurement are not connected to reporting towards external users. This disconnect increases the risk of greenwashing - where disclosure is symbolic rather than substantive, and sustainability performance is reported but not truly managed.

We propose that the integration of management control, performance measurement, and reporting systems is essential to support both internal performance improvement and external transparency. Frameworks such as the Sustainability Balanced Scorecard and novel monetization methodologies enable companies to incorporate non-financial indicators, align incentives with sustainability goals, and understand the long-term value of sustainability investments. An integrated systems approach ensures that sustainability becomes part of day-to-day business practices - not just a communication exercise.

By designing systems that serve both decision-making and reporting purposes, companies can reduce the risk of greenwashing and enhance their capacity to deliver measurable sustainability outcomes. This paper contributes to ongoing debates in accounting and strategic management literature. We use an illustrative case study to provide insights into current practices, examine the underlying drivers, and offer a foundation for further research, deeper analysis and actionable recommendations.

Key words: sustainability strategy, management control, performance measurement, sustainability reporting, integrated systems

JEL Classification: M1

Introduction

Corporate sustainability has evolved from a voluntary initiative to a strategic necessity, driven by increasing regulatory demands, stakeholder expectations, and the urgent realities of climate change. While many companies now communicate ambitious sustainability commitments, a persistent gap remains between stated intentions and measurable outcomes. This gap could increase the risk of greenwashing.

At the heart of this challenge lies the disconnect between external sustainability reporting and internal management systems. Reporting frameworks such as the Corporate Sustainability Reporting Directive (CSRD), Global Reporting Initiative (GRI), and IFRS Sustainability Standards emphasize transparency, comparability, and accountability. Yet these frameworks often prioritize standardized indicators aimed at investors and regulators, offering limited relevance for managerial decision-making. By contrast, management control and performance measurement systems are designed to align organizational activities and behaviour with strategy, monitor progress, and guide resource allocation. When these systems are insufficiently integrated, sustainability management risks becoming fragmented, duplicative, or not serving their main purpose.

This paper examines the current practice of companies, main drivers of both sustainability reporting and disclosure and sustainability performance improvements. We argue that an integrated systems approach is essential to embed sustainability into organizational routines while maintaining credibility in external communication. Building on concepts such as the Balanced Scorecard, Hoshin Kanri, and emerging monetization frameworks, we explore how internal systems can serve both decision-making and disclosure purposes.

To ground these insights in practice, the paper presents a case study of a Dutch hospital navigating national sustainability policies and sector-specific certification schemes. By analysing its approach to embedding sustainability in governance, strategic planning, and accountability structures, the study provides an illustrative example of opportunities and limitations organizations face when seeking to embed sustainability into daily operations while meeting external expectations. In doing so, it contributes to ongoing debates in accounting and management literature about the role of internal systems in advancing meaningful and measurable sustainability outcomes.

1. Literature review¹

1.1. Sustainability assessment, transparency, and reporting

Sustainability assessment provides an outside-in perspective on organizational sustainability performance, focusing on transparency and enabling external users to evaluate company's social and environmental impact. This process is driven by external stakeholders' expectations, legal requirements, and reporting standards, relying on quantifiable, standardized, and comparable indicators to facilitate inter-company and temporal comparisons. Companies typically draw on legislation such as CSRD and standardization frameworks including IFRS Sustainability Standards, GRI Standards, and European Sustainability Reporting Standards, as well as guidelines like the GHG Protocol or the Carbon Disclosure Project. However, a large number of frameworks can lead to confusion and actually reduce comparability (Sugai et al., 2022).

To support transparency, companies must organize internal systems to collect relevant financial and non-financial data. Yet, standardized indicators often do not reflect a company's unique context or strategy and primarily serve investors and external partners in circular and sustainability initiatives. While these indicators are necessary for collaborative business models and comparison purposes, they provide limited guidance for future-oriented management and decision-making. However, the disconnect between these two purposes can potentially be harmful. Namely, conducting sustainability measurement solely for transparency purposes can limit business value and risk greenwashing (Gray & Milne, 2002).

Information for management differs from that for reporting: management requires detailed, context-specific, forward-looking indicators at departmental, product, and activity levels. Sustainability management accounting must therefore satisfy dual purposes - supporting transparency for external users and decision-making for internal management - while promoting integration between these perspectives to enhance coherence and effectiveness. The gap between reporting and decision-making systems, carrying the risk of greenwashing and inefficiencies, highlights the need for integrated approaches that support both transparency and management objectives.

1 Literature review for this paper has been derived from the broader scope overview in Pešalj, B. (2025). Circular and sustainable business: Integrated strategic frameworks for impact assessment, performance management, and decision-making. Fontys University of Applied Sciences, Eindhoven, Netherlands.

1.2. Management control and performance measurement systems in managing sustainability performance

Effective sustainability management requires identification and measurement of unique strategic objectives within a company's context. Management control (MC) and performance measurement (PM) systems align employees' activities and behaviour with strategic sustainability objectives, track progress, and support long-term value creation. Defined by Simons (1991) as "formalized routines and procedures that use information to maintain or alter patterns in organizational activity," these systems include budgets, key performance indicators (KPIs), targets, procedures, job descriptions, approval systems, but also recruitment, training, value systems, corporate culture, and peer influence. Multiple MC and PM systems can be used simultaneously to work together to guide behaviour and influence decisions (Pešalj et al., 2018). PM systems can be based on financial metrics, a mix of financial and non-financial metrics, dashboards, or more comprehensive approaches such as the Balanced Scorecard.

The Balanced Scorecard (BSC), developed by Kaplan and Norton (1992), integrates financial and non-financial indicators across financial, customer, internal business process, and learning and growth perspectives, linking operational activities to long-term strategy. In the sustainability context, eco-control systems explicitly incorporate environmental and broader sustainability considerations, including sustainability-specific KPIs, budgeting for environmental initiatives, linking goals to incentives, and using metrics for internal decision-making (Henri & Journeault, 2010). Dialogue-based informal controls also play a crucial role in successful sustainability implementation, helping companies recognize stakeholder financial impacts, encourage innovation, and reinforce long-term thinking (Epstein et al., 2015).

While the BSC provides a structured framework to measure and manage performance, Hoshin Kanri, is a complementary approach that translates high-level objectives into actionable plans and ensures alignment across all organizational levels. Hoshin Kanri (Tennant & Roberts, 2000) emphasizes a top-down goal-setting process combined with bottom-up feedback, often referred to as the catchball process, which refines objectives and integrates them across departments.

In sustainability management, Hoshin Kanri can complement the BSC by deploying (sustainability) objectives throughout the organization, ensuring that employees' actions are aligned with corporate (sustainability) goals. By connecting long-term sustainability strategies to daily operations and

performance monitoring, Hoshin Kanri can provide coherence between internal processes, decision-making, and reporting, thereby supporting measurable sustainability outcomes.

PM systems are a part of MC systems. MC systems are broader than PM systems and include the incentive and compensation systems whose main purpose is to align the objectives of employees and managers with the organization's objectives. In this way incentive and compensation systems stimulate managers and employees to put their effort into achieving the organisation's objectives (Merchant & Van der Stede, 2017). Reward and incentive systems should further reinforce sustainability objectives by motivating employees and managers to prioritize long-term social and environmental outcomes alongside financial performance. Together, MC and PM systems embed sustainability into everyday business practices, translating strategy into actionable outcomes.

1.3. Integrated business systems to account for, improve, and report on sustainability performance

As presented in the previous two sections, internal business systems must serve two distinct purposes: sustainability disclosure for external stakeholders and management control for internal decision-making. Separating these systems leads to duplication, misalignment, and ineffective communication and could lead to greenwashing and inefficiencies. Sustainability management accounting should encompass both financial and non-financial performance, including lagging and leading indicators, to measure past, present, and future outcomes. Non-financial indicators, even if not monetized, such as carbon emissions and not easily quantified, such as employee engagement, are crucial for systematic performance improvement.

Sustainability investments, often long-term and intangible, require robust frameworks to link actions to financial and strategic outcomes. Methodologies such as AREOPA's framework for valuing intellectual capital (AREOPA, 2023), NYU Stern's ROSI™ approach (NYU Stern Center for Sustainable Business, 2023), methodology of the Impact Economy Foundation (2024) or WifOR Institute in collaboration with the Value Balancing Alliance (Value Balancing Alliance & WifOR Institute, 2022), provide structured methods to quantify and monetize sustainability-related assets. Only when sustainability management accounting provides reliable measurement and reporting of both financial and non-financial performance can this information be effectively communicated to external stakeholders as well as internal managers, supporting informed decision-making and the continuous improvement of sustainability performance.

Research and practice highlight the need for integrated systems linking sustainability reporting with management control and performance measurement

(Maas et al., 2016). Integrated systems equip decision-makers with timely information connecting operational drivers to long-term value creation, combining financial and non-financial data to enhance both internal decision-making and external transparency. While some progress has been made, further research is needed to explore how companies can ensure this integration in practice. In this paper, we use an illustrative case study to provide insights into current practices, examine the underlying drivers, and offer a foundation for deeper analysis and actionable recommendations.

2. Research design and methods

This study employs a qualitative case study approach, using semi-structured interviews as the primary data collection method. A case of a private hospital in the Netherlands (further on: the hospital) operating as a private limited liability company was selected as an illustrative case due to its insightful approach to sustainability.

Data were collected through an online group interview conducted in July 2025 via Microsoft Teams. The session lasted 90 minutes and involved three representatives from the hospital: Manager of Facility Services, Manager of the Research Department, and student intern. The interview was conducted by the author of this paper, with the support of one more researcher, who acted as a supervisor of student's graduation assignment in the hospital.

The interview builds upon preliminary research and reporting previously carried out by student interns at the hospital. This prior work informed the interview guide and provided contextual grounding for the discussion. The semi-structured format allowed participants to discuss predefined topics while enabling flexibility for elaboration and clarification.

The interview guide covered themes including: (1) the hospital's context concerning sustainability reporting and main drivers for sustainability improvement; (2) integration of sustainability into strategic planning and quality systems; (3) performance measurement, evaluation and accountability for sustainability. All participants provided informed consent before the interview commenced. The conversation was audio-recorded with permission and later transcribed verbatim for analysis.

2.1. Case selection

The case company is a mid-sized regional general hospital in the Netherlands. It provides care services to a population of approximately 280,000 inhabitants and collaborates closely with primary care providers and regional partners. With around 1,500 full time employees (excluding volunteers),

the hospital operates with an annual revenue of €240 million in 2023. The hospital in its current form opened in 2013. Organizationally, the hospital operates as a private limited liability company, a relatively unusual legal form for Dutch hospitals. The ownership structure is participatory, including shareholding opportunities to hospital employees and bonds issued to general practitioners, pharmacists, and local residents, enabling community members to contribute financially and symbolically to the hospital's mission. This model aligns with the hospital's broader strategy of fostering local engagement and focusing on value-based healthcare, patient outcomes, cost-effectiveness, and collaborative care pathways.

2.2. Context and background

In the Netherlands, the Green Deal Sustainable Healthcare 3.0 (2023–2026) is the national framework that drives sustainability efforts across the healthcare sector based on the European Green Deal. More than 550 organizations, including hospitals, nursing homes, and mental health institutions, have committed themselves to its targets. The Green Deal sets out five key ambitions: reducing CO₂ emissions, cutting waste and raw materials use, lowering the environmental impact of pharmaceuticals, increasing knowledge and awareness, and promoting health through prevention. By 2026, the sector aims to achieve a 30 percent reduction in CO₂ emissions and 25 percent less residual waste, while also preparing for a climate-neutral and circular future by 2050 (Government of the Netherlands, Ministry of Health, Welfare and Sport, 2022).

The European Green Deal (EGD) is a comprehensive policy framework aimed at transforming the EU into a climate-neutral economy by 2050. While it sets ambitious environmental goals, it does not mandate specific measurement requirements for all sectors. Instead, it provides a broad roadmap, leaving the implementation details, including measurement and reporting obligations, to be determined through subsequent regulations and directives, tailored to specific industries.

To translate these national ambitions into measurable results within individual organizations, many healthcare providers use the Environmental thermometer for the Health sector (*Milieuthermometer Zorg*). This is a Dutch certification scheme that helps hospitals and care institutions assess, improve, and validate their sustainability performance. The Environmental thermometer for the Health sector works with three levels of achievement - Bronze, Silver, and Gold (Milieu Platform Zorg, n.d.):

- The Bronze level represents the entry point for healthcare organizations that want to structure their sustainability efforts. It shows that an institution has taken the first essential steps in environmental management and is systematically working on improvement. It confirms that the organization is meeting legal standards and has made visible progress on environmental issues, but it does not yet cover the full scope of the Green Deal Sustainable Healthcare.
- Silver certification is fully aligned with the requirements of the Green Deal, meaning that organizations at this level are demonstrably meeting the national sustainability commitments.
- Gold represents frontrunners that go beyond these standards, for example by using more renewable energy, applying stricter procurement rules, and embedding sustainability more deeply in organizational culture.

Hospitals across the country have adopted the Environmental thermometer for the Health sector.

Our case hospital is in the process of implementing the Environmental thermometer for the Health sector as part of its sustainability strategy. According to its sustainability policy, the hospital has set the goal of undergoing an external audit by 2025, with the ambition to obtain the Bronze certificate.

In practice, the Green Deal provides the policy direction, while the Environmental thermometer for the Health sector offers a practical, certifiable system that allows hospitals to show concrete results.

3. Data analysis and findings

the interview data were transcribed verbatim and analysed thematically to identify patterns related to sustainability integration, performance measurement, and reporting practices. An inductive coding approach was combined with sensitizing concepts drawn from the literature on management control, performance measurement, and sustainability reporting (e.g., Simons, 1991; Kaplan & Norton, 1992; Maas et al., 2016). Codes were iteratively refined to capture both formal structures and informal practices. This process enabled the comparison of empirical findings with theoretical frameworks and supported the identification of gaps between disclosure towards external users and internal management systems. Main findings are presented in the following text.

3.1. Embedding sustainability at the hospital

The hospital has taken a structured and evolving approach to integrating sustainability throughout its organization. The hospital's sustainability efforts

are driven by both national frameworks - such as the Green Deal and CSRD reporting and the Environmental thermometer certification. While formal certification has not yet been achieved, the hospital aims to reach the Bronze level.

The hospital is still not obliged to prepare the sustainability reports following CSRD, but will need to report in 2028 over 2027 for the first time.

In 2024 the hospital established the role of the Sustainability Manager. Today a cornerstone of the hospital's approach is the Sustainability Committee, established in 2024 and broadened in 2025 to include heads of different departments. This committee distributes responsibility for sustainability across multiple managers, ensuring that initiatives are embedded in day-to-day operations rather than relying solely on the sustainability manager. The Sustainability Committee consists of Project Groups, Work Groups and Green Teams.

Project Group is in charge of externally driven reporting and disclosure on sustainability performance, such as CSRD and Environmental Thermometer. The sustainability manager is in charge of these project teams together with the finance manager.

Each manager of supporting departments oversees a Work Group, covering areas such as waste, food, energy, circularity, and purchasing. At the hospital, sustainability responsibilities have been integrated into existing roles rather than creating new positions. For example, the manager initially responsible for waste continues in that role but now also manages sustainability aspects related to waste. Similarly, traditional (supporting) functions such as finance, logistics, and other departments have incorporated sustainability into their responsibilities, particularly for areas with material environmental impact. These managers work closely with Work Groups within the Sustainability Committee, ensuring that sustainability objectives are embedded into departmental operations while leveraging existing expertise. These groups coordinate with departmental staff to achieve specific sustainability goals and KPIs. Goals, KPIs and activities related to sustainability are supported by the sustainability manager and project management specialist.

Parallel to this top-down structure, the hospital fosters bottom-up initiatives through Green Teams, voluntary working groups within medical (core business) departments, that work on sustainability initiatives. Participation is optional, and team members generally engage outside their regular work hours or during quieter periods at the hospital. While staff cannot fully self-allocate time to Green Team activities, they can use a portion of their working hours for these initiatives, often requiring managerial approval. Green Teams identify opportunities to reduce environmental impact in their own departments,

such as reusing materials, reducing waste, or improving operational processes. These initiatives are coordinated with the Sustainability Committee to align with broader organizational goals, such as the Green Deal target of waste reduction.

To integrate individual initiatives into hospital-wide objectives, the hospital combines top-down targets with bottom-up innovation. The Sustainability Committee ensures that Green Team ideas are supported and prioritized according to their potential impact, but also that the successes and learnings are shared with other teams. Managers responsible for specific operational themes, such as logistics, translate organizational KPIs into actionable measures for their departments. For example, waste reduction targets are communicated to the logistics manager, who works with staff, Work Groups and Green Teams to implement practical measures and track progress.

The hospital emphasizes that enthusiasm alone is not enough - Green Teams need support to implement their ideas effectively. To maximize impact, hospital provides guidance on priority actions, such as focusing on medical disposables with the highest environmental impact². The hospital also ensures that teams have sufficient resources and support so that their motivation is sustained.

Overall, the hospital demonstrates a hybrid sustainability model: a structured, committee-led system providing oversight and accountability, combined with voluntary, department-driven initiatives that encourage engagement and innovation. This model allows the hospital to progress toward national sustainability targets while leveraging the expertise and motivation of its staff.

3.2. Integration of sustainability into strategic planning and quality systems

Sustainability is also embedded in annual departmental goals. While not yet part of individual job descriptions or formal performance evaluations, sustainability objectives are integrated into department-level year goals, which are discussed and monitored in managerial meetings. This approach ensures that sustainability is not an isolated effort but a shared responsibility across the organization, linking strategic objectives with everyday operational practices.

Sustainability is embedded in the hospital's Hoshin system, which cascades company-wide goals into department and sub-department goals. Green Deal objectives are included in the yearly policy document, ensuring managers and

2 Medical/Facility User group (or committee) has compiled a list of high-impact disposables (gloves, syringes, IV sets, etc.) to help hospitals prioritize sustainability measures. Environmental Platform for the Health sector coordinates sustainability in healthcare and runs the Environmental thermometer.

teams can see sustainability priorities. Managers integrate these objectives alongside other operational goals. But since there is no immediate enforcement or pressure from above – according to one of the interviewees “there is no big scary dagger” compelling exact progress reporting, the adoption of sustainability is largely framed as “we will do it” rather than an urgent mandate, reflecting the hospital’s primary focus on patient care, as its core business.

The Hoshin system allows goals to cascade from company to department to sub-department levels, with projects, timelines, and responsible staff assigned. Project management support helps departments operationalize goals, including waste reduction projects. Practical targets are set, but some sustainability objectives, especially those requiring detailed measurement, cannot yet be fully operationalized due to workflow complexity. Namely:

- Measuring hospital sustainability performance is extremely complex due to care processes. For example, tracking specific types of disposables used per patient is labour-intensive and practically unfeasible in most units.
- External standards like CSRD or Environmental thermometer require awareness and measurement of waste, but the Green Deal (connected to hospital’s objectives) itself does not mandate measurement, only reduction. This creates a gap between compliance requirements and internal improvement tracking.
- Current monitoring relies on departmental reporting, external suppliers’ data (for example on waste collected), and limited project support; there is no comprehensive, automated tracking system.
- The organization prioritizes action-oriented improvement (of core activities) over strict quantitative measurement, acknowledging the difficulty of fully integrating KPIs into operational workflows.

Accurate tracking of disposable use (e.g., syringes, gloves, gases) is extremely difficult due to:

- High variability and volume of materials.
- Operational complexity of care processes.
- Limited time and capacity of clinical staff, especially in urgent or intensive care settings.
- Multiple variations of a single item type (e.g., 10 types of syringes).

Small-scale studies have attempted measurement (e.g., counting disposables for ER airway patients), but these efforts are very labour-intensive and limited in scope. Comprehensive tracking across all care processes is currently impractical, and measurement is still evolving.

3.3. Performance measurement, evaluation, and accountability for sustainability

Individual employees are not formally evaluated for sustainability performance; assessment is primarily at the departmental or managerial level through Hoshin reviews. While sustainability KPIs exist, they are loosely integrated, and progress tracking is inconsistent. Formal measurement responsibilities for external reporting standards (e.g., CSRD, Environmental thermometer) have not yet been fully delegated. Currently, only the sustainability manager and supporting staff handle data collection for compliance purposes. Internal improvement initiatives focus more on actions and quality of primary processes rather than strict measurement, reflecting a dual approach: compliance-driven versus improvement-driven.

Individual employees, such as nurses, are evaluated based on the quality of their professional tasks (e.g., clinical or procedural quality), not directly on sustainability contributions. Sustainability objectives influence department-level planning but are not part of individual job descriptions or formal performance reviews.

Conclusion

The case of the hospital illustrates both progress and fragmentation in embedding sustainability into organizational practice. On the one hand, sustainability has been institutionalized through formal structures such as the Sustainability Committee, departmental Work Groups, and voluntary Green Teams, ensuring visibility across multiple levels of the organization. Sustainability objectives are integrated into the Hoshin planning system, linking national Green Deal commitments to departmental goals, and supported by project management tools that translate high-level ambitions into actionable initiatives. On the other hand, integration remains partial: external reporting and disclosure requirements under frameworks such as CSRD or the Environmental Thermometer are treated as separate compliance tasks, largely managed by specialized staff (sustainability manager), rather than fully embedded in operational systems.

Based on the literature (Maas et al., 2016) this paper has argued that in order to avoid duplication and inefficiency, tighter alignment between sustainability reporting and disclosure to external users and internal management systems is required. The presented case study of the Dutch hospital illustrates both the opportunities and limitations organizations face when seeking to embed sustainability into daily operations while meeting external expectations.

External frameworks such as the CSRD and the Environmental Thermometer provide clear benchmarks for disclosure and comparability. However, in practice they remain largely detached from the hospital's internal goal-setting and monitoring processes. The Hoshin system integrates national Green Deal objectives into hospital's and departmental planning. However, links to external standards and requirements are not fully operationalized. The hospital prioritizes action-oriented improvements - such as waste reduction projects - over the comprehensive measurement required for standardized reporting and disclosure. As a result, internal systems (Green Teams and Work Groups) currently serve practical improvement needs, while compliance-driven reporting remains the responsibility of a limited set of managers and project teams.

Sustainability at the hospital is strategically visible, formally acknowledged in planning systems, and translated into departmental goals. It is supported by hybrid structures such as the formal Sustainability Committee and less formal Green Teams, ensuring a combination of top-down direction and bottom-up engagement. Yet, enforcement is loose, and measurement does not extend to the individual or operational level. The realities of clinical workflows and the hospital's primary mission to deliver patient care constrain the feasibility of precise tracking. Consequently, sustainability initiatives are pursued more as pragmatic improvement efforts than as obligations subject to strict accountability.

Taken together, these insights reinforce the need for integrated systems that simultaneously support managerial decision-making and external transparency. The hospital case highlights the risk of sustaining parallel systems - one for reporting, another for internal management - without effective bridges between them. While operational constraints are real, the gradual alignment of performance measurement, management control, and reporting systems remains essential if organizations are to reduce the risk of greenwashing and deliver on the promise of sustainability as a strategic imperative.

The hospital case highlights the persistent gap between external reporting demands and internal management practices, a tension widely acknowledged in sustainability accounting literature. As Gray and Milne (2002) argue, reporting conducted primarily for transparency risks can become symbolic if not connected to organizational decision-making. This separation illustrates Maas et al.'s (2016) observation that without integration between reporting and management control, sustainability systems risk duplication and inefficiency. At the same time, elements of internal alignment are visible. The Sustainability Committee, departmental Work Groups, and Green Teams echo Simons' (1991) levers of control, combining formal routines with informal dialogue to shape behaviour and encourage bottom-up engagement.

Described dual orientation - strategic visibility with limited enforcement - illustrates the tension between compliance and substantive integration that characterizes many organizations' sustainability journeys. Future research should draw on a broader sample of organizations to generate more generalizable insights and develop actionable recommendations.

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TRENDS AND GAPS IN FORENSIC ACCOUNTING LITERATURE: A SYSTEMATIC AND BIBLIOMETRIC REVIEW

Abstract

Forensic accounting has emerged as a vital discipline in detecting and preventing fraud, evolving alongside the increasing complexity of financial crime and regulatory demands. This paper presents a systematic and bibliometric review of forensic accounting literature spanning the period from 2005 to 2025. Drawing on a dataset of 359 peer-reviewed articles indexed in the Web of Science database, the study employs VOSviewer software and Biblioshiny (R Studio) to map the intellectual structure, thematic evolution, and research trends within the field. The review maps the intellectual landscape by pinpointing leading authors, journals, affiliations, and countries involved in advancing forensic accounting research.

The results reveal a steady yet uneven growth in publication output, with notable clustering around themes such as fraud, corporate governance, performance, and earnings management. The findings suggest that while forensic accounting is gaining relevance in academic discourse, significant research gaps remain in empirical validation, interdisciplinary integration, and real-world application of forensic methods.

This review provides valuable insights for academics, practitioners, and educators by outlining priority areas for future inquiry and supporting the strategic development of forensic accounting as both a research field and a professional discipline. By synthesizing two decades of literature, the paper contributes to a deeper understanding of the evolution and current state of forensic accounting, laying a foundation for more targeted and impactful future research.

Key words: forensic accounting, bibliometric analysis, financial fraud, audit, research trends, fraud detection

JEL Classification: M41, M42

Introduction

Forensic accounting is a significant and multifaceted discipline that integrates elements of accounting, finance, and law (Mustafa Airout et al., 2024). Awareness of fraud and fraudulent financial reporting has significantly increased following major global accounting scandals such as Enron, WorldCom, and others (Ebaid, 2022). These incidents triggered the development of various standards, laws, and regulations aimed at preventing and mitigating corporate misconduct (Kaur et al., 2022) and have prompted an increased demand for professionals capable of investigating, analyzing, and addressing fraudulent activities within organizations. In this context, forensic accounting has developed into a specialized field that integrates a diverse set of skills to identify, prevent, and address financial wrongdoing (Abdullah & Morley, 2014; Okoye & Gbegi, 2013).

Fraud is a universal phenomenon that has existed for many years (Repousis et al., 2019) and it can be defined in several ways. At its core, fraud is an intentional act of deception or misrepresentation, which directly opposes the principles of truth, justice, and fairness (Singleton & Singleton, 2010). According to the Association of Certified Fraud Examiners (ACFE, n.d.), fraud becomes a criminal offense when it involves “a knowing misrepresentation of the truth or concealment of a material fact to induce another to act to their detriment.” In essence, fraud is a deliberate act designed to secure an unlawful gain or to harm another party’s legal rights.

In today’s complex and interconnected global economy, the prevalence of financial fraud, corporate scandals, and unethical business conduct has become a growing concern for organizations, regulators, and stakeholders. Over the past two decades, numerous companies have experienced severe financial distress due to fraudulent financial reporting, embezzlement, asset misappropriation, and manipulation of accounting records. These developments have not only undermined public confidence in financial statements but have also exposed systemic weaknesses in corporate governance and internal controls (Ellili et al., 2024). Therefore, organizations now recognize forensic accounting not only as a post-fraud detection tool, but also as a preventive mechanism integrated into risk management frameworks (Bhasin, 2015).

However, despite the growing relevance of forensic accounting both in practice and academia, a noticeable research gap remains in the scientific literature regarding the structure, evolution, and thematic focus of academic contributions in this field. To address this gap, the present study employs bibliometric analysis combined with systematic literature review to examine the current state and development of forensic accounting research. This approach enables

a clearer understanding of the intellectual landscape of forensic accounting and supports future researchers, practitioners, and policymakers in navigating this critical area of financial oversight. The aim of the study is to offer a structured overview of the scientific output in this domain, to highlight the emerging research streams, and to identify areas for future investigation. Accordingly, the study is guided by the following research questions:

RQ1: How has the academic research on forensic accounting evolved over the past twenty years?

RQ2: Who are the leading contributors in terms of authors, institutions, and countries?

RQ3: What are the most influential publications and dominant research themes in the field?

RQ4: What are the key research gaps and underexplored areas within the field of forensic accounting that warrant further investigation?

This study is structured as follows: section 1 describes the research sample and the methods used. Section 2 then presents the captivating findings, offering insights from the network analysis and the thematic evolution of the research field. The final section is dedicated to conclusion, highlighting areas for future research.

1. Research methods

1.1. Approach to the study

Bibliometric analysis, although still an unfamiliar concept for many (Ellili et al., 2024), represents a powerful methodological approach used to examine the body of existing academic literature on a given topic. By applying quantitative techniques, this method systematically evaluates bibliographic data such as citation frequencies, publication years, authorship patterns, and journal rankings. The objective is to identify underlying structures, trends, and dynamics within a specific field of research.

In the context of forensic accounting, bibliometric analysis offers valuable insights into the intellectual development and thematic evolution of the discipline. It facilitates the identification of research gaps and provides a clearer understanding of how scholarly interest in forensic accounting has progressed over time. By utilizing specialized software, the bibliometrix package within RStudio, this study primarily employs the interactive tool ‘Biblioshiny’ for comprehensive bibliometric data analysis (Al-Qudah et al., 2022; Qudah

et al., 2023). In addition, VOSviewer (Eck & Waltman, 2009; van Eck & Waltman, 2017) is used to perform visual mapping and network analyses, effectively revealing the complex relationships and structures embedded within the scholarly literature. These tools support the creation of co-authorship maps, keyword co-occurrence networks, and thematic clusters, ultimately offering a comprehensive overview of the academic landscape and guiding future research directions.

1.2. Data collection

For the purposes of our bibliometric analysis, we utilized the Web of Science (WoS) as the primary data source. This database is widely recognized for its credibility and comprehensive coverage in multiple disciplines such as social sciences, law, economics, and finance. In addition to its academic credibility, Web of Science offers a user-friendly interface and sophisticated tools for filtering and exporting data, making it particularly well-suited for systematic literature analysis.

To ensure that the dataset accurately reflected the scope of our study, we developed a targeted search strategy using a range of keywords related to the topic, explained in table 1. The analysis encompassed various publication types within the WoS database spanning from 2005 to 2025. The search was conducted using topic-related keywords: „forensic accounting” or „accounting fraud” or „financial fraud” or „financial statement fraud”. Research by topic includes the searches in title, abstract, keyword plus, and author keywords. To refine the scope, we limited results to articles and review articles published in English, within the business economics research area. Additionally, only publications indexed in the Social Sciences Citation Index (SSCI), Science Citation Index Expanded (SCI-Expanded) or Emerging Sources Citation Index (ESCI) were considered. We further refined the dataset by selecting only those papers categorized under business finance, business, or economics in WoS categories.

The initial query generated 1549 research papers. After applying the previously explained filters and excluding papers from unrelated disciplines, a refined dataset of 359 documents was obtained. This final selection served as the foundation for the bibliometric analysis. Table 1 provides a detailed overview of the search query and the resulting data for analysis.

Table 1: Description of the query

Category	Limitation	Number of refined documents
Search query	„forensic accounting” or „accounting fraud” or „financial fraud” or „financial statement fraud”	1549
Access (types including both open access and others)		
Years	Including only years 2005–2025 (1499)	(50)
Document type	Limited to article (1035) and review article (59)	(405)
Research area	Business economics (546)	(548)
Wos Science Index	ESCI (159), SSCI (357) and SCI-Expanded (16)	(32)
WoS categories	Business finance (275), business (145) and economics (118)	(36)
Language	We excluded all languages other than English (466)	(14)
Final number refined search		466
Manual refinement	Reviewed 466 titles and abstracts and excluded irrelevant documents, those not related to forensic accounting and fraud topics	107
Final remaining documents after manual refine		359

Source: Authors

2. Findings

This section presents an overview of the bibliometric landscape related to the selected body of literature, covering the period from 2005 to 2025. A total of 359 documents published across 153 different sources were analyzed, indicating a diverse yet focused academic interest in the topic. The annual growth rate of publications stands at 23,3%, reflecting a significant upward trend in scholarly attention over the years. On average, each document received 23,81 citations, suggesting a relatively strong academic impact. The average age of the documents is 4,09 years, highlighting the recent and evolving nature of research in this field. With a total of 17292 references, the dataset provides a rich foundation for further citation and content analysis.

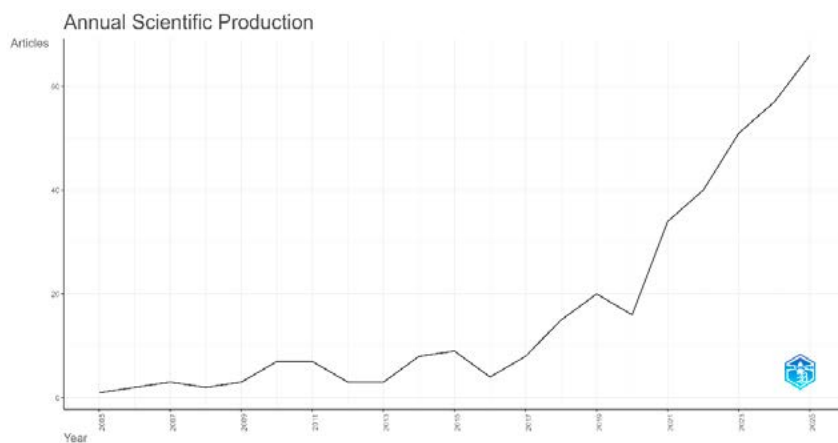
In terms of authorship and collaboration, the dataset includes contributions from 955 unique authors. Among these, only 33 authors produced single-authored works, resulting in a total of 34 single-authored documents. Notably, 28,41%

of the documents involve international co-authorships, emphasizing the global dimension of the research efforts. These findings establish the groundwork for the following analyses, which will delve into citation patterns, keyword trends, and thematic structures using tools such as VOSviewer software and Biblioshiny (R Studio).

2.1. Overview

The annual scientific production shows a clear upward trend over the 2005–2025 period in figure 1. In the early years, from 2005 to around 2016, the number of published articles remained relatively low and stable, rarely exceeding 10 publications per year. However, starting in 2017, a noticeable increase begins, accelerating significantly after 2020. The peak occurs in 2025, with over 65 publications, indicating a growing academic interest and research activity in recent years. This growth pattern aligns with the previously reported annual growth rate of 23,3%, suggesting that the field is gaining momentum and becoming more relevant in contemporary scientific discourse.

Figure 1: Annual scientific production

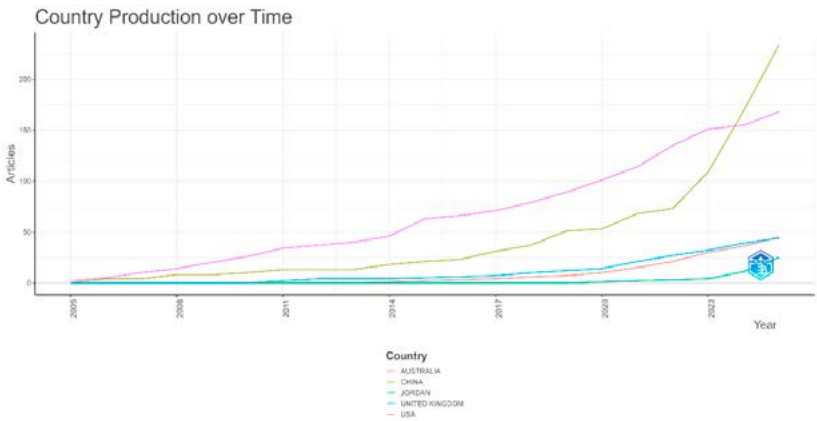


Source: R studio, authors

As shown in figure 2, China and the USA have experienced the most significant growth in scientific production over time, with China's output accelerating sharply after 2022 and surpassing all other countries by 2025. The USA has maintained steady growth throughout the entire period. The United Kingdom, Australia, and Jordan also demonstrate gradual increases, with notable upticks

in recent years. This upward trend is further reflected in the growing number of publications originating from leading universities in some of these countries, where the research in this field has been shaped by the interconnected efforts of global institutions and organizations. Table 2 outlines the ten institutions with the highest publication output and shows the top university affiliations contributing to forensic accounting research. Hashemite University leads with 8 articles, followed closely by the Chinese Academy of Sciences, Nanjing University of Finance and Economics, and Shanghai Jiao Tong University, each with 7 publications.

Figure 2: Country production over time

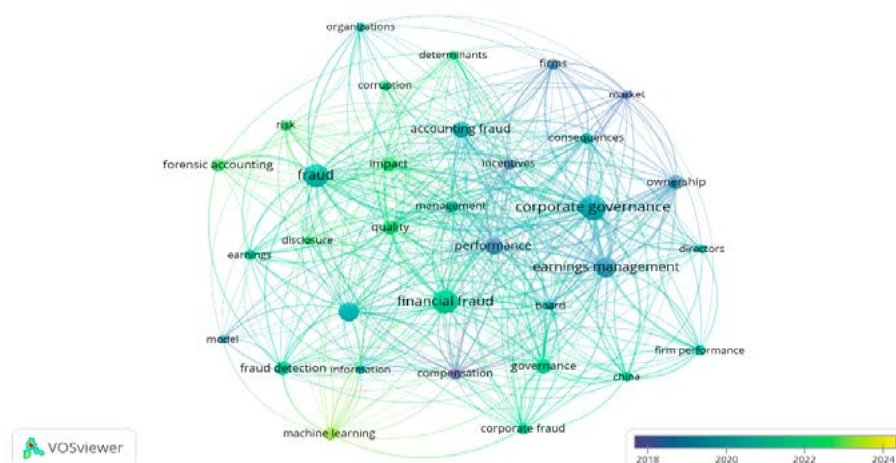


Source: R studio, authors

Table 2: Most relevant affiliations

Affiliation	Articles
HASHEMITE UNIVERSITY	8
CHINESE ACADEMY OF SCIENCES	7
NANJING UNIVERSITY OF FINANCE AND ECONOMICS	7
SHANGHAI JIAO TONG UNIVERSITY	7
SHANDONG UNIVERSITY	6
SOUTHWESTERN UNIVERSITY OF FINANCE AND ECONOMICS - CHINA	6
STATE UNIVERSITY SYSTEM OF FLORIDA	6
UNIVERSITY OF VIRGINIA	6
BEIJING NORMAL UNIVERSITY	5
CHANGSHA UNIVERSITY OF SCIENCE AND TECHNOLOGY	5

Source: R studio, authors

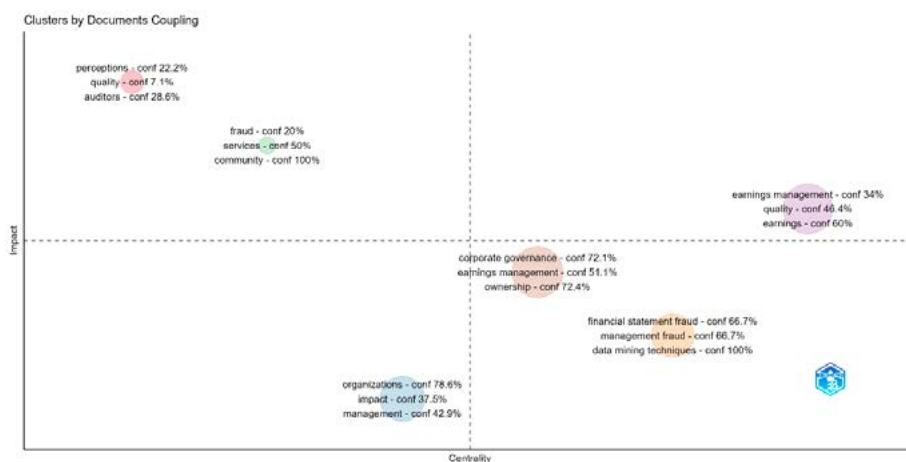
Figure 4: Keywords/growth analysis

Source: VOSviewer, authors

2.3. Cluster-based content analysis of the literature

The coupling map in figure 4 visually depicts the thematic structure of the forensic accounting literature, highlighting the relationships between research topics based on bibliometric coupling. Following the approach suggested by Callon et al. (1991) and further applied in bibliometric studies by Eck & Waltman (2009), clusters were ranked according to their centrality and impact, as indicators of their relevance within the research network.

In order to preserve analytical focus and emphasize the most influential thematic streams, only four of six identified clusters with the highest values on these metrics were retained for in-depth discussion. The remaining two clusters, addressing perceptions and auditor judgment, as well as fraud in service and community settings, remain acknowledged as part of the broader research landscape, yet are excluded from detailed examination due to their relatively lower influence within the network. This selective approach is consistent with prior bibliometric reviews (e.g. Zupic & Čater, 2015) where peripheral clusters are summarized briefly to maintain clarity and coherence in thematic analysis.

Figure 4: Coupling map

Source: VOSviewer, authors

The major cluster 1, centered on corporate governance, ownership structure, and fraud prevention, elucidates the governance mechanisms and organizational factors that contribute to the emergence of fraudulent practices within businesses. Wang et al. (2022) examine the influence of gender diversity in corporate leadership on the commission and detection of financial statement fraud, finding that greater representation of female leaders enhances fraud detection and reduces its occurrence. These results are also consistent with Liao et al. (2019), who find that female CFOs are less likely to engage in accounting fraud. Diversity-related factors in top leadership play a significant role in constraining fraudulent behavior, as well as demographic and personal board characteristics, since Xu et al. (2018) emphasise the importance of board age role in monitoring duties.

Lennox & Pittman (2008) provide strong evidence that the presence of a Big Five auditor similarly reduces the likelihood of fraudulent financial reporting, with consistent associations observed even during periods of heightened fraud incidence. In line with these findings, besides external and internal mechanisms for fraud detection and reduction, different kinds of regulations such as the shortselling system in China, can curtail the likelihood of financial fraud and mitigate its severity (Lu et al., 2024). Another noteworthy approach to reducing and detecting fraud involves the use of machine learning-based systems. Several studies in the literature such as Lokanan & Sharma (2025), Riskiyadi (2023), Zhang et al. (2025) examine the application of such techniques to enhance the predictive capability in detecting corporate financial

fraud, as well as to identify the influencing factors and characteristics of such fraudulent activities.

The line of research on financial statements and accounting fraud has attracted considerable scholarly attention, particularly in relation to earnings management and reporting quality topics, represented in cluster 2. For example, Sun et al. (2023) examined digital finance with the aim to describe the quality of financial reports, focusing on factors that could reduce the likelihood of fraud in financial statements, and found that digital finance inhibits corporate financial fraud by alleviating financing constraints and reducing corporate leverage. More emerging factors such as crowdfunding platforms and the economic disruptions caused by the COVID-19 pandemic may elevate fraud risks, but reductions in information asymmetry, search and transaction costs, and the increased adoption of blockchain technology could contribute to enhancing the quality of financial reporting (Karpoff, 2021). Earnings management indicators are also often used in order to detect anomalies in financial statements (Chen et al., 2021; Sakawa & Watanabel, 2021). Authors Phong et al. (2024) discovered that machine learning algorithms can effectively identify such irregularities and thereby improve the detection of potential reporting issues.

Cluster 3 comprises studies that focus on fraud detection through the application of data mining techniques, as the most frequently used techniques for detecting financial statement misstatements or frauds (Aboud & Robinson, 2020). In their study, the authors identify main barriers for implementing data analytics to detect fraud, and discover that 50% of Irish businesses consider data analytics tools to be either extremely or very effective in detecting such fraud - such as data mining, financial ratio analysis, and logistic regression. The importance of data mining techniques is confirmed by Suljić et al. (2025), who demonstrate that different algorithms can effectively identify key balance sheet positions most relevant for developing predictive models. Papík & Papíková (2022) use predictive models, which are developed using eight commonly applied algorithms on US GAAP financial data, where they significantly outperform previous US GAAP based studies in terms of accuracy, F-measure, and error reduction.

Finally, scholars within cluster 4 have extensively examined various dimensions of organizational impact and management control systems in this research field. This cluster is particularly important given the components of the well known fraud triangle - pressure, opportunity, and rationalization, the elements which are often rooted in management structures, decision-making dynamics, and organizational culture. Regarding that, since the power is often used to recruit others to participate in fraudulent acts, Albrecht et al. (2015) proposed a

reciprocal model that provides organizations with a practical tool to educate employees, raise fraud awareness, and empower them against unethical influence. Robinson et al. (2012) explored one more interesting and important topic from the employees' perspective - reporting the fraud, and concluded that ethics training can enhance employees' awareness of the seriousness of fraud and their personal responsibility to report it, thereby effectively increasing whistleblowing intentions. In each organization in the corporate sector, policies regarding whistleblowing systems, fraud awareness training and internal controls should be clearly defined (Mandal & S, 2023), thereby creating a foundation for proactive fraud prevention and enhancing overall corporate governance effectiveness.

Conclusion and directions for further research

At the international level, forensic accounting has been widely acknowledged by both governments and the business community as a critical and multifaceted discipline, essential for preventing and addressing unethical financial practices. Ensuring the integrity and transparency of financial reporting makes the role of forensic accounting indispensable (Mustafa Airout et al., 2024).

The primary aim of this bibliometric study was to examine and uncover gaps in the existing forensic accounting literature, providing insights into the relative prominence of different countries, journals, authors, and keywords within the business research landscape. Based on the cluster analysis, several research gaps emerge that warrant further examination. First, although existing studies emphasize the role of leadership diversity in fraud prevention, further research is needed to investigate this relationship across diverse cultural, industry, and regulatory contexts to determine the extent to which these findings are universally applicable. Second, while emerging technologies such as blockchain, crowdfunding platforms, and digital finance show considerable potential in mitigating fraud risks and enhancing reporting quality, scholarly work on their practical implementation and their integration into existing governance frameworks remains scarce. Finally, further investigation is required to address barriers for adopting advanced analytics tools, such as machine learning and data mining, by assessing how effectively they can complement traditional audit and control mechanisms for improved fraud detection. Inquiries like these would not only expand the theoretical understanding of fraud prevention and detection, but also provide actionable insights for practitioners. Addressing these gaps could significantly strengthen organizational resilience and the effectiveness of forensic accounting practices worldwide.

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THE PARADOX OF CORRUPTION: DOES INSTITUTIONAL CONTROL ENCOURAGE OR DISCOURAGE FOREIGN INVESTORS?

Abstract

A favorable investment environment is a key determinant of investor security and an important factor in attracting foreign direct investment (FDI). Given its potential impact on economic growth, corruption has become a subject of extensive research in recent decades. The literature recognizes a dual effect of corruption on FDI: a negative one, as it increases uncertainty and transaction costs, and a potentially positive one in institutionally weak environments, where corruption may serve as a tool to bypass bureaucratic obstacles, thereby facilitating market entry for investors. The relevance of this topic is underscored by the development of various methodologies for measuring corruption control, which indicate the extent to which the abuse of public power is restrained by institutional mechanisms. Accordingly, this study examines how the Control of Corruption, measured as one of the Worldwide Governance Indicators, affects FDI inflows in four former Yugoslav republics during the period from 2006 to 2023. Using multiple regression analysis, we draw several important conclusions. The lack of effective anti-corruption mechanisms has a direct impact on attracting FDI, supporting the “grease the wheels” hypothesis. A positive relationship between corruption levels and FDI can be explained, among the other things, by the presence of geopolitically motivated investments, particularly from countries less sensitive to issues of corruption and democracy, driven by geostrategic positioning, access to natural resources, or political influence. Further analysis of macroeconomic determinants shows that investors value liberal trade environments and market potential, particularly population size. While a corrupt environment may attract investors prone to manipulative practices, it is essential for policymakers to strengthen institutional capacity and improve corruption control, not only for economic growth but also for citizen security, institutional trust, and social integrity.

Key words: foreign direct investment, corruption, macroeconomic determinants, multiple regression analysis, former Yugoslav countries

JEL Classification: D73, E22, F21, F23

Introduction

Foreign direct investment (FDI) stands for a fundamental form of international capital movement and is one of the most attractive modalities of business cooperation that host countries use to achieve their developmental objectives. FDI serves as a key driver of economic growth, particularly in developing countries, as it promotes capital accumulation, generates employment opportunities, and stimulates the development of both manufacturing and service sectors (Cai & Karasawa-Ohtashiro, 2018). Despite an 11% decline in global FDI flows in 2024, attributed to unfavorable financing conditions and rising geopolitical uncertainty, investment levels in developing countries remained stable, accounting for 57% of total global inflows (UNCTAD, 2025). In this context, understanding the FDI determinants is of crucial importance, especially for countries with varying foreign capital absorption capacities.

A growing body of research shows that the quality of institutional infrastructure, particularly the efficiency of anti-corruption mechanisms, plays a key role in attracting FDI (Hajdini, Collaku & Merovci, 2023). This is quite understandable considering that corruption accounts for 48% of all fraud cases, with the region of Eastern Europe and Western/Central Asia recording as much as 71% of all corruption incidents (ACFE, 2024). Although corruption is generally expected to deter foreign investors, some findings suggest it may have the opposite effect (Cruz, Jha, Kırşanlı & Sedai, 2023). For that reason, determining the nature of the association between corruption and FDI has become the focus of extensive theoretical and empirical research in the field of economics.

The relationship between corruption and FDI is interpreted through two fundamentally distinct perspectives. On the one hand, corruption is viewed as a *helping hand*, a notion supported by the “grease the wheels” hypothesis (Leff, 1964). Here it is assumed that corruption can stimulate economic growth by offsetting inefficient and rigid state regulations. Proponents of this view argue that bribery may help companies reduce transaction costs arising from excessive bureaucratic burdens, while also serving as an incentive for bureaucrats to perform their duties more efficiently. Although corruption may, in some cases, promote short-term economic growth, authors more commonly identify it as an obstacle to economic development. In this context, corruption is typically viewed as a *grabbing hand*, in line with the “sand the wheels” hypothesis (Murphy, Shleifer & Vishny, 1993; Aidt, 2003). Corruption and financial crime undermine trust in state institutions, hinder the effectiveness of poverty-reduction mechanisms, degrade the quality of public services, and discourage in-

vestors. Gupta, Davoodi, and Alonso-Terme (2002) support these claims and argue that corruption exacerbates poor living standards and poverty through its negative impact on economic growth. Similarly, Mo (2001) demonstrates that a one-unit increase in the Corruption Perception Index (CPI) decreases economic growth rate by 0.55%.

Given that the complete eradication of corruption is almost impossible, focus must be put on regulatory frameworks and the competent authorities responsible for the prevention, detection, and prosecution of this form of crime (Alexander & Cumming, 2022). Higher trust in institutional mechanisms that ensure the smooth operation of capital markets enhances their stability and efficiency, thereby encouraging investors to undertake new investment (Malinić, 2014).

This study investigates the impact of corruption levels, alongside other determinants, such as trade openness, political stability, and population size, on FDI inflows. The analysis covers four countries from the former Socialist Federal Republic of Yugoslavia (SFRY): two current European Union (EU) member states, the Republic of Croatia and the Republic of Slovenia, and two post-transition countries currently in the process of EU accession, the Republic of Serbia and Montenegro. Due to their shared historical legacy but different levels of economic development and varying capacities for attracting foreign capital, the selected sample serves as a suitable basis for comparative analysis. Since the breakup of the SFRY, most of the former republics have seen corrupt behavioral patterns influenced by war, political transitions, privatization processes, and bankruptcies, as well as weak institutional infrastructure, inefficient law enforcement, and low-quality governance in the fight against this type of fraud. The study covers the period from 2006 to 2023, marked by the global financial crisis, the Covid-19 pandemic, and geopolitical tensions. This turbulent period helps assess the way the analyzed countries responded to various types of crises and the extent to which they managed to restore macroeconomic stability. To determine which factors have the potential to influence the FDI inflows in the analyzed countries, we set four hypotheses described in Section 2. below.

The contribution of the paper is twofold, both theoretical and practical. From a theoretical point of view, the study supports the OLI paradigm, or the eclectic theory of FDI (Dunning, 1980), and points to the importance of infrastructural prerequisites and macroeconomic policies for stimulating FDI inflows during and after crisis periods. In addition, the study contributes to the existing literature by suggesting that, under certain institutional conditions, corruption may act as a *helping hand*, in line with the “grease the wheels” hypothesis

(Leff, 1964). From a practical standpoint, the focus on factors that influence the attraction of foreign capital is particularly important, as we believe it offers better insight into the analyzed countries' economic realities and shows that bringing national systems in line with EU's anti-corruption standards, along with their proper implementation, remains a significant challenge for both EU candidate countries and member states.

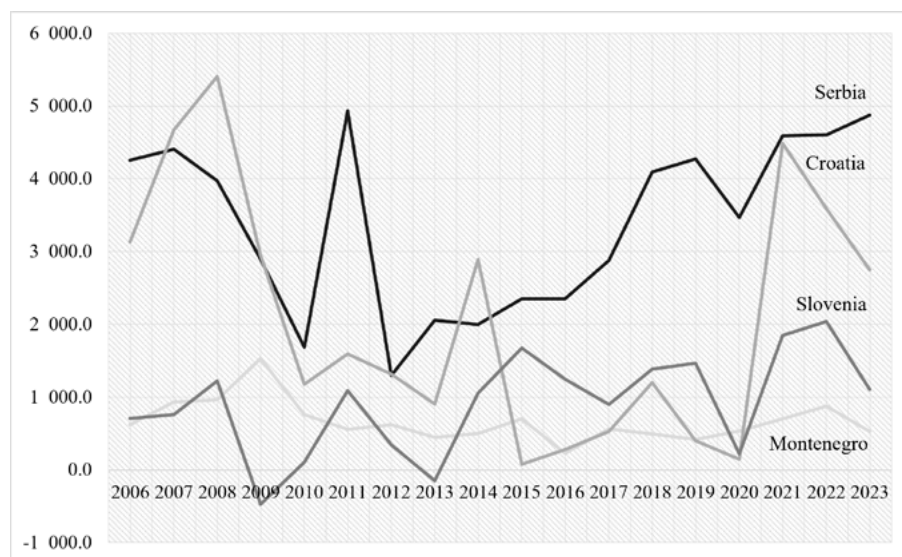
The paper is structured as follows: after the introduction, the first section gives the research context, while the second presents literature review and the hypothesis development framework. The third section outlines the empirical data and research methodology. The fourth section discusses the research findings. The final section offers conclusions, highlights the study's limitations, and proposes directions for further research.

1. The research context

To examine the effect of corruption control on FDI inflows, the authors analyze four former Yugoslav countries, selected due to several specific features. First, their former unity within a single state and geographical proximity shaped a shared historical and cultural legacy, along with a similar social mentality that, to some extent, tolerates corrupt behavior. Second, these countries differ today in terms of economic development and the strength of their regulatory mechanisms. While Croatia and Slovenia, as EU members, have undergone more intensive institutional reforms, Serbia and Montenegro are still in the EU accession process, which may influence their responses to systemic shocks and their capacity to attract FDI.

The analyzed period, 2006–2023, includes three major systemic events: the global financial crisis, the Covid-19 pandemic, and the Russia-Ukraine conflict. Despite the challenges these events posed to the global economy, Serbia emerged as a leading FDI destination in the region. After a significant decline in FDI inflows during the global financial crisis, 2015 has brought their gradual recovery. Although the pandemic and geopolitical tensions made companies focus on capital preservation and shareholder trust rather than business expansion, Serbia remained attractive to foreign investors. Graph 1 confirms this and shows that investment in the 2021–2023 period exceeded pre-crisis levels. Serbia's investment climate is attractive due to tax incentives, subsidies, low labor costs, simple company registration procedures, and efficient building permit issuance (Denčić-Mihajlov, Lepojević & Stojanović, 2021).

Graph 1: FDI inflows in the analyzed countries in the period 2006-2023
(In millions of US dollars)



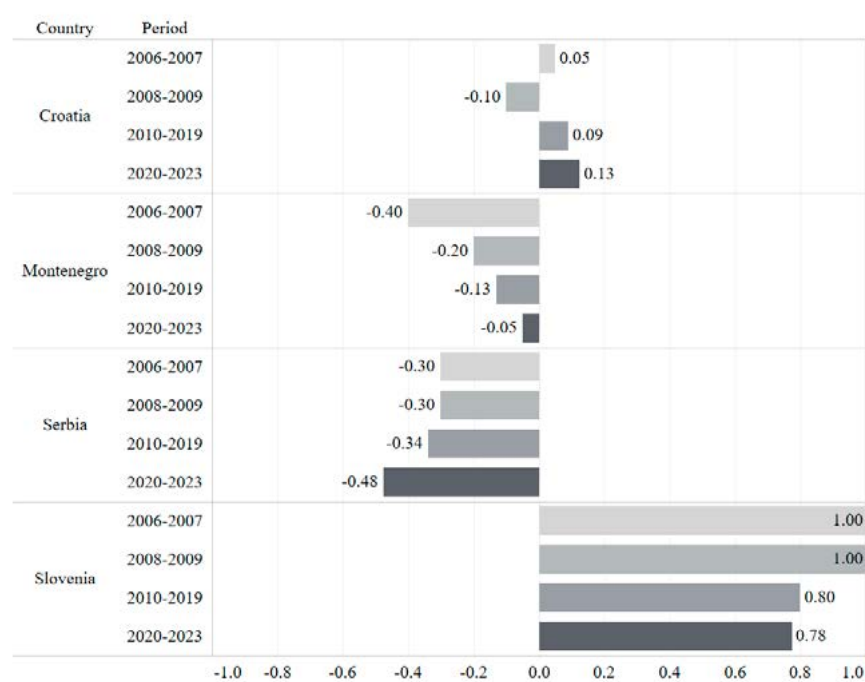
Source: Authors' elaboration based on UNCTAD (2024) data

Montenegro has the lowest FDI flows due to its small economic base and sensitivity to external shocks. Croatia is marked by pronounced inflow volatility following its EU accession, while Slovenia, despite a well-developed institutional framework, records fluctuating FDI inflows, including negative values. Although the latter two countries offer stable business environments, investors sometimes avoid highly regulated and saturated markets in favor of more flexible economies that offer greater room for expansion.

In this study, we use the Control of Corruption indicator as a measure of institutional infrastructure for preventing corruption in the public sector, given that more than half of fraud cases in government organizations involve some form of corrupt practice (ACFE, 2024). Control of Corruption, as one of the Worldwide Governance Indicators (WGI), measures the institutions' ability to prevent corruption and ensure transparency in the management of public resources. Its calculation is based on methodology that relies on analysts', experts', business leaders', and research organizations' assessments. Scores range from -2.5 to +2.5, with values closer to +2.5 indicating low levels of corruption. Such countries have efficient anti-corruption mechanisms, and their institutions are transparent and accountable. Conversely, values closer to -2.5 indicate high levels of corruption in a country.

To monitor and compare the levels of Control of Corruption indicator, as shown in Graph 2, we divide the analyzed period into four sub-periods: the pre-global financial crisis period (2006–2007), the crisis period (2008–2009), the post-crisis period (2010–2019), and the period of the pandemic and geopolitical tensions (2020–2023).

Graph 2: Control of Corruption indicator for the analyzed countries (2006–2023)



Source: Authors’ elaboration based on World Bank (2024) data

Graph 2 indicates that Slovenia has consistently led in institutional anti-corruption efforts over the entire period, maintaining positive values throughout, albeit with a slight decline since 2010. Croatia records steady growth, but only after joining the EU, which can be associated to stronger regulatory framework and higher pressure to implement reforms. Montenegro shows gradual progress, ranging from significantly negative values in the pre-crisis period to nearly neutral levels during the crisis triggered by recent systemic events. Serbia, similarly to Montenegro, records exclusively negative Control of Corruption values throughout the entire period. However, unlike Montenegrin, Serbian values deteriorate. Their most pronounced decline is between 2020 and 2023, with the

indicator's average value of -0.48. Serbia's percentile rank further confirms its classification as a country with widespread corruption. Namely, between 2006 and 2009, Serbia was ranked above 46–48% of countries worldwide; however, during the most recent crisis period, this position declined to just 36.6% (World Bank, 2024).¹

2. Literature review and hypothesis development framework

Due to its dual impact on economic growth, over the past decades corruption has become a subject of intensive economic research. In this context, there is a considerable number of empirical studies on the impact of corruption on FDI inflows, often in combination with other macroeconomic and institutional factors. Alongside the corruption control, this study focuses on indicators of trade openness, political stability and population size.

Corruption can be considered an instrument for more efficient overcoming of administrative barriers and reduction of transaction costs for economic entities. Such views are based on Leff's arguments (1964), who points to the extra-institutional influence of corruption on the creation and implementation of public policies. The thesis on the positive effects of corruption on the economies of countries that tolerate administrative inefficiencies relies on the assumption that corruption can, in the short term, facilitate favorable transactions that would otherwise be hindered. Both theoretical and empirical research has often discussed and supported this thesis, despite its controversial nature. For example, Grosse and Trevino (2005), Quazi, Vemuri, and Soliman (2014), Ozekhome (2022), and Cruz et al. (2023) argue that higher corruption levels enable investors to negotiate terms that deviate from existing regulations, reduce tax liabilities, and influence local authorities to adjust the regulatory framework. This accelerates the start of business operations, mitigates the negative effects caused by unfavorable circumstances, and consequently, increases profitability. Although Moustafa (2021) also finds a positive association between corruption and FDI, he highlights that this finding is counterin-

1 Although Serbia has had numerous reforms, ranging from the adoption of strategic documents and laws to the establishment of relevant anti-corruption bodies, their effects are still limited. Despite formal progress, shortcomings in the transparency of the legislative process, the integrity of the public sector, human and financial capacities, and the effectiveness of prosecuting high-level corruption cases are still there. Weak implementation of measures and insufficient coordination further undermine the perception of institutional commitment to a fight against corruption. In response to these challenges, Serbia adopted the 2024–2028 National Anti-Corruption Strategy, aiming to build a democratic society based on the rule of law, transparency, and accountability, in which the integrity system plays a key role in preventing corruption.

tuitive and raises doubts about the assumptions underlying investment policy and the logic of countries' financial risk ratings. It is concerning that a corrupt environment may foster the development of specific skills among managers who, through practice, gain experience in manipulative actions and then transfer these skills to subsidiaries in countries with similar institutional weaknesses (Brada, Drabek, Mendez & Perez, 2019).

On the other hand, there is evidence that corruption negatively affects investment realization, limiting long-term economic growth potential. Mauro (1995) demonstrates that corruption has a negative effect on investment, even in countries facing administrative inefficiencies. Aidt (2009) warns that accepting corruption as a way to bypass bureaucratic barriers creates a direct interest among bureaucrats to maintain and deepen these procedural flaws, as they bring them personal benefits. While short-term "greasing the wheels" can stimulate economic growth, at the same time it lays the foundation for long-term distortions in resource allocation and their irrational use, making corruption an obstacle to sustainable economic growth. Zander (2021) disputes that host countries should encourage corruption to attract FDI, arguing that such an approach is contrary to common sense. He expresses particular concern that a propensity for corruption lowers investors' risk premiums, enabling them to more easily manipulate bureaucracy and the regulatory framework. Finally, Castro and Nunes (2013) and Hajdini et al. (2023) give evidence that countries with more effective corruption control attract higher FDI inflows, confirming the strategic importance of the institutional framework in creating a favorable business environment. Considering theory and results of previous empirical studies, we propose the following hypothesis:

Hypothesis 1 (H1): There is a positive association between corruption control and FDI inflows.

The second independent variable is trade openness. Economies are finding it increasingly challenging to operate in isolation and are becoming ever more reliant on international cooperation. "Since foreign trade expands the boundaries of the domestic market, a higher openness in the host country offers foreign investors the opportunity to achieve economies of scale through international markets rather than relying solely on the host country's market" (Petrović-Randelović, Janković-Milić & Kostadinović, 2017, p. 99). However, one should not overlook the fact that additional market liberalization may pose certain risks and challenges, such as destabilization of domestic production or excessive dependence on foreign markets (Bertrand & Zitouna, 2006). Such a view may explain why some investors direct their capital precisely to countries with lower levels of trade openness (Moghadam, Mazlan, Chin & Ibrahim,

2019). According to World Bank (2024), trade openness in all analyzed countries has an upward trend during the most recent crisis period. Slovenia is the most integrated economy in global trade flows, Serbia and Montenegro show moderate openness, while Croatia, despite EU membership, records the lowest level of trade openness. To examine the impact of this variable on attracting foreign capital, we define the second hypothesis:

Hypothesis 2 (H2): Trade openness is positively associated with FDI inflows.

Political factors have a significant influence on investment decisions as they shape the risk perception associated with investing in a particular country. While current economic prospects may appear favorable and promising, it is crucial to recognize that adverse political conditions in the host country can prevent these opportunities from being realized (Kurniasih, Islahiyah, Kurniawati & Iqbal, 2023). This aspect is most often assessed through various indices that measure the level of political stability and evaluate investment risks across countries worldwide. Generally, countries with a stable political environment enable smooth business operations, thus stimulating investment growth. Sabir, Rafique, and Abbas (2019) note that institutional quality, which partly reflects political stability, has a greater impact on FDI inflows in less developed countries than in developed ones. According to World Bank (2024), Serbia records by far the lowest political stability compared to Montenegro, Croatia, and Slovenia. This points to serious challenges in Serbia's political environment, largely due to deep public distrust in institutions and state authorities. Considering that this factor may negatively affect the country's attractiveness to investors, we formulate the third hypothesis:

Hypothesis 3 (H3): Political stability is positively associated with FDI inflows.

The fourth variable in this paper is population. A larger population generally implies a greater available labor force as well as more dynamic economic activity. However, the population serves not only as a production resource but also as a source of demand, with its purchasing power shaping the size and potential of the domestic market (Petrović-Randelović et al., 2017). Serbia, Montenegro, and Croatia are experiencing a decline in population, which can affect not only the internal market contraction, lower consumption, and drop in long-term demand, but also the working-age population decline (World Bank, 2024). This may increase labor costs, especially in sectors relying on labor-intensive production, further diminishing these countries' attractiveness for foreign investors. Based on these arguments, the fourth hypothesis is set as follows:

Hypothesis 4 (H4): There is a positive association between population size and FDI inflows.

3. Data collection and research methodology

This study employs a quantitative empirical research design aimed to identify and assess the determinants influencing the dynamics of FDI inflows in four former Yugoslav countries during the period 2006–2023. This approach enables the systematic testing of association between institutional and macroeconomic indicators, on the one hand, and FDI inflows, on the other, relying on relevant literature in the fields of economic and political stability, as well as investment risk. The integration of statistical analysis and careful operationalization of variables enables the evaluation of the predictive power of factors in shaping international capital flows in the context of European financial markets. Secondary data sources were used for research purposes.

The dependent variable in this paper is the annual value of FDI inflows (in millions of US dollars), scaled relative to GDP per capita and expressed in natural logarithms. This approach is used as it allows for comparison between countries with different development levels and reduces the risk of result distortion due to the use of absolute data (Kasasbeh, Mdanat & Khasawneh, 2018; Moustafa, 2021; Ozekhome 2022; Asafo-Adjei et al., 2023). The database for FDI inflows was published by the United Nations Conference on Trade and Development (UNCTAD).

For this research, four independent variables are selected, with their values obtained from the World Bank database (World Bank, 2024).

Although there are several options for measuring corruption (e.g., Control of Corruption, Corruption Perception Index, and Bribe Payers Index), we use the Control of Corruption indicator, as adopted by other authors (Brada et al., 2019; Luu, Nguyen, Ho & Nam, 2019; Asafo-Adjei et al., 2023). This indicator, already explained in *The Research Context* section, measures institutional efficiency in combating corruption. Its values range from -2.5 to +2.5, with higher values indicating a lower level of corruption.

Trade Openness is calculated as the sum of import and export values divided by GDP, followed by a logarithmic transformation. According to Paul and Feliciano-Cestero (2021), imports and exports, when considered separately, are often used as determinants of FDI. However, in line with Cai, Kim, and Wu (2019) and Denčić-Mihajlov et al. (2021) studies, we use an integrated variable, as it represents a comprehensive measure of trade openness.

Political Stability and Absence of Violence/Terrorism is also part of the WGI. Its values range from -2.5 to +2.5, where values closer to +2.5 indicate a higher level of political stability, low incidence of violent conflicts, and the existence of mechanisms to prevent terrorism. Conversely, values near -2.5 indicate po-

litical instability, internal conflicts, and a high level of terrorist activity, which can have serious consequences for economic growth and social peace.

Population represents the total population of a given country, similar to Re-
mini (2000), Petrović-Randelović et al. (2017), and Zander (2021). We trans-
form it using the natural logarithm for statistical analysis. Population data usu-
ally originates from national censuses conducted by official statistical agencies.

To test previously defined research hypotheses, there should be a well-es-
tablished research design. The analysis was performed using descriptive, corre-
lation and regression analysis in IBM SPSS statistical software, version 22.

Multiple regression analysis was selected as the primary statistical method for
two main reasons. First, the study involves one continuous dependent variable
and multiple continuous independent variables. Second, this method allows
for assessing how well a given set of variables can predict a specific outcome
(FDI) and identifying the strongest predictor within that set. The linear regres-
sion model can be presented as follows:

$$FDI/GDP_{pc}(\log)_{it} = \beta_0 + \beta_1 CC_{it} + \beta_2 OPEN(\log)_{it} + \beta_3 POLIT_{it} + \beta_4 POPUL(\log)_{it} + \varepsilon_{it}$$

where $FDI/GDP_{pc}(\log)_{it}$, as the dependent variable, is the natural logarithm of
FDI inflows relative to GDP per capita. The independent variables are: CC_{it} ,
as the control of corruption, $OPEN(\log)_{it}$, as the natural logarithm of trade
openness, $POLIT_{it}$, as the political stability and absence of violence/terro-
rism, and $POPUL(\log)_{it}$, as the natural logarithm of population size. β_0 is the
constant, ε_{it} is the stochastic error, t denotes time, and i denotes the country.

4. Empirical results and discussion

Table 1 shows the basic statistical indicators, which include parameters of cen-
tral tendency, dispersion, and distribution shape for continuous variables. The
modest variations observed in FDI and openness suggest a certain level of in-
stability in the analyzed economies.

Table 1: Descriptive statistics

Variable	Minimum	Maximum	Mean	Std. Dev.
FDI/GDP _{pc} (log)	0.000	13.800	11.283	2.252
CC	-0.500	1.100	0.097	0.470
OPEN (log)	0.700	1.900	1.108	2.265
POLIT	-0.600	1.100	0.396	0.466
POPUL (log)	13.300	15.800	14.714	0.938

Source: Authors' elaboration based on SPSS output

Table 2, Panel A shows the correlation matrix displaying Pearson correlation coefficients between the independent variables, including the dependent variable. The analysis reveals a moderate to strong negative correlation between control of corruption, openness, political stability, and FDI, which contradicts our initial hypotheses. Conversely, a moderate positive correlation was found between population size and FDI, aligning with our initial hypothesis. Although in one case the correlation between independent variables exceeds 0.7, this does not necessarily point to a problem of multicollinearity. Nevertheless, potential multicollinearity effects were checked using variance inflation factor (VIF) and tolerance tests. Table 2, Panel B shows that all tolerance values are greater than 0.10, while all VIF values are below 10, confirming the absence of multicollinearity.

Table 2: Matrix of correlations and multicollinearity diagnostic statistics

Panel A: Matrix of correlations					
Variable	FDI/ GDPpc (log)	CC	OPEN (log)	POLIT	POPUL (log)
FDI/GDPpc (log)	1.000				
CC	-0.592**	1.000			
OPEN (log)	-0.292*	0.647**	1.000		
POLIT	-0.474**	0.773**	0.475**	1.000	
POPUL (log)	0.282*	-0.174	-0.310**	-0.211	1.000
Panel B: Multicollinearity diagnostic statistics					
VIF		3.378	1.864	2.546	1.131
Tolerance		0.296	0.537	0.393	0.885

Source: Authors' elaboration based on SPSS output

Table 3 shows the values of the coefficient of multiple determination and the adjusted coefficient of multiple determination. The values obtained point to the conclusion that the model explains 41.4% of the variance of the dependent variable.

Table 3: Model summary

R	R square	Adjusted R square	Std. error of the estimate
0.643 ^a	0.414	0.379	1.775

Source: Authors' elaboration based on SPSS output

The next step is to analyze the contribution of each independent variable in the model when predicting the dependent variable. When interpreting the results, coefficients will be considered relevant if they are statistically significant at the 5% or 10% level.

Table 4: Regression coefficients

Model	Unstd. coefficients		Std. coeff.	T	Sig.
	B	Std. error	Beta		
(Constant)	1.057	4.045		0.261	0.795
CC	-3.445	0.823	-0.719	-4.185	0.000
OPEN (log)	2.011	1.084	0.237	1.855	0.068
POLIT	0.092	0.722	0.019	0.128	0.899
POPUL (log)	0.564	0.239	0.235	2.361	0.021

Source: Authors' elaboration based on SPSS output

Table 4 shows that the control of corruption has the greatest relative impact on FDI inflows, as well as the highest relative importance in predicting them (beta coefficient of -0.719, with statistical significance below 0.05). Although the initial hypothesis assumes a positive correlation between these two variables, the results point to a negative correlation. Numerous studies highlight various ways in which a corrupt environment may encourage foreign investors to direct capital into such countries (Grosse & Trevino, 2005; Višić & Škrabić Perić, 2011; Quazi et al., 2014; Brada et al., 2019; Luu et al., 2019; Moustafa, 2021; Ozekhome, 2022; Cruz et al., 2023). First, a corrupt environment makes it easier to bypass complex and slow bureaucratic procedures, often through informal channels, thus accelerating the process of obtaining permits, reducing administrative barriers, and enabling a faster start of business. Second, investors can more easily negotiate terms that deviate from standard regulations. Third, corruption may give various tax-related advantages, leading to cost reduction and higher profitability. Fourth, corruption can allow foreign inve-

stors to influence local authorities and tailor regulatory frameworks to their needs, which is particularly beneficial in industries requiring specific permits. Although corruption may increase efficiency in individual cases in the short term, this does not imply such an effect at the macroeconomic level over the long term. In this regard, Mauro (1995) and Castro and Nunes (2013) indicate that corruption increases uncertainty, thus reducing the interest of potential foreign investors. Similarly, Kurniasih et al. (2023) emphasize that a corrupt environment undermines investor confidence and raises financial risk. Therefore, it is recommended that countries focus efforts on strengthening anti-corruption mechanisms to create a more transparent business environment. However, Pantelić and Živanović (2024) and Hajdini et al. (2023) add that the fight against corruption should not be limited solely to legal reforms, but should ensure consistent implementation of regulations in practice, which requires strict monitoring and corrective actions when necessary.

Since the trade openness beta coefficient is 0.237 with a significance level below 0.1, the analysis shows that investors prefer to allocate capital to countries with higher trade openness, stable foreign exchange regimes, lower investment barriers, and greater trade flows, which is in line with our initial hypothesis. This result suggests that openness contributes to a more favorable business environment as it reduces entry barriers for foreign investors (Luu et al., 2019). Countries with liberalized trade policies allow better access to global markets, which makes companies' integration into global supply chains much easier, optimizes production processes, and improves efficiency. However, it should be noted that excessive liberalization may cause a sudden increase in imports, leading to heightened competition in certain sectors and domestic market saturation (Denčić-Mihajlov et al., 2021).

The research results also show that population size has a statistically significant and positive direct impact on FDI inflows, with a beta coefficient of 0.235 and significance level below 0.05, which is in line with our initial hypothesis. Resmini (2000), Petrović-Randelović et al. (2017), Kasasbeh et al. (2018), and Zander (2021) come to similar conclusion as they find that market size, as measured by population, positively affects foreign capital attraction. A larger population may indicate a greater labor force, higher consumption, and a broader market potential, while a larger market can foster stronger competition and innovation, creating favorable conditions for investment attraction. However, Aziz and Makkawi (2012) and Li, Chen, and Zhang (2024) suggest that a large population does not guarantee high FDI inflows, as it can strain economic resources and infrastructure and negatively affect economic growth.

Political stability and absence of violence/terrorism is the variable with the lowest relative importance in predicting the dependent variable (beta coefficient of 0.019). Its regression parameter is not statistically significant (significance level 0.899), so it can be concluded that political stability and absence of violence and terrorism do not have a significant impact on FDI inflows in the analyzed countries.

Conclusion

Focusing on the influence of corruption control, trade openness, political stability, and population size on FDI inflows in four former Yugoslav countries during the period 2006–2023, this study leads to several conclusions.

First, capital market instability and high business risk caused by the global financial crisis brought the expected decline in FDI values, while the most recent crisis did not dramatically affect capital inflows in most of the analyzed countries. Despite supply chain disruptions, drops in supply and demand, and rising borrowing costs, Serbia managed to maintain investor confidence, with investments in the period 2021–2023 exceeding pre-crisis levels. Relatively favorable aggregate results can be explained by compensatory effects between affected and more resilient sectors, as well as various financial incentives aimed at foreign investors.

Second, while Slovenia, Croatia, and Montenegro report better outcomes regarding corruption control, Serbia faces persistent challenges in this field. Despite implemented reforms, their enforcement has not yielded the expected effects, and during the pandemic and political challenges, public trust in the effectiveness of institutional control further declined.

Third, our study reveals both paradoxical and expected associations between FDI and the observed variables. The results primarily show that a lack of efficient anti-corruption mechanisms positively influences capital inflows, contradicting intuitive expectations. This trend is particularly pronounced in Serbia, where declines in corruption control have been temporally associated with the rise in FDI inflows. Investors may be drawn to environments with weak and dysfunctional institutions for various reasons, including the ability to speed up bureaucratic processes (especially for those investors coming from countries with institutional environments with corruption challenges), secure contracts more reliably, acquire monopolistic positions or exclusive access to resources, access confidential information, and offset poor product quality and high prices. However, while corruption might temporarily enhance operational efficiency, this effect is not sustainable at the broader economic level. By including other macroeconomic aspects in the analysis, it becomes clear that

rational motives, such as trade openness and market potential, particularly population size, often outweigh institutional risks in investment decision-making. While a corrupt environment may attract investors prone to manipulative practices, corruption undeniably constitutes a negative phenomenon that severely threatens stability of an entire society. It undermines trust in institutions, erodes democratic principles, jeopardizes citizens' security, and infringes on their fundamental rights. Therefore, it is crucial that policymakers continuously strengthen existing anti-corruption mechanisms and develop new institutional solutions aimed at raising awareness of corruption's harmful consequences and ensuring conditions for its detection, prosecution, and strict punishment of corruption-related crimes.

In the end, it is important to outline some limitations of this research. Due to limited data availability, North Macedonia and Bosnia and Herzegovina could not be included in the analysis. Furthermore, since corruption cannot be directly observed, the main challenge in empirical research is the lack of objective data sources to measure it. For that reason, composite corruption indicators, which combine multiple sources, are most commonly used. However, their key drawbacks are reliance on perceptions, measurement imprecision, and a lack of objectivity in interpreting their values. Since this analysis was conducted in the context of Balkan countries, future research could include the Višegrad Group countries, which entered the transition process earlier and could serve as benchmarks in building institutional infrastructure. Such a study could focus on identifying factors that most significantly affect corruption levels, measured by the CPI, thereby contributing to a more comprehensive understanding of this issue.

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CONSTRUCTIVE DIVIDEND: TAKING THE UNTAXED MONEY OUT OF A COMPANY¹

Abstract

Most tax systems worldwide encourage retained earnings over dividend payments by taxing dividends often at a high rate. Therefore, many companies arrange transactions whose primary purpose is to benefit shareholders rather than a valid business purpose. For instance, a company may cover the personal expenses of its shareholders instead of paying out dividends to them. A company and its shareholders may also arrange manipulative transfers of goods and services to benefit shareholders. These benefits are widely known as constructive dividend. They result in dividend tax evasion, as well as in corporate income tax evasion, as such shareholder benefits are often deducted for tax purposes. Therefore, national tax authorities have paid significant attention to the constructive dividend, though they are yet to fully combat it, primarily because it is hard to detect and prove. The main objective of the research is to identify and analyse the key methods of constructive dividend, with a special focus on the Republic of Serbia. Although constructive dividend is primarily connected with a company's cash, we also show several constructive dividend methods on a non-cash basis. Further, we discuss the tax implications of these methods, primarily from the perspective of dividend tax and corporate income tax. We also discuss the efforts of the national tax authorities that are (to be) made to mitigate or fully eliminate tax evasion through the constructive dividend.

Keywords: *dividend, dividend tax, constructive dividend, tax evasion, corporate income tax, tax audit*

JEL Classification: *H25, H26, M41*

Introduction

The financial management theory posits that decisions regarding the distribution of net income are, together with investment and financing decisions, fundamental decisions for financial managers (Arnold, 2012, p. 363). Therefore, many studies in financial management discuss the advantages and weaknesses of paying dividends out instead of retaining earnings.

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Many studies (Bank, 2003; Santomarino, 2020) argue that national tax systems favour retaining earnings over dividend payments due to double taxation of dividends. In fact, under classical taxation systems, dividends are taxed twice: first, with the corporate income tax, and second, with the dividend tax. As a result, many companies turned to other types of payments with favourable tax treatment to benefit shareholders, such as share repurchases (Grullon & Michaely, 2002). Some companies, however, use illegal constructive dividend methods without paying any taxes.

The subject of the paper is constructive dividends. They are transactions that result in the transfer of benefits from a company to its shareholders without formally declaring a dividend payment. From a tax perspective, constructive dividends are legal if a company pays dividend tax on them. However, many companies tend to illegally recognise constructive dividends as usual business expenses, thus evading significant tax payments.

We focus on constructive dividends to individuals as the most frequent shareholders, though constructive dividends may also arise from transactions between a company and legal entities among its shareholders, or even result from double taxation avoidance agreements (Ilić-Popov & Kostić, 2012).

Past research primarily studied formally declared dividends and their unfavourable tax treatment compared to debt financing and interest paid. Such studies are conducted both in developed (Feld et al., 2013; Faccio & Xu, 2015; Karpavicius & Yu, 2016) and emerging and transitioning countries (Malinić et al., 2013; Arsov & Naumoski, 2016). The constructive dividend was often neglected, particularly from the accounting perspective. Constructive dividend was primarily studied from a law perspective, both in developed (Polito, 2012; Nowotny, 2015; Hopper, 2017) and emerging and transitioning countries (Khan, 2006; Ilić-Popov & Kostić, 2012).

The paper consists of three parts. The first part briefly lays out the concept of constructive dividend. The second part analyses how much tax on constructive dividend should be paid and when. The third part presents the tax regulation of constructive dividend in the Republic of Serbia and possible solutions for the problem of untaxed constructive dividend.

1. The concept of constructive dividend

The concept of constructive (hidden, disguised) dividend is mainly used by the tax authorities of the United States – Internal Revenue Service (IRS). According to the IRS, the dividends to the shareholders may be paid out as formally declared dividends or constructive dividends. Constructive dividends refer to the

transactions that have fundamental characteristics of profit distribution, but are not formally declared as dividend payout. For instance, if a company lends a certain amount of money to its shareholder and then cancels the shareholder's debt, such a transaction should be treated and taxed as a dividend payout (IRS, 2024).

Formally declared dividends and constructive dividends are different in many aspects. First, formally declared dividends are based on a formal decision, unlike constructive dividends. Second, the formal decision on formally declared dividend payout is usually published, unlike constructive dividends. However, both formally declared dividends and constructive dividends should have similar tax treatment. While it is hard to evade taxes for formally declared dividends due to their publicity, constructive dividends are often used as a tax evasion tool.

Badura (2008) states that expenses considered to be disadvantageous to a company but beneficial to the shareholder will be reclassified as constructive dividends or hidden profit distribution by the tax authorities, adding that if a company has effected a constructive dividend in a fiscal year, its taxable income for that year will be increased accordingly. More specifically, Polito (2012) argues that a company transfer is a constructive dividend if:

- the primary purpose of the transfer is to benefit shareholders rather than for a valid business purpose pertaining to the company as an entity distinct from its shareholders and
- the transfer causes property to leave the control of the transferring company and to be subject to direct or indirect control by shareholders.

Due to the significant cross-national differences in tax systems, it is hard to list specific examples of constructive dividends. Helminen (2000) argues that a constructive dividend in one country may not be treated as a constructive dividend in another country. Further, courts sometimes have to make subjective judgments when deciding whether a transaction should be classified as a constructive dividend or not, so different judgments are possible even within the territory of one country (Hopper, 2017). However, a typical transaction of constructive dividend assumes using a company's cash to finance private expenditures of the shareholders. Such transactions may include:

- direct transfer of money from a company's bank account to pay the private expenses of the shareholders;
- using the company's business debit and credit cards to pay the private expenses of the shareholders and
- withdrawing money from a company's bank account (in a bank branch or from the ATM), as the shareholders finance their private expenditures with withdrawn cash.

The company's cash may be used by shareholders in several ways. For instance, a shareholder may use it to pay for the holiday, birthday celebration and similar family celebrations, scholarships for his/her children, everyday consumption goods, furniture and home appliances for the family's house, building materials to build or adapt family's house, fuel for personal consumption and consumption of his/her family etc.

To evade paying tax on withheld money, these expenditures are often presented as the company's expenses in the company's accounting. For instance, expenses for a shareholder's private holidays may be presented as expenses for business trips, while expenses for private celebrations of the shareholder and his family may be presented as the company's celebrations and costs of representation.

Constructive dividend may also be identified in other types of transactions. A company may decide to transfer certain parts of its assets (apartment, car, furniture, goods, etc) to the shareholder for free. National tax authorities usually classify such transactions as constructive dividend and require payment of taxes, as in the case of formally declared dividends.

Another option is to sell certain parts of the company's assets to the shareholder for a price below the market value (Polito, 2012). For instance, if a company may sell the piece of furniture for €6,000 on the market and, instead, sells it for €2,000 to the shareholder, the difference between market value and selling price ($€6,000 - €2,000 = €4,000$) is treated as constructive dividend and is subject to taxation similar to formally declared dividends.

Most tax systems prescribe that using the services of a company by its shareholders may also be treated as a constructive dividend (Nowotny, 2015), though such services are harder to detect (than selling the company's assets) by tax audits. If a shareholder uses the services of the company for private purposes and personal consumption without any fee, such a transaction should be classified as a constructive dividend. Gazur (2006) argues that using the company assets for personal purposes by a shareholder was generally found to produce constructive dividend treatment. The same holds for the situation when a company provides services to its shareholders for a price below the market value.

Constructive dividend may also be identified in relation to loans between a company and its shareholders (Maydew, 1996). If a company grants a loan to its shareholder without interest or with an interest rate below the market interest rate, the interest savings of the shareholder may be treated as a constructive dividend. Further, if a company cancels a loan before the shareholder pays it back, the unpaid amount of the loan may also be treated as a constructive dividend.

In some cases, inventory shortages may be treated as a constructive dividend. If an inventory list (prepared on a regular basis or at the request of the national tax authorities) shows that the real inventory is smaller than the inventory in the business books, and if it can be proved that a shareholder took these assets for personal consumption, such an inventory shortage may be treated as a constructive dividend.

2. How much tax is evaded with a constructive dividend?

Most tax systems across the world prescribe that tax on dividends should be calculated using the gross amount of dividend, which includes the net amount of dividend and dividend tax. The same applies to constructive dividend, which is usually expressed in the net amount. For instance, if a company's shareholder takes €5,000 from the company's account to pay personal expenses, this amount is the net amount.

Therefore, the net dividend should be converted to a gross dividend for tax purposes. Let t be the dividend tax rate. The dividend tax is determined by multiplying the gross dividend by t . Gross dividend may be mathematically expressed as follows:

$$\text{Gross dividend} = \text{Net dividend} + \text{Dividend tax} \quad (1)$$

$$\text{Gross dividend} = \text{Net dividend} + \text{Gross dividend} \times t \quad (2)$$

When the net dividend and t are known, the gross dividend may be calculated as follows:

$$\text{Gross dividend} - \text{Gross dividend} \cdot t = \text{Net dividend} \quad (3)$$

$$\text{Gross dividend} \cdot (1 - t) = \text{Net dividend} \quad (4)$$

$$\text{Gross dividend} = \text{Net dividend} / (1 - t) \quad (5)$$

Instead of presented formulas, accountants often use so-called conversion coefficients to convert the net dividend to the gross dividend. The conversion coefficient is a ratio between the gross dividend and the net dividend. However, when the gross dividend is not known, the conversion coefficient may be calculated as follows.

$$\text{Conversion coefficient} = 1 / (1 - t) \quad (6)$$

The gross dividend may be calculated after multiplying the net dividend by the conversion coefficient. For instance, if the dividend tax rate is 15%, the conversion coefficient is equal to 1.176471. Assuming that a company's shareholder took €5,000 to pay private expenses, the gross amount of dividend is €5,882.35, while the dividend tax is €882.35.

It should also be noted that if a company does not treat such a payment as a dividend and record it as a business expense, it also evades corporate income tax. In other words, the amount of such dividend illegally reduces the tax base and the corporate income tax to be paid. Therefore, the evaded corporate income tax may be calculated after multiplying the dividend by the corporate income tax rate. Assuming a corporate income tax rate of 15%, in an example with €5,000 paid to the shareholder to finance his private expenses, €750.00 of corporate income tax is evaded. In total, undeclared constructive dividend implies €1,632.35 ($882.35 + 750.00$) of dividend and corporate income tax evaded.

One of the most important characteristics of taxes is the moment when the tax is due for payment. Most tax systems prescribe that tax on constructive dividends should be paid at the moment of constructive dividend payment. Tax on constructive dividend is a type of withholding tax, so a company that pays dividends out is a taxpayer. If a company misses the deadline, it risks tax penalties from the national tax authorities. This is often the case when the accountants are not sure whether a payment is made for business expenses of the company (in which case tax should not be paid) or for private benefits of a shareholder (in which case tax should be paid). In some situations, documentation that follows the payment is delivered late to the accounting department of the company, so the accountants recognise constructive dividend (and pay tax on it) quite late.

3. Constructive dividend in the Republic of Serbia

3.1. Overview of tax regulation

The tax system of the Republic of Serbia favours retained earnings over dividends, since dividend payments are double taxed: 1) at the corporate income tax rate, and 2) at the dividend tax rate. Dividend tax rate depends on the type of shareholder. Dividends paid to resident individual shareholders are taxed at 15%. Dividend paid to non-resident individual shareholders are also taxed at 15% unless otherwise stated in the tax treaty (double taxation avoidance agreement) between the Republic of Serbia and the country of residence of the individual shareholder.

The number of companies that regularly pay dividends is very small (Vržina, 2019; Jovković & Vržina, 2021). On the other hand, many companies tend to use constructive dividends to benefit a shareholder without declaring the dividend payment. This may be particularly applicable in smaller companies, in which ownership and management are not separated.

According to the article 61, paragraph 1, point 5 of the Personal Income Tax Law (The Official Gazette of the RS, 24/2001, ..., 19/2025), any transfer of the property to and using the services of a company by the shareholders for their private purposes and personal consumption is taxable as the capital income. According to Article 64 of the Personal Income Tax Law, the tax rate for capital income is 15%. Such transfers are not deductible in the book-to-tax reconciliation (for corporate income tax calculation), so they increase the taxable base and the tax payable. It implies that they have a similar tax treatment to formally declared dividends.

It is also important to note that such transfers from a company to its shareholders between 30 May 2013 and 31 December 2015 were treated as other revenue, taxed in line with Article 85 of the Personal Income Tax Law. Therefore, they were taxed at 20%, using the allowance to reduce the taxable base for 20%. Before and after that period, such transfers are treated as capital income.

Deciding whether a constructive dividend should be treated as capital income or other revenue is also important from the aspect of annual personal income tax. Capital income is not subject to the annual personal income tax, while other revenue is. According to Article 87 of the Personal Income Tax Law, annual personal income tax is paid by individuals whose income in a calendar year was greater than three times the average annual salary per employee paid out in the Republic of Serbia in the year for which the tax is being charged.

The constructive dividend may be, however, taxed differently, depending on specific circumstances. For instance, if a person is simultaneously a shareholder and employee of the company, the constructive dividend may be treated as salary, which is a less favourable alternative for tax purposes. If a constructive dividend is treated as salary (instead of as the capital income), the tax burden would be considerably higher, as the company would have to pay payroll tax of 10% and the following social security contributions:

- 24% for mandatory pension and disability insurance;
- 10.3% for mandatory health insurance, and
- 0.75% for unemployment insurance.

When deciding whether a constructive dividend should be treated as capital income or salary, national tax authorities judge whether the constructive dividend is a result of a) the employment of a shareholder or b) ownership in a company. If a transaction classified as a constructive dividend is not accessible to other employees, the constructive dividend is considered to be a result of ownership and should be taxed as capital income. On the contrary, it should

be taxed as salary. Real-world experiences show that constructive dividend in these cases is mostly taxed as a salary.

Another specific circumstance is when a shareholder is not employed in the company, but is a director of the company (through a so-called managerial contract). The constructive dividend paid to such a shareholder may be treated either as the capital income or the director's fee, with the latter being the less favourable alternative for both company and director. If a constructive dividend is treated as the director's fee, the tax burden would be considerably higher, as the company would have to pay personal income tax of 20% (using the allowance to reduce the taxable base for 20%) and social security contributions. Contribution for mandatory pension and disability insurance of 24% is paid unless a shareholder is exempt from paying it, which is quite a rare situation. If a shareholder has no health insurance elsewhere, for instance, through employment in another company, the contribution for mandatory health insurance of 10.3% should also be paid. On the other hand, contributions for unemployment insurance should not be paid.

The Ministry of Finance of the Republic of Serbia issued numerous opinions in the past two decades regarding the constructive dividends. Just two such opinions are opinion 464-01-0096/2016-04 from 14 March 2016 and opinion 430-00-158/2016-04 from 10 January 2017. At the end of each opinion, the Ministry states that, in each particular case, tax authorities judge the tax treatment of the transaction based on principle of facticity, in line with the article 9 of the Law on Tax Procedure and Tax Administration (The Official Gazette of the RS, 80/2002, ..., 94/2024). That principle posits that tax facts shall be established based on their economic substance. If a simulated legal transaction is used to conceal a different legal transaction, the base for assessing the tax liability shall be the dissimulated legal transaction.

The Serbian tax system prescribes that tax on constructive dividend is payable at the moment of dividend payout. If national tax authorities find out that a company paid a constructive dividend without paying tax, the company will be required to pay dividend tax together with appropriate default interest. According to Article 75 of the Law on Tax Procedure and Tax Administration, the annual default interest rate is equal to ten per cent plus the key interest rate published by the National Bank of Serbia. Further, a company might face a fine for non-filing and late filing of tax returns and failure to calculate tax liabilities, in line with Article 177 of the Law on Tax Procedure and Tax Administration.

Alternatively, a company may decide to report the tax evasion before national tax authorities take any action with regard to the performed evasion, or before

the beginning of a tax audit, or before the filing of a motion to initiate misdemeanour proceedings, in line with article 182b of the Law on Tax Procedure and Tax Administration. In such a case, a company is still liable to calculate and pay default interest, but avoids fines from the national tax authorities.

3.2. What can be done?

Previous discussion indicates that many constructive dividend methods can be applied to evade various types of taxes. Consequently, national tax authorities should pay significant attention to constructive dividends when conducting tax audits to mitigate or fully eliminate such untaxed transactions. However, national tax authorities, particularly in emerging and transitioning countries, cope with several limitations, such as a lack of financial and information technology resources and an insufficient number of tax auditors (Bilicka & Seidel, 2020). Further, tax authorities in emerging and transitioning countries often work in an environment with low tax morale (Randelović, 2017), thus making their job even harder.

Lennox et al. (2013) argue that accounting and financial statements fraud may often be connected to tax fraud. Therefore, to prevent tax evasion through constructive dividend, tax authorities may seek help from the auditors of financial statements and forensic accountants and auditors. They are often engaged to inspect issues other than taxes, but they have the professional responsibility to contact tax authorities if they consider a certain transaction suspicious from a tax aspect.

Many authors (De Mooij & Devereux, 2011; De Mooij, 2012; Karpavicius & Yu, 2016) proposed an implementation of new tax solutions to mitigate or eliminate favourable tax treatment of debt and interest over equity and dividend. If the tax treatment of formally declared dividends becomes more favourable, it is rational to assume that constructive dividends would be a less attractive mechanism. The first option is CBIT (Comprehensive Business Income Tax), under which interest would not be tax-deductible. The second option is ACE (Allowance for Corporate Equity), under which costs of equity would also be tax-deductible. In 2016, the European Commission proposed AGI (Allowance for Growth and Investment), similar to the ACE (Valenduc, 2018), while they proposed DEBRA (Debt-Equity Bias Reduction Allowance) in 2022. CBIT is yet to be implemented, while ACE is already implemented in many countries (De Mooij & Devereux, 2011). Further, De Mooij (2012) argues that the implementation of ACE may give better results than the implementation of CBIT.

Conclusion

From the tax perspective, constructive dividend should not be disputed if a company pays tax just like on formally declared dividends. On the other hand, many companies tend to use a constructive dividend as a tax evasion mechanism. Therefore, constructive dividend is still the subject of many tax studies, although it has already been studied for many decades.

The paper showed that companies may use various constructive dividend methods to benefit shareholders without paying any tax. Although the method using the company's cash is mostly discussed, there are several non-cash methods of constructive dividend. We showed that a constructive dividend may result in significant evasion of both corporate income and dividend tax.

We also showed that tax law in the Republic of Serbia, when it comes to constructive dividend, is relatively well-structured, though it is often hard to be implemented as companies tend to present constructive dividends as expenses of a company. However, the Republic of Serbia still implements double taxation of dividends, thus making space for a reform of the Serbian tax system.

We believe that our research may benefit various interest groups. First, national tax authorities, whose actions are of the first-order importance for mitigating tax evasion through constructive dividends, may benefit the most from identifying the key methods of constructive dividends. Second, national government and tax authorities should also consider proposals to reduce the tax burden on dividends to make constructive dividends less attractive. Third, auditors of financial statements and forensic accountants and auditors should also be prepared to identify constructive dividends and cooperate with tax authorities.

Future research should include empirical data, such as historical data from tax audits by the national tax authorities, to study the key determinants of constructive dividends in the Republic of Serbia. Further, constructive dividend practices should be analysed in neighbouring emerging and transitioning countries to compare the extent to which constructive dividend is used and the key constructive dividend methods.

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GREENWASHING AS A FORM OF FRAUD IN SUSTAINABILITY REPORTS

Abstract

Sustainability reporting is gaining more and more importance when it comes to companies' operations in accordance with sustainable development goals and ethical business principles. In fact, in addition to information about the financial success of companies, an increasing number of stakeholders (such as investors, consumers, regulatory bodies, the general public and others) show interest in disclosing non-financial information about environmental, social and management aspects of business. Quality and credible reporting on sustainability is becoming crucial for building long-term trust and for evaluating the overall sustainability of companies. However, although the purpose of sustainability reporting is to ensure transparency and build trust between stakeholders and the company, the growing importance of this type of reporting creates room for potential manipulation. In an effort to improve their image or fulfill formal requirements, without actually changing their business practices, some companies resort to manipulative techniques of presenting information, among which greenwashing stands out. The aforementioned phenomenon, which may have the character of fraud, implies a situation in which companies falsely present their business as environmentally friendly, in order to win the favor of consumers and improve their image, without real investment in sustainability. Therefore, the aim of this paper is to identify key forms of fraud in sustainability reports, with a special focus on the practice of greenwashing as the dominant form of deception, and to examine its impact on the perception of users of these reports. The research results in the paper indicate that effective and well-organized corporate governance, as well as a developed regulatory framework, are key to mitigating the harmful effects of greenwashing on sustainability reporting, but also that the verification of sustainability reports can prevent the occurrence of greenwashing.

Keywords: sustainability, sustainability reporting, fraud, greenwashing, misrepresentation of information

JEL Classification: M41, Q01, Q56

Introduction

In addition to financial performance, companies can significantly enhance their market image if they contribute to social welfare through socially responsible activities and environmental care (Dumitru & Sofian, 2017). Accordingly, due to growing concerns about social and environmental issues, there has emerged a need for the disclosure of sustainability reports, through which companies present stakeholders with information on the economic, environmental, and social aspects of their operations (Klok, 2003). Society's concern regarding these issues has resulted in various levels of pressure on companies from external stakeholders to adopt "green" practices in their business operations (Kommuri & Arumugam, 2024). However, a strategy focused on achieving favorable environmental performance can be costly and, ultimately, unsuccessful in maximizing shareholder value, which may, consequently, encourage the occurrence of fraud in sustainability reporting (Gorovaia & Makrominas, 2025).

The most prevalent form of fraud in sustainability reporting is greenwashing (Hossain, 2025). This type of fraud refers to the practice in which companies make false claims about their environmental activities in an attempt to benefit from the perception created among environmentally conscious stakeholders, without actually bearing the costs of implementing genuine environmental practices (Gorovaia & Makrominas, 2025). The multilayered forms in which greenwashing can occur make it difficult for stakeholders to recognize how it manifests (Hossain, 2025). Identifying greenwashing involves comparing the claims about a company's environmental practices with its actual environmental performance. Given that both aspects are difficult to measure, due to the varying formats and channels used to communicate environmental claims, as well as the unclear quantification of environmental performance (Gorovaia & Makrominas, 2025), recognizing this phenomenon can be a challenge even for expert stakeholders who are well-informed about greenwashing (Hossain, 2025).

Based on the above, the subject of this paper is greenwashing as a form of fraud in sustainability reporting. The aim of this paper is to identify key forms of fraud in sustainability reports, with a special focus on the practice of greenwashing as the dominant form of deception, and to examine its impact on the perception of users of these reports. Considering that sustainable development is becoming an increasingly important concept in modern business conditions, manipulation and fraud in sustainability reporting can significantly distort stakeholders' perceptions of companies engaging in such practices. Therefore, a deeper understanding and analysis of manipulative practices in sustainability reporting is necessary, with greenwashing represen-

ting one of the most common forms of fraud. Although a significant number of studies on this topic exist globally, the domestic literature shows a noticeable lack of analyses focused on fraud in sustainability reports, which may hinder their adequate identification.

The paper is based on a review of relevant domestic and international literature and a content analysis in the field of fraud in non-financial reporting. The structure of this paper, besides the introduction and conclusion, consists of three parts. First, the focus will be on the essential definition and types of fraud in sustainability reporting. The second part of the paper will discuss greenwashing as the most common form of fraud in sustainability reporting, while the third part concerns the analysis of the impact of greenwashing on the perceptions of users of sustainability reports.

1. Essential definition and types of fraud in sustainability reporting

Fraud is often defined as a deliberate act involving deception with the intention of gaining an unfair or unlawful advantage (KPMG, 2020). Firozabadi, Tan & Lee (1998) emphasizes that fraud occurs when, on one hand, an individual or organization deliberately makes a false statement about a material fact or event, while on the other hand, the person or organization to whom the statement is made believes the false statement, relies on it, acts upon it, and, as a result, suffers a loss due to relying on and acting upon the false statement. Fraud in the field of sustainable development has not yet been widely researched, but based on available data and research findings, it can be observed that manipulation of sustainability information is occurring with increasing frequency and can cause harm to companies and their stakeholders in various ways (KPMG, 2020). Stakeholders, i.e., users of the information published in sustainability reports, should be aware of the possibility of fraud in such reports as a new form of economic crime. In fact, it is important that measures to reduce the risk of fraud in sustainability reporting are incorporated into a company's sustainable development strategy (Dorfleitner & Utz, 2024).

Fraud in the field of sustainability can take various forms, most commonly occurring as inaccurate reporting aimed at creating a better perception of the company among different stakeholders. This can lead to an improved reputation and image, and consequently, to higher company value and stock prices (KPMG, 2020). In fact, false reporting is a deliberate deception carried out for the benefit of the company or individuals within it, and may be motivated by the desire to meet the expectations of various stakeholders or to achieve personal goals (Dorfleitner & Utz, 2024).

There is a wide range of pressures and incentives that can lead to fraud in sustainability reporting. The pressures that drive fraud in this area are not limited to financial pressures but may also include various other pressures related to the reputation of the company and individuals within it (Steinmeier, 2016). It is also important to emphasize that the requirements of the Corporate Sustainability Reporting Directive (CSRD) impact companies by increasing the pressure to disclose sustainability indicators and progress in environmental protection, social issues, and corporate governance. In fact, the CSRD's requirements for disclosing key data about companies' value chains are extensive and complex, which can lead not only to improved corporate transparency but also to increased risks of fraud in sustainability reporting (KPMG, 2025).

In many countries, regulatory frameworks related to sustainability reporting are still under development, which, combined with limited understanding of the topic, creates an environment that may facilitate the occurrence of fraud. If individuals exploit this lack of understanding and go unpunished for manipulating reports, the risks of committing fraud increase, while the chances of detection remain low without improvements in controls specific to this type of fraud (Dorfleitner & Utz, 2024). Steinmeier (2016) points out that fraud in sustainability reporting arises from a lack of internal control and data verification. Additionally, the voluntary nature of sustainability report verification and the fact that verification services are still insufficiently developed can also create opportunities for fraud in sustainability reporting.

Hossain (2025) conducted research on the role of forensic auditing in identifying fraud and ensuring compliance within environmental and social aspects reporting. The study yielded significant findings. It highlighted the widespread presence of fraud in sustainability reporting, such as greenwashing and manipulative or inaccurate reporting on social compliance. Hossain (2025) concluded that forensic auditing methods, particularly data analysis, blockchain tracking, and document verification, successfully identify fraud in sustainability reports. However, although forensic auditing plays a crucial role in detecting fraud, numerous challenges remain to be addressed, such as differing regulatory frameworks, lack of standardized metrics, and issues related to data availability.

It is important to note that raising awareness, conducting fraud risk assessments, and integrating fraud risk management in sustainability reporting within broader frameworks can significantly help reduce the risk of fraud in sustainability reporting. Additionally, consulting with experts on specific sustainable development topics can contribute to lowering fraud risks. A key step in managing fraud risk is the proper establishment of corporate governance structures,

meaning providing examples “from the top” and promoting a culture of ethical business practices (PwC, 2023). The purpose of corporate governance is to help build the trust, transparency, and accountability needed to encourage long-term investments, financial stability, and business integrity, thereby fostering societal growth and development (Čupić & Todorović, 2024). For the effective identification, prevention, and reduction of fraud risks in sustainability reporting, KPMG (2025) recommends the following:

- introducing a system for reporting irregularities,
- establishment of an internal control system,
- definition of clear responsibilities,
- conducting risk analyses to assess business partners and identify risks, and
- regular audit reviews.

Examples of fraud in sustainability reporting can vary, from manipulating sustainability targets to falsely present the fulfillment of conditions for sustainability-linked loans, to false claims about meeting key performance indicators in the field of sustainability. In addition, a common example of fraud in sustainability reporting is the concealment of relevant facts to fraudulently obtain certificates of compliance with pollution management standards (Dorfleitner & Utz, 2024). One of the most common forms of fraud in sustainability reporting is greenwashing (Ferrón-Vílchez, Valero-Gil & Suárez-Perales, 2021). Greenwashing refers to all forms of communication that result in misleading stakeholders into forming a more favorable perception of a company's environmental achievements regarding its products and/or processes than is actually the case (Malinić & Janjić, 2024). In addition to greenwashing, social washing is also cited as a common form of misuse of sustainability claims. The concept of social washing involves presenting a misleading image of a company regarding social issues and human rights. Social washing encompasses various unethical practices related to the treatment of human capital, including labor and human rights (of employees and the broader community), gender inequality, racial discrimination, modern slavery, and other related issues (Gálová, 2023).

Finally, it is important to emphasize that existing research indicates that manipulation through reporting in the field of sustainable development is relatively easy (Steinmeier, 2016). The reason for this is a weak and insufficiently researched control environment, as well as the existence of numerous opportunities for fraudulent behavior. Considering the fact that fraud in the form of greenwashing is the most widespread, it can be said that a company steps into the realm of fraud the moment it starts making false claims about sustainability (Kurpierz & Smith, 2020).

2. Greenwashing as the most common form of fraud in sustainability reporting

Truthful and complete disclosure of relevant sustainability information is a widely accepted social standard that companies should strive to meet. Besides aiming to maximize profit, companies should also comply with certain standards, professional ethics, laws, and regulations, as well as fulfill obligations related to environmental protection and contributing to society (Xu, Li & Xu, 2023). As environmental awareness spreads, stakeholders are increasingly concerned about how companies, through their operations, contribute to environmental degradation. The environmental efficiency of companies is increasingly scrutinized by stakeholders, which in turn motivates companies to present their products and services as “green” or “greener” compared to competitors (Spaniol, Danilova-Jensen, Nielsen, Rosdahl & Schmidt, 2024). Consequently, awareness of greenwashing, that is, misleading or entirely false environmental claims made by companies when presenting their environmental protection strategies is growing. Such claims are often used to enhance social reputation, build relationships with stakeholders, or achieve short-term profits, while simultaneously avoiding making essential changes needed to reduce negative environmental impact (Nemes et al., 2022).

Greenwashing as a phenomenon is studied by researchers from various fields, and due to its multidisciplinary nature, a universally accepted definition has not been established to date (de Freitas Netto, Sobral, Ribeiro & Soares, 2020). The lack of a common definition of greenwashing may lead to fragmented academic research, unclear practical guidelines, inconsistent law enforcement, and reactive political frameworks, which can result in ineffective efforts to combat its spread (Spaniol et al., 2024). However, in the literature dealing with this topic, the definition most frequently cited is the one found in the Oxford English Dictionary, which defines greenwashing as misinformation spread by a company with the aim of presenting itself to the public as an environmentally responsible company. Additionally, greenwashing can be defined as the public image of environmental responsibility promoted by a company, which is perceived as unfounded or deliberately misleading (Zioło, Bąk & Spoz, 2024).

In the context of sustainability reporting, greenwashing poses a threat to the accuracy, reliability, and transparency of reporting, as at the core of greenwashing lies a discrepancy between what a company wants to disclose to stakeholders regarding sustainable aspects of its operations and the actual activities it undertakes in this area (Moodaley & Telukdarie, 2023). Consequently, the impact of greenwashing can hinder precise measurement and real progress

toward achieving sustainable development goals. For example, in the context of mitigating climate change issues, society may develop a false sense of security that climate targets will eventually be met, while the reality may be far from that, given the “distorted” image companies present to society through greenwashing. The consequences of this could indeed lead the world to a catastrophic scenario where global warming exceeds 2°C above pre-industrial levels (Cojoianu, Hoepner, Ifrim & Lin, 2020). From the perspective of sustainability reporting, it can be said that the negative effects of greenwashing are often more severe than the mere lack of corporate social and environmental responsibility, considering that deception creates a greater degree of misconception and harm to stakeholders (Xu et al., 2023).

Greenwashing can occur at multiple levels, ranging from product-level claims using eco-labels to the depiction of natural elements in company-level sustainability reports (de Freitas Netto et al., 2020). In fact, the existing literature points to the existence of three main levels of greenwashing, which are (Dorfleitner & Utz, 2024):

- greenwashing at the product or service level – advertising certain products or services as “green,” while in reality, the products are not as environmentally friendly as some companies claim,
- greenwashing at the company level – a discrepancy between the company’s “green” image and its actual performance in the area of sustainability, and
- greenwashing at the level of financial intermediaries – offering a financial product, such as a sustainable investment fund, which in reality is not as sustainable as claimed. Although this could be argued to be just a form of product-level greenwashing, there are reasons against such an interpretation, given that this form not only affects the legitimacy of the financial institution but can also have broader negative effects on investment goals.

Some researchers highlight two additional levels of greenwashing, namely (Kommuri & Arumugam, 2024):

- greenwashing at the strategic level – misleading communication about environmental issues related to the company’s future strategies, including medium- and long-term goals, public communication about strategy, plans for process improvement, interpersonal communication, and extraordinary operations that deliberately send a “green” message, and
- greenwashing at the “dark” level – environmental messages that serve as a cover for illegal activities.

Frauds in the form of greenwashing can occur as follows (Yang, Huong, Nam, Nga & Thanh, 2020):

- selective disclosure of information – revealing only certain information,
- decoupling – occurs when companies claim to meet the expectations of their shareholders but do not actually change their business practices,
- distraction – refers to symbolic activities designed to divert stakeholders' attention and conceal corrupt business actions,
- deceptive manipulations – involves misleading behavior in which sustainable communication is used to consciously shape business practices with the aim of creating the impression that the company's products, goals, or policies are environmentally friendly,
- dubious permits and labels – refers to permits issued by external organizations that define standards and replace the reliability of independent bodies with the company's own right to grant itself approval, and
- ineffective public voluntary programs – companies participate in voluntary programs, but mere participation cannot bring about real improvements in environmental protection.

A recent analysis conducted by the UK Competition and Markets Authority and the Dutch Authority for Consumers and Markets showed that around 40% of environmental claims fall into the category of greenwashing (Nemes et al., 2022). Specific greenwashing activities can be observed in numerous companies. For example, “Coca-Cola” advertises with the slogan “plastic-free” (even though the company is ranked as one of the largest plastic polluters), “Poland Springs” uses the term “natural” on bottled water labels (although the bottles are intended for single use), and “Starbucks” promotes the use of a strawless lid (even though such a lid contains more plastic than the original lid and straw combined) (Crumbley, Grossman & Grossman, 2024, according to Robinson, 2022).

Finally, it is important to emphasize that although greenwashing is mostly described in the literature as deliberately misleading corporate communication, conceptual analysis points to the fact that this phenomenon is often a matter of perception, arising in situations where there is a misalignment between stakeholder expectations, the messages companies convey, and the way those messages are interpreted (Seele & Gatti, 2017). It is worth noting that while many countries have regulations in place to prevent misleading claims, these are mostly limited to commercial practices, leaving many aspects of greenwashing unaddressed and unpunished (Nemes et al., 2022).

3. The impact of greenwashing on the perception of users of sustainability reports

In the era of sustainability, companies are under significant pressure to act in an environmentally responsible manner and to disclose information on such matters (Kommuri & Arumugam, 2024). A large number of companies strive to improve their environmental image by presenting their environmental protection efforts to the public. Given this, companies often apply green marketing strategies in order to gain a competitive advantage and attract environmentally conscious stakeholders. Green marketing can help stakeholders make better and more informed decisions about a company and its products, but it is also a powerful marketing tool that companies use to differentiate themselves based on sustainability (Szabo & Webster, 2021). However, not all claims made within green marketing are fully aligned with companies' actual environmental practices, considering that some companies may exploit the opportunities offered by green marketing to make misleading claims about their "greenness" (Brouwer, 2016).

Given that companies often do not implement their declared corporate social responsibility policies in practice (Ioannou, Kassinis & Papagiannakis, 2023), an increasing number of firms combine poor environmental performance with positive communication about that area (Delmas & Burbano, 2011). In fact, companies engage in greenwashing when they fail to maintain consistency and honesty in their green marketing strategies. The perception that a company's actions are desirable, acceptable, or socially justified within the framework of social norms, principles, and beliefs forms the basis of greenwashing (Kommuri & Arumugam, 2024).

Greenwashing can have serious negative consequences on the trust of users of sustainability reports, i.e. stakeholders, in "green" products and environmentally responsible companies. Consumers and investors are identified as key stakeholders (Delmas & Burbano, 2011). When stakeholders perceive greenwashing, they form negative judgments and perceptions of corporate hypocrisy, which leads to lower satisfaction with the company's products and services (Ioannou et al., 2023) and decreasing interest in "green" products on the market (Yang et al., 2020). Such situations, in turn, increase the incentives for companies to engage in environmentally harmful behaviors that have been shown to generate negative externalities and adversely affect social welfare (Delmas & Burbano, 2011).

It can be said that greenwashing exploits consumers' genuine concern for the environment, creating problems such as limiting consumers' ability to make environmentally friendly decisions or causing skepticism toward all products

that promote “green” attributes, including those that are truly environmentally friendly (Brouwer, 2016). From the consumer’s perspective, greenwashing can also negatively affect attitudes toward the brand (Szabo & Webster, 2021). The level of greenwashing negatively impacts brand perception, depending on the degree of discrepancy between the set sustainability goals and actual alignment with them. Compared to lower-level greenwashing, high-level greenwashing, characterized by significant gaps between the “green” goals and their implementation, leads to a more pronounced negative effect on brand perception by consumers. However, it is crucial to recognize that even smaller forms of greenwashing can significantly damage consumer perception (Janz, Jordanow, Heidenreich & Schäfer, 2025). Research conducted by Aji and Sutikno (2015) demonstrated that greenwashing leads to increased consumer confusion, skepticism, and perceived environmental risk, as well as a negative correlation between consumer skepticism and trust in “green” products. Therefore, it can be said that the more skepticism a consumer feels, the less their trust in the “green” product.

The negative consequences of greenwashing can also be viewed from the investors’ perspective. The disclosure of sustainability reports is highly significant for making investment decisions. Deng, Zhang, and Yu (2024) point out that the disclosure of sustainable development factors plays a key role in optimizing investment strategies. Accurate information about companies’ sustainability can help investors make better decisions, thereby increasing the profitability and security of investment portfolios. However, falsely portraying companies as environmentally responsible can damage the reputation and “green” brand of companies, which negatively affects investor trust and their interest in investing, reducing the likelihood of cooperation and resource exchange with the company. In fact, when forming partnerships with a company that engages in greenwashing, investors may fear that they themselves will be perceived as “greenwashers”, which further increases their desire to avoid such a company (Yang et al., 2020). Kommuri and Arumugam (2024) conclude that investors are more likely to support companies involved in corporate offenses and offenses unrelated to deceptive marketing than those engaging in greenwashing, considering corporate offenses to appear less hypocritical than deliberate manipulation of trust.

Although the literature mainly analyzes the effects of greenwashing from the perspective of those who engage in it, the perceptions of managers in the decision-making process remain insufficiently explored, especially when it comes to whether to retain or enter into a contract with new business partners, clients, or other stakeholders involved in greenwashing activities. Kommuri and Arumugam (2024) suggest that companies must integrate the preferences and

needs of stakeholders into their strategy in order to gain a competitive advantage and add value to the company. The recognition of greenwashing by managers contributes to the development of negative feelings toward the company engaging in it, which negatively affects managers' willingness to initiate or continue business cooperation with that company. An increasing number of studies indicate that as greenwashing activities become more frequent, managers become less willing to collaborate with companies that resort to such practices. Ferrón-Vílchez et al. (2021) pointed out that the relationship between perceived greenwashing and willingness to establish business cooperation depends on a high level of the management's "green" attitude. This can be explained by the fact that managers' knowledge and feelings are fundamentally linked to the decision-making process in the company, and that there is a strong correlation between these two aspects.

Szabo and Webster (2021) pointed out that greenwashing negatively affects companies' profitability and causes ethical harm. Therefore, many companies try to avoid stakeholders' perception of greenwashing by relying on transparent communication. In order to reduce negative stakeholder reactions, it is important that companies never claim to be the best in their industry. Instead, they should clearly indicate in which areas they perform better and exactly how they gain an advantage over their competitors. Szabo and Webster (2021) emphasize that transparency leads to greater stakeholder trust, even in situations where no aspect of the company's operations is sustainable. Transparency reduces the perception of greenwashing by preventing negative reactions from other companies, increasing accountability, and highlighting the company's values.

External verification of sustainability reports significantly contributes to reducing the possibility of companies to use greenwashing. In fact, external verification is considered a key factor in stakeholder trust, as it undoubtedly contributes to the overall integrity and credibility of sustainability reporting (Jovanović, 2024). The need to conduct independent external verification of sustainability reports aims to increase the accuracy of disclosed information. Higher quality information is perceived as more reliable, and therefore more useful for companies and information users (Savić, 2023). Sometimes this type of verification is required by investors or business partners, but in any case, it undeniably enhances the credibility and reliability of information, thereby strengthening stakeholder trust, especially investors. It is important to emphasize that the process of independent verification can also positively impact internal matters, such as improving data collection systems, internal control processes, and the identification and management of risks (Smart Kolektiv, 2021).

Conclusion

Despite the growing importance of the concept of sustainable development in business operations, manipulations and various forms of fraud in sustainability reports pose a serious threat both to the integrity of companies and to stakeholder trust. Frauds, most commonly manifested through false reporting, or greenwashing, often result from pressures to meet the high expectations of various stakeholders without the actual implementation of sustainable practices. The multidisciplinary nature of greenwashing makes it difficult to detect, while its consequences include not only ethical damage but also the jeopardizing of achieving global sustainable development goals. Nevertheless, effective and well organized corporate governance, a developed regulatory framework, and verification of sustainability reports represent the key to mitigating and preventing the harmful effects of greenwashing.

The aim of this paper was to identify key forms of fraud in sustainability reports, with a special focus on the practice of greenwashing as the dominant form of deception, and to examine its impact on the perception of users of these reports. Considering the growing importance of sustainable development reporting and the increasing number of identified greenwashing cases, as well as the relatively small number of studies addressing this problematic area, the theoretical implications of this research relate to filling the gap in domestic literature. It is expected that the paper will contribute to the improvement and expansion of the knowledge base in the field of greenwashing and, more broadly, the detection of fraud in sustainability reports. Furthermore, the paper has certain practical implications. Companies can use the findings of this research to improve their reporting policies and to recognize the importance of enhancing transparency, thereby avoiding reputational risks associated with greenwashing. Managers can better understand the importance of ethical reporting and the consequences of manipulating sustainability information. Moreover, the paper provides investors with insights into potential risks of misallocating capital due to inaccurate claims about sustainable business aspects, while it can help consumers develop a critical attitude toward “green” products.

This paper has certain limitations, primarily related to the fact that only greenwashing, as the most common form of fraud, was analyzed, and that the paper is based solely on theoretical considerations. Future research could include, besides greenwashing, other forms of fraud in sustainability reports and be supported not only by theoretical discussions but also by empirical research in this field.

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ESSENTIAL COMPETENCIES FOR FINANCIAL CRIME INVESTIGATION: INSIGHTS FROM THE FINANCIAL POLICE OFFICE IN NORTH MACEDONIA

Abstract

As financial crimes grow more sophisticated in the digital age, the role of financial police officers demands a refined set of competencies. This study explores the essential technical skills and personal traits that enable effective detection and investigation of financial crimes, drawing insights from the Financial Police Office in North Macedonia. A mixed-method approach was applied, combining survey responses from 35 investigators with follow-up semi-structured interviews conducted with 7 senior officials.

The findings highlight three core technical competencies (i) investigative skills, (ii) analytical proficiency, and (iii) legal knowledge, as the most critical for successful case resolution. Additionally, personal traits such as (i) investigative intuitiveness, (ii) ethics and integrity, (iii) teamwork and collaboration, (iv) critical thinkings and (v) effective communication (both written and oral) emerged as crucial for navigating the complexities of financial investigations. The study also identifies key breakthrough methods in contemporary investigative practice, including whistleblower disclosures, forensic analysis of digital communications, and direct in-person interactions with suspects and witnesses.

Further training and education emerged as a critical theme, with senior officials emphasizing the need for specialized programs focused on digital forensics, document analysis, transaction monitoring, and cryptocurrency investigations. The importance of ongoing collaboration between academia and investigative institutions was also highlighted as a means to strengthen institutional capacity and support knowledge transfer.

The results reflect a high level of alignment with global standards for fraud investigation skills, underscoring the importance of continuous professional development in line with evolving financial technologies. This research contributes to the un-

derstanding of human capital needs within law enforcement institutions and offers practical implications for designing training programs that support effective financial crime prevention.

Key words: *Financial crime investigation, forensic skills, financial police, investigative competencies, training and education, North Macedonia*

JEL Classification: *K42, M41, H83*

Introduction

Financial and economic crime is a critical issue in modern economies, affecting both public and private sectors globally. Criminals continuously evolve their techniques, often exploiting technological innovations and complex global financial systems (Europol, 2023). For instance, Europol's recent threat assessment highlights how perpetrators leverage advancements like cryptocurrency and online platforms to launder money and commit fraud at an unprecedented scale (Europol, 2023). Similarly, the European Anti-Fraud Office (OLAF) has reported a significant rise in fraud over the past decade driven by increased digitalization of commerce and finance. This trend has greatly increased the complexity of financial crimes, necessitating more sophisticated methods to detect and investigate them (OLAF, 2023). In response, law enforcement agencies are under pressure to continuously update their skills and techniques in order to keep pace with evolving threats.

Economic and financial crimes lack a universally agreed-upon definition, resulting in diverse interpretations across different regions and countries (Bhasin, 2013; Letia, 2014; Jamil *et al.*, 2022). These include corruption, tax evasion, cybercrime, accounting fraud, money laundering, bribery, embezzlement, identity theft, and insider trading (Gottschalk, 2010; PwC, 2022). The Financial Police Office (FPO) in North Macedonia plays a specialized role in combating such crimes, similar to financial crime units elsewhere. Over time, the role of financial police officers in North Macedonia has expanded with growing demands for accountability and transparency in both government and business sectors. Investigating financial crime requires a distinctive blend of technical competencies and personal traits or cognitive skills. In essence, the complexity and creativity of modern financial crime demand an equally sophisticated set of competencies among those who seek to detect and prevent it.

Recent global trends further underscore the need for enhanced investigator skills. The rise of financial technology (FinTech), growth of digital curren-

cies, and the emergence of Industry 5.0 have given criminals new tools to conduct complex schemes. They exploit advanced technologies like artificial intelligence, blockchain, automation, and big data analytics to conceal illicit activities and launder proceeds. As a result, financial crime investigators must develop expertise in new areas such as data analytics, cybersecurity, and digital forensics to trace these crimes (Deloitte, 2024; PwC, 2022). In a 2021 study on policing financial crime in England and Wales, Gilmour (2021) noted that technological barriers and limited digital expertise in police forces have hindered effective enforcement. Likewise, a survey by PricewaterhouseCoopers (PwC) found that many organizations feel ill-equipped to handle digital fraud threats, highlighting a gap that law enforcement training needs to fill (PwC, 2022). All these factors point to an urgent need for clearly identifying the essential competencies required for financial crime investigators today and ensuring these skills are cultivated through targeted training programs.

This study aims to outline the essential competencies, both technical skills and personal traits, that enable financial police officers to effectively detect and investigate financial crimes. In particular, we focus on three core aspects: (1) the technical competencies and personal traits most critical for financial crime investigation, (2) the key breakthrough methods and techniques used in contemporary investigative practice, and (3) the training and educational needs for financial investigators. By concentrating on these aspects, the research seeks to provide an understanding of what makes financial crime investigators effective in the field.

This paper offers insights drawn from the experiences of officers in North Macedonia's FPO, enriched with evidence from broader academic and professional literature. The goal was to identify which competencies and methods have the greatest impact on successfully uncovering complex financial crimes, and how continuous training and knowledge exchange can bolster these efforts. In turn, defining this competency framework can guide targeted capacity-building initiatives so that financial police units are equipped with the necessary skills, tools, and knowledge to combat sophisticated economic crimes. The subsequent sections of the paper cover a review of relevant literature, an overview of the research methodology, the results of our survey and interviews (organized by the three focal themes), a combined discussion integrated with the results, and a conclusion with implications for practice and future research.

1. Literature review

Financial crime investigators must possess both expertise and authority derived from knowledge, which legitimizes their role in identifying misconduct. Michel Foucault's concept of knowledge and power suggests that the effectiveness of crime control is tied to the expertise possessed by investigators (Foucault, 1980). Investigators derive authority from their knowledge, which legitimizes their role in uncovering misconduct. In practical terms, this means an effective financial crime investigator must command a mix of specialized knowledge and interpersonal characteristics to expose complex fraud schemes and protect societal interests. This idea aligns with institutional theory as well. DiMaggio and Powell's notion of institutional isomorphism posits that organizations tend to adopt similar best practices to meet societal expectations (DiMaggio & Powell, 1983). In the realm of financial crime enforcement, agencies like financial police units are increasingly adopting standardized investigative practices, advanced analytical tools, and transparency measures to conform to global standards and effectively counter evolving criminal methods. Both theoretical perspectives emphasize that professionalization and standardization of skills within financial crime units are necessary responses to the growing sophistication of economic crimes.

Financial crime investigation is inherently multidisciplinary. Ramaswamy (2005) illustrated a model of overlapping domains, such as investigative auditing, forensic accounting, criminology, litigation services, all of which contribute to an investigator's expertise. This implies that a financial investigator must have broad-based knowledge across multiple fields, not just traditional accounting. A diverse skill set spanning these areas enhances investigators' ability to detect sophisticated schemes and follow the money through convoluted transactions (Ramaswamy, 2005; CIPFA, 2021). The Chartered Institute of Public Finance and Accountancy (CIPFA) has similarly emphasized that modern financial investigators should combine professional accounting skills with investigative techniques and strategic thinking (CIPFA, 2021).

A number of empirical studies have investigated the essential skills required to detect and investigate financial and economic fraud (Digabriele, 2008; McMullen & Sanchez, 2010; Shanikat & Khan, 2013; Bhasin, 2013; Salleh & Aziz, 2014; Gbegi & Adebisi, 2014; Arežina et al., 2014); Chukwu et al., 2019; King, 2020; Akinbowale et al., 2020; Gilmour, 2021; Al-Daoud et al., 2023).

According to Digabriele (2008) analytical proficiency is fundamental in financial crime detection, as professionals must process and interpret large datasets, identify irregularities, and make evidence-based conclusions. Bhasin

(2013) emphasizes this skill as „the ability to examine for what should be provided rather than what is provided”. Closely tied to this is investigative skill, which involves methodically gathering and examining evidence of fraudulent activities (Akinbowale et al., 2020). Alongside accounting, auditing, and legal knowledge, these skills are essential for forensic accounting and quality financial crime investigation (Zysman, 2004; King, 2020; Shanikat & Khan, 2013; Bhasin, 2013). Accounting and financial literacy provide a foundation for understanding financial statements and identifying discrepancies that may signal fraud (Chukwu et al., 2019).

Investigative intuitiveness and the ability to „think like the wrongdoer” help professionals anticipate criminal methods and develop proactive strategies (Arežina et al., 2014). Ethics and integrity are also vital, as investigators must maintain impartiality throughout their work (Salleh & Aziz, 2014). Legal knowledge is also crucial for ensuring compliance with legal standards, allowing professionals to navigate complex regulations and appropriately present evidence (Bhasin, 2013; Al-Daoud et al., 2023). Communication skills, both written and oral, are fundamental for conveying findings to courts and regulatory bodies (Chukwu et al., 2019; Ramaswamy, 2005). King (2020) highlights that oral communication, particularly in conducting interviews, plays a crucial role in daily investigative operations. Technology skills, particularly in data mining (Deloitte, 2024), cybersecurity (PwC, 2022), and forensic accounting software (Gbegi & Adebisi, 2014), are increasingly important as financial crimes become more complex. Business acumen and industry experience are also valuable for understanding sector-specific fraud patterns (King, 2020). Among personal traits, critical thinking is critical for solving complex problems and developing strategies for tackling sophisticated crimes (Salleh & Aziz, 2014). Financial crime investigators require a blend of technical, analytical, and interpersonal skills to tackle the complexities of modern financial crimes. Both technical skills and personal traits must be continuously refined to keep up with evolving criminal methods (Shanikat & Khan, 2013; Salleh & Aziz, 2014; Arežina et al., 2014).

Almost all authors researching financial crime investigation skills stress the need for developing specialized training programs. These programs should address current challenges and reflect the growing importance of forensic accounting and fraud examination in higher education (Salleh & Aziz, 2014; Gilmour, 2021; Al-Daoud et al., 2023; Shanikat & Khan, 2013). They also underscore the importance of developing tailored curricula and professional training programs to address the current, complexities and evolving demands of financial and economic crime investigations.

2. Methodology

2.1. Research design

This study adopted a mixed-methods approach to explore the competencies and practices in financial crime investigation, with a specific focus on North Macedonia's FPO. We combined a quantitative survey of financial police officers with qualitative semi-structured interviews of senior officials. The mixed-method design was chosen to capture both the breadth of perspectives (via the survey) and the depth of insights (via interviews) on the three key themes: (i) essential technical skills and personal traits, (ii) key investigative methods for breakthroughs, and (iii) training and development needs.

2.2. Survey of financial police officers

The first phase of research was a survey administered to FPO in the Republic of North Macedonia. The survey was distributed online in coordination with the Office's Director to ensure it reached active financial inspectors and investigators. Participation was voluntary and responses were kept anonymous. Due to the sensitive nature of their work and internal regulations, we did not collect identifiable personal data from respondents (including their exact ranks or units), and the total number of officers in the FPO is confidential and not publicly disclosed by the institution. We can report, however, that the FPO is a relatively small, specialized unit, so the pool of potential respondents was limited to a few dozen personnel.

The questionnaire was developed based on a review of prior literature, as the work on Digabriele (2008), McMullen & Sanchez (2010), Shanikat & Khan (2013), Bhasin (2013), Salleh & Aziz (2014), Gbegi & Adebisi (2014), Arežina et al. (2014), Chukwu et al. (2019), King (2020), Akinbowale et al. (2020), Gil-mour (2021), and Al-Daoud et al. (2023). We first compiled a comprehensive list of skills and traits mentioned across these studies, which resulted in several dozen items. Many items overlapped conceptually (e.g., "analytical proficiency" vs. "analytical skills", or "oral communication" vs. "effective oral communicator"). We standardized the terminology to avoid redundancy, for instance, treating "analytical proficiency" and "analytical skills" as one skill category. In total, we distilled the list to 16 distinct competencies, evenly divided into 8 technical skills and 8 personal traits, which the literature suggested were among the most significant for financial crime investigation.

Each skill/trait was presented with a brief description to ensure common understanding. Survey respondents were asked: "How important is this skill/trait

for a financial police officer to successfully conduct financial crime investigations?” They rated each of the 16 items on a 5-point Likert scale (1 = Not important at all, 5 = Very important). Additionally, for each category (technical skills and personal traits), an open-ended option for “Other (please specify)” was provided, allowing respondents to mention any important competency not listed. The technical skills evaluated included (i) analytical proficiency, (ii) investigative skills, (iii) accounting/financial literacy, (iv) legal knowledge, (v) attention to detail, (vi) written communication/documentation, (vii) IT/technology skills, (viii) business acumen/industry experience, (ix) other. The personal traits evaluated included (i) critical thinking, (ii) communication skills, (iii) investigative intuitiveness, (iv) think like the wrongdoer, (v) ethics and integrity, (vi) adaptability and flexibility, (vii) motivation/resilience, (viii) teamwork and collaboration, (ix) other.

2.3. Semi-structured interviews with senior officials

The second phase involved semi-structured interviews with high-ranking officials of the FPO to gain qualitative insights, especially regarding investigative methods (theme ii) and training needs (theme iii). We conducted interviews with seven officials in total. The sample was purposefully selected in coordination with the agency’s leadership to include those with significant experience and oversight roles. It comprised four sector heads or senior advisors to the Director (each overseeing different functional areas of financial crime investigation) and three senior financial inspectors who have led major investigations. The group included both women and men (three female and four male interviewees), reflecting a consideration for diverse perspectives. All interviewees had over 10 years of experience in financial crime investigations, and some had decades of expertise.

Interviews were scheduled and conducted in April 2024, in person at the FPO headquarters. The interviews lasted approximately 75 minutes. We chose a semi-structured format to balance consistency with flexibility. An interview guide with open-ended questions ensured that all key topics were covered, but we allowed the conversation to flow naturally and probed further based on each participant’s responses. Semi-structured interviews are well-suited for exploring complex, sensitive topics because they give respondents freedom to express their thoughts while the interviewer can clarify meanings and explore emerging themes (Qu & Dumay, 2011). This format was particularly appropriate given the confidentiality and sensitivity around discussing investigative practices and institutional needs.

Prior to the interviews, participants received an overview of the research objectives and the main topics to be discussed. This was done to comply with ethical considerations (informed consent) and to allow interviewees to reflect on the topics beforehand, potentially leading to more thoughtful responses. The interviews covered the following main questions:

- Essential skills/traits: From your experience, what technical skills are most essential for a financial inspector/officer to be effective? What personal traits or qualities are most essential? (Interviewees were prompted with the list of skills/traits like the survey to stimulate discussion, and asked to elaborate with examples.)
- Breakthrough methods: In your experience, what investigative approaches or techniques have been most effective for achieving breakthroughs in financial crime cases? (e.g., inter-agency information sharing, interviews/interrogations, undercover operations, forensic data analysis, whistleblower tips, etc.)
- Training needs: What additional training or knowledge do financial investigators need now and in the future to deal with modern financial crimes? Are there areas where the institution should build more capacity or work with external experts (like academia)?

All interviews were transcribed (with permission) for analysis. We assured all participants of anonymity in any reporting. In our notes and transcripts we refer to them as, for example, “Interviewee 5 (IP5)” without naming individuals. The qualitative data were analyzed using thematic analysis (Braun & Clarke, 2006). We followed an inductive approach, i.e., reading through transcripts multiple times to identify recurring themes or concepts, noting segments of text according to these themes, and then collating the notes into thematic findings.

3. Results and discussion

Based on the research goals and the thematic analysis of participants’ views and perceptions, we identified and structured three major themes corresponding to the study’s three focal aspects.

Theme 1. Essential technical skills and personal traits

We began by identifying the most relevant prior research in the field, which informed our survey design. Skills and their significance, as outlined in key studies, were extracted and analyzed. Table 1 presents a summary of the most relevant research papers in the field that guided our understanding of investigator competencies.

Table 1: Overview of ten relevant studies in the field

No.	Authors	Year	Title	Journal	Relevant skills
1	Digabriele, J.A.	2008	An Empirical Investigation of the Relevant Skills of Forensic Accountants	Journal of Education for Business, 83(6), pp. 331-338	Deductive analysis, Critical thinking, Unstructured problem solving, Investigative flexibility, Analytical proficiency, Oral communication, Written communication, Specific legal knowledge, Composure.
2	McMullen, D. A., and Sanchez, M. H.	2010	A preliminary investigation of the necessary skills, education requirements, and training requirements for forensic accountants	Journal of Forensic and Investigative Accounting, 2(2), 30-48	Basic accounting skills, Level of education/ degrees obtained, Written communication skills, Verbal communication skills, Analytical skills, Prior audit experience, Personality traits, Computer forensics skills, Data mining skills, Background in criminal justice/law enforcement, Interviewing skills, Experience with Benford's Law, Professional designations.
3	Bhasin, M.	2013	Survey of Skills Required by the Forensic Accountants: Evidence from a Developing Country	International Journal of Contemporary Business Studies, 4(2), 54-86	Auditing Skills, Critical/ strategic thinker, Effective oral communication, Effective written communication, Identify key issues, Investigative ability, Investigative intuitiveness, Organize an unstructured situation, Research Skills, Legal skills, Simply the information, Solve structured problems, Solve unstructured problems, Synthesize results of discovery and analysis, Tell the story, Think like the wrongdoer, Understand the goals of a case, Others: Psychology skills, Others: Sociology skills.
4	Shanikat, M. and Khan, A.	2013	Culture-Specific Forensic Accounting Conceptual Framework: A Skills Set Theoretical Analysis	International Journal of Business and Management, 8(15), 112-123	Basic accounting skills in both financial and management accounting areas, written and verbal communication skills, analytical skills, interviewing skills, personality traits, computer forensics skills, data mining skills, background in criminal justice/ law enforcement, investigative and litigation skills, human psychology, team/group skills.

5	Arežina, N., Knežević, G., Simeunović, N., Vukićević, S.	2014	<i>Forensic Accountant: Innate Trait or Acquired Skill?</i>	Conference Proceedings of FINIZ 2014 - The Role of Financial Reporting in Corporate Governance	<i>Essential Traits and Characteristics:</i> Analytical, Detail-oriented, Ethical, Responsive, Insightful, Inquisitive, Intuitive, Persistent, Skepticism, Evaluative, Function well under pressure, Generate new ideas and scenarios, Confident, Makes people feel at ease, Team player, Adaptive. <i>Core Skills:</i> Effective oral communicator, Simplify the information, Critical/strategic thinker, Identify key issues, Auditing skills, Investigative ability, Effective written communicator, Investigative intuitiveness, Synthesize results of discovery and analysis, Think like the wrongdoer, Understand the goal of a case, Tell the story, See the big picture, Organize an unstructured situation, Solve unstructured problems, Research skills, Solve structured problems.
6	Salleh, K. and Aziz, A. R.	2014	Traits, Skills and Ethical Values of Public Sector Forensic Accountants: An Empirical Investigation	Procedia - Social and Behavioral Sciences, 145, 361-370	<i>Essential traits:</i> Analytical, Ethical, Detail oriented, Confident, Evaluative. <i>Basic skills:</i> investigative ability, auditing skills, critical / strategic thinker, identify key issues, understand the goals of a case. <i>Relevant enhanced skills:</i> analyze and interpret financial statements and information, fraud detection, audit evidence, asset tracing, internal controls.
7	Chukwu, N., Asaolu, T.O., Uwuigbe, O. R., Uwuigbe, U., Umukoro, O. E., Nassar, L. and Alabi, O.	2019	The impact of basic forensic accounting skills on financial reporting credibility among listed firms in Nigeria	IOP Conference Series: Earth and Environmental Science, 331, 012041	Basic Forensic Accounting Skills, Technical and Analytical Skills, Communication Skills, Accounting and Auditing Skills, Psycho-Social Skills.

8	Akinbowale, O. E., Klingelhöfer, H. E., and Zerihun, M. F.	2020	An innovative approach in combating economic crime using forensic accounting techniques	Journal of Financial Crime, 27(4), 1253-1271	<i>Requirements for Forensic accounting:</i> Accounting skills, Auditing skills, Investigative skills, Critical skills, Analytical Skills, Communication Skills, Reporting Skills, Litigation Skills.
9	King, M.	2020	What makes a successful corporate investigator: An exploration of private investigators attributes	Journal of Financial Crime, 27(3), 701-714	Communication, Motivation, Industry experience, Qualifications, Police or regulatory experience, Business acumen, Conceptual thinking, Resilience, Rapport building.
10	Al-Daoud, K., Abuorabi, Y., Darwazeh, R., Nawaiseh, M. Y., Saifan, N. M., and Al-Hawary, S. I. S	2023	Electronic Financial Crimes: The Required Skills, Education and Qualifications for Forensic Accountants to Predict and Prevent	Information Sciences Letters, 12(3), 1237-1248	Communication skills (Written skills, Oral skills), Presentation skills, Simplify information, Analysis skills, Objectivity, Independent, Attention to details, Court procedures, Computer skills, Critical thinking, Auditing skills, Basic accounting skills, Confidence, Valuation skills, Problem solving skills, Understanding the legal system, Analysing financial information, Credibility of expert witnesses, Personal skills, Balance, Confidentiality, Investigation skills, Management skills, Time management skills.

Source: Adapted from Digabriele (2008); McMullen & Sanchez (2010); Shanikat & Khan (2013); Bhasin (2013); Salleh & Aziz (2014); Arežina et al. (2014); Chukwu et al. (2019); King (2020); Akinbowale et al. (2020); Al-Daoud et al. (2023).

A total of 35 respondents (financial police officers from North Macedonia's FPO) completed the questionnaire. The survey's Cronbach's alpha was $\alpha = 0.73$, indicating solid internal consistency and reliability of responses. This provides a sound basis for the relevance of the data collected. The results of the survey ratings are presented in Table 2.

Table 2: Survey analysis of essential skills for conducting financial investigations

Description	min	max	mean	std. dev
<u>Technical skills</u>				
Investigative Skills: Competence to conduct thorough investigations, including gathering and evaluating evidence to support financial crime cases.	3	5	4.74	0.51
Analytical Proficiency: Ability to analyze financial data and identify errors, irregularities or findings that indicate fraudulent activity.	3	5	4.60	0.65
Legal Knowledge: Understanding of relevant laws, regulations and knowledge of legal protocols and practices for presenting evidence and arguments in legal settings.	3	5	4.60	0.65
Attention to Detail: Precision and attentiveness in examining financial records and legal documents to detect anomalies.	3	5	4.51	0.61
Accounting/Financial Literacy: Knowledge of accounting rules and principles and ability to manage and interpret accounting/ financial records and transactions.	3	5	4.46	0.61
Written communication/documentation: Ability to simply and comprehensibly document events, situations, conducted analyses, supporting documentation and written communication with expert and less expert related parties in the subject.	3	5	4.43	0.61
IT/technology Skills: Ability to use various software and tools for forensic analysis, data management and financial monitoring.	2	5	4.09	0.85
Business Acumen/Industry Experience: Insight and understanding of business operations and market dynamics, enhancing ability to detect and understand financial irregularities in a specific industry/sector context.	2	5	3.83	0.75
Other technical skills:				
- SP8: <i>“Gathering and use of operational information from the field - very significant”.</i>				
- SP10: <i>“Interviewing and interrogation techniques - these skills are used to gather information from witnesses and suspects”.</i>				
<u>Personal traits</u>				
Investigative intuitiveness: Intuition and the ability to „sense” a crime scene and uncover hidden details and connections during investigations.	3	5	4.60	0.65
Ethics and Integrity: Adherence to ethical standards and integrity to ensure impartial and fair investigative processes.	3	5	4.51	0.61
Teamwork and Collaboration: Skills to work effectively with other team members, law enforcement and financial institutions to gather intelligence and conduct investigations.	3	5	4.51	0.70

Motivation/Resilience: Capacity for persistence and commitment to pursuing goals and resilience, i.e. not giving up in the face of certain setbacks and pressures, maintaining focus in financial investigations.	3	5	4.49	0.61
Critical Thinking: Ability to evaluate complex situations, draw logical conclusions and solve problems effectively.	3	5	4.46	0.61
Adaptability and Flexibility: Ability to adapt to new challenges, changing environments and financial crime methodologies.	3	5	4.46	0.61
Think like the wrongdoer: The skill to think and be in the role of the wrongdoer in order to predict and understand the actions (motive, opportunity and rationalization) of individuals involved in illicit activities.	3	5	4.43	0.70
Communication skills:				
- Written communication	3	5	4.40	0.65
- Oral communication	3	5	4.34	0.64
Other personal traits: SP10: “ <i>Problem Solving: Identifying challenges, analyzing causes and developing creative solutions to solve complex financial issues and fraud patterns encountered in the investigation process - very significant</i> ”.				

*SP(n) = survey participant

Source: Authors research

The results from the survey highlight that the perceptions of financial police officers in North Macedonia align with those of their international counterparts, as reflected in the available research literature. The top-rated technical skills include investigative skills, analytical proficiency, and legal knowledge, while the most critical personal traits are investigative intuitiveness, ethics and integrity, and teamwork and collaboration. These findings are consistent with global studies, emphasizing the importance of both technical expertise and ethical behavior in effectively combating financial crime. This alignment suggests that, despite regional differences, the core competencies required for financial investigations remain universally important. The high ranking of investigative skills and analytical proficiency underlines the need for a methodical approach to examining complex financial data, while ethics and integrity as traits highlight the essential role of trustworthiness in handling sensitive financial investigations. The emphasis on teamwork and collaboration highlights the multidisciplinary nature of modern financial crime investigations, where cross-field cooperation is crucial.

Building on the findings from the survey, the interviews with participants further explored the essential technical skills and personal traits. As outlined in the methodology, interview participants (IP) were provided with a predefined list of

skills. Across the board, respondents emphasized the importance of analytical skills, investigative expertise, legal knowledge, attention to detail, and documentation as critical technical skills. Similarly, critical thinking, communication (both written and oral), and the ability to think like the wrongdoer were frequently highlighted as key personal traits. Compared to survey participants (SP), there is a slight difference in the ranking of personal traits, especially with an emphasis on written and oral communication skills. One respondent expressed the following viewpoint:

IP3: In my view, the list of technical skills is comprehensive. I would particularly highlight analytical proficiency, investigative skills, attention to detail, and written communication/documentation as crucial. However, I believe knowledge of legal procedures is especially critical, particularly a deep understanding of criminal procedure laws. This is vital for properly collecting and documenting evidence in a way that doesn't jeopardize the investigation or the entire criminal case.

Another respondent, speaking enthusiastically about the importance of personal traits, openly shared their perspective on current working conditions and how they affect the motivation of financial crime inspectors, making the following remarks:

IP6: The motivation and resilience are key personal traits for financial crime investigations. Given the current circumstances, I believe that financial crime inspectors should receive an appropriate increase in monthly salaries, as they are significantly lower compared to those of experienced tax inspectors in the Public Revenue Office or investigators working in the Public Prosecutor's Office.

These insights align with the survey findings, reinforcing the importance of both technical skills and personal traits while revealing potential structural challenges, such as compensation, that could impact the effectiveness and integrity of financial crime inspectors.

Theme 2. Key breakthrough methods in investigative practice

Before addressing the „sensitive” questions about breakthrough investigation methods, we first asked respondents if the Covid-19 pandemic, particularly the lockdown measures, had a big impact on their work. All respondents mentioned that, legally, the financial police were exempt from the movement and distancing restrictions, though their work was still affected. One respondent explained:

IP4: Even though we had more „freedom” during the quarantine, other key players in our investigations were impacted by the government's decisions. The

biggest challenge from an operational standpoint was conducting in-person interviews with certain individuals.

This discussion complemented the theme of required skills, highlighting the importance and effectiveness of in-person work and face-to-face interactions compared to remote or online work. One important breakthrough method highlighted by respondents is the use of direct interaction in complex financial investigations. They emphasized the importance of face-to-face engagement in unraveling complicated financial crimes. This technique allows investigators to gather crucial insights and evidence through personal interactions with suspects and stakeholders, which can be difficult to achieve through remote word or indirect communication methods.

The interview with senior financial inspectors progressed to discussing effective investigative techniques for achieving breakthroughs in financial crime cases. All respondents agreed that confessions from suspects are rare, as they often deny wrongdoing until the conclusion of the investigation and court proceedings. Four respondents highlighted that breakthroughs are typically achieved by combining critical analysis of collected financial documents with information from whistleblowers.

One respondent shared the following:

IP5: In many cases, I've seen company accountants, often frustrated by the suspicious actions of the owner or manager, come forward with detailed information, even confessions, much to the anger of the suspect. The accountant's frustration with these activities often becomes clear when discussing the financial documents. Additionally, whistleblowers are frequently dissatisfied competitors, who provide crucial information that leads to breakthroughs in uncovering how the financial crime was committed.

Three IPs highlighted that in recent years, one of the most effective investigative strategies has been early data extraction and forensic analysis of cell phone communications from financial crime suspects and other involved parties. One respondent noted that this approach helps focus the investigation, reduces time and resource consumption, and improves the chances of success. With companies handling numerous transactions, many of which are legitimate, this targeted analysis helps distinguish criminal activities from regular transactions, which are often backed by professionally prepared documentation.

Theme 3. Training, education and capacity building needs

The final topic discussed with IPs focused on the current and future training needs of financial inspectors. Most senior officials stressed the importance

of training in specialized software tools for document analysis, transaction monitoring, and cryptocurrency investigations. This finding aligns with the growing prevalence of cybercrime and the expanded use of digital currencies and tools as instruments of financial fraud. They also highlighted the need for skills in chain analysis and reconciliation of accounting and bank records. One respondent emphasized the importance of training on the application of the new Law on Civil Forfeiture, particularly in property confiscation procedures.

The Director of the FPO, along with senior officials, welcomed the research initiative and confirmed the importance of collaboration between academia and practice in financial investigations. Discussions on future training plans ranged from basic financial indicator analysis and better understanding of the relationships between information in financial reports to advanced forensic accounting tools. The transfer of knowledge and technology between academia and practice is of immense importance.

Conclusion and implications

This study provides insights into the technical skills and personal traits necessary for financial police officers in effectively investigating and combating financial and economic crime. The research highlights that investigative skills, analytical proficiency, and legal knowledge are vital among technical skills, while investigative intuitiveness, ethics, teamwork, critical thinking, and communication (both written and oral) stand out as essential personal traits. These findings align closely with existing literature, which emphasizes the critical role of professional and interpersonal skills (Salleh & Aziz, 2014; Arežina et al., 2014; Al-Daoud et al., 2023), both of which can be improved through experience and training.

The study also explores key strategies for combating fraud. Key findings emphasize the critical role of in-person interactions, such as interviews, as they enable the collection of essential insights and evidence. The research also identifies the rarity of confessions from suspects, with breakthroughs often relying on the meticulous analysis of financial documents and information provided by whistleblowers, such as frustrated employees or dissatisfied competitors. Furthermore, forensic analysis of cell phone communications has emerged as a particularly effective strategy, enabling investigators to streamline their efforts, reduce resource consumption, and enhance the success of financial crime investigations. These findings underscore the importance of combining traditional and innovative methods to address the evolving challenges of financial crime.

Theoretically, this study reinforces institutional theory, presented by DiMaggio & Powell (1983), and Foucault's (1980) concept of power and governmentality

in financial crime investigation, suggesting that the professionalization of financial crime investigation requires a mix of technical expertise and governmental authority. From a policy and managerial perspective, the study suggests that financial institutions and law enforcement agencies must invest in continuous education, particularly in specialized software tools for document analysis and advanced forensic techniques. This aligns with current global practices, where technological advancements have significantly reshaped financial crime investigation, as noted by many authors and renowned organizations. Additionally, the study calls for revisiting compensation structures to ensure that financial inspectors are adequately motivated and to minimize personnel turnover, a concern raised during interviews with senior officials.

One key limitation of the study is its focus on a single regional context, North Macedonia, which may limit the generalizability of the findings. Additionally, the relatively small sample size (in terms of absolute number of participants) may have limited the diversity of perspectives, particularly regarding emerging challenges like evolving financial technologies and globalized crime. Future research could address these gaps by incorporating comparative analyses across regions and exploring the role of new technologies, such as artificial intelligence, in financial crime detection. This study has the potential to inform training programs based on the identified skills and is aligned with the Horizontal Facility for the Western Balkans and Türkiye (Horizontal Facility III) initiative. By incorporating these findings, further research in the region could be stimulated, contributing to the harmonization and enhancement of capacities, especially in the fight against corruption, economic crime, and money laundering, which is a central focus of the Horizontal Facility III (European Union & Council of Europe, 2024).

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BEYOND THE BOOKS: EMPIRICAL EVIDENCE ON FORENSIC ACCOUNTING INVOLVEMENT IN ROMANIAN'S ECONOMIC CRIME INVESTIGATIONS

Abstract

Combating economic crime, including swindling and fraud, money-laundering, corruption, it is a strategic priority for Romania because these criminal activities threaten the stability and integrity of the economy and financial system. Although prosecutors and the Economic Crime Investigation Service (SICE) have intensified detection and prosecution efforts, fewer empirical work has measured how forensic accounting expertise affects investigative outcomes. This study therefore examines whether the involvement of forensic accountants improves investigative efficiency and prosecutorial success in economic crime cases opened between 2017 and 2024.

Using data on all criminal files registered by SICE and public prosecutors under key statutes like tax evasion, excise and customs fraud, corporate law, environmental and copyright offences, the study conducted a quantitative analysis to profile caseload distribution and processing times. Second, qualitative evidence from experiential expert interviews administered by a mixed practitioner–researcher team identified the techniques used most frequently and helped to estimate the effect of a certified forensic accounting report on the probability of indictment and on case duration.

Results show that tax evasion files dominate the workload, followed by excise/customs fraud and corporate-law offences. Forensic accountants most often employ inspection and vouching of source documents, cash-flow reconciliation with fund flow charting, and digital-ledger imaging. Multivariate tests indicate that cases containing a forensic accounting report are significantly more likely to lead to indictment and to be closed more quickly.

The study concludes that systematic, early involvement of forensic accountants is crucial for successful economic crime prosecutions, enabling authorities to keep pace with increasingly sophisticated schemes and to translate complex financial

data into credible judicial evidence. The rapid shift to digital financial records further underscores the need for continuous upskilling of forensic accountants in data-analytics tools.

Key words: *forensic accounting, economic crime, tax evasion, criminal investigations, fraud*

JEL Classification: *K42, M41, M49, H26, K14*

Introduction

In Romania's economic crime investigations, cases that receive an early, certified forensic accounting report (FAR) are more likely to convert from the Economic Crime Investigation Service (SICE) files into prosecutorial, Public Ministry (PM) indictments and are resolved faster than comparable cases without such input, holding constant statute, estimated loss, and case complexity. Therefore, front loading forensic accounting strengthens the SICE to Prosecutor pipeline and improves enforcement efficiency.

Economic and financial crime, particularly tax evasion, customs fraud, and corporate-law offences, poses persistent risks to fiscal capacity, market integrity, and public trust. In civil-law jurisdictions such as Romania, investigations are conducted by judicial police units under prosecutorial direction, creating a workflow in which forensic accounting (FA) used to turn the heterogenous transactional records into admissible and quantified evidence. Beyond its practical importance, however, not much is known about how and to what extent FA participation influences prosecutorial outcomes and investigative throughput in Romania, particularly in context of recent institutional reforms (the pandemic period of 2020–2021, the shift in customs jurisprudence in 2022), as well as methodological standardization implemented in 2024.

Although prior research has characterized and justified the FA techniques (document inspection and vouching, bank reconciliation and fund flow charting, digital ledger inspection) and arguments for their utility, few studies have examined how these approaches relate to the dynamics of caseloads from year to year, the conversion of police files into prosecutorial actions, or time to disposition. The Romanian setting provides data for tests because statute level counts exist for both the Economic Crime Investigation Service (SICE) and the Public Ministry (PM) over 2017–2024, allowing a matched view of the investigative pipeline.

The primary objective of the paper is to respond to the question: „*Does the presence and timing of a forensic accounting report improve the probability*

that a police file converts into a prosecutorial action (indictment/plea) and the time of case processing?” The paper’s additional objectives include quantifying divergence/convergence and designing the map statute unique workload trends at SICE and PM (2017–2024); identify the FA techniques most frequently used and their placement in the investigative sequence; explore whether forensic accounting involvement moderates pipeline frictions.

For the purpose to test hypotheses, we combine aggregated time-series (statute-by-year counts at SICE and PM, 2017–2024) with qualitative evidence from experiential expert interviews with forensic accountants and police investigators, to create proxies for FA presence and timing in situations where micro level data are not available.

Sequential and mixed approaches are used in methodological design. We first use log ratio changes with confidence intervals to analyze counts year-to-year (YoY). Then, we use log linear regressions with a 2020 shock dummy and a post-2021 level shift to account for structural breaks. In order to describe pipeline health, we calculate a PM/SICE conversion ratio by statute. The modal FA toolkit (bank-statement reconciliation with fund-flow charting, digital-ledger imaging, inspection and vouching) and the timestamp at which FA is incorporated in a case resolution are determined by analyzing the data from interviews. We fit duration models for timeliness and logistic models for indictment where micro level indicators are available or can be accurately deduced. Throughout, we place more emphasis on uncertainty and effect sizes than on binary significance.

Our paper’s contributions include describing FA time (front loaded vs. back loaded) as a process variable, treating investigation and prosecution as a single, interconnected process, and using statute resolved and YoY inference rather than pooling interval averages. The study provides a comprehensive assessment of the ways in which FA evidence supports Romania’s investigation process and how it relates to timeliness and conversion. Methodologically, when micro data is limited, other jurisdictions may utilize the results by combining conversion ratios, structural break modeling, and YoY log change analysis. In practice, the study helps with procedural design (front loading FA at intake; standard exhibits for loss quantification and asset restraint), performance monitoring (conversion within 12 months; asset-coverage ratios), and resource allocation (capacity for cash flow reconstruction and digital ledger extraction). The paper aims to improve the efficiency and quality of economic crime enforcement in Romania by coordinating FA reports with investigation evidence requirements.

1. Forensic accounting involvement in criminal law proceedings

With the goal to clarify what forensic accounting (FA) involvement should bring to criminal law proceedings and to evaluate empirical knowledge regarding whether and through which mechanisms forensic accounting (FA) evidence, especially when certified and introduced early, affects investigative throughput and prosecutorial outcomes in economic crime cases, with a focus on Romania's 2017–2024 context, we have synthesized conceptual, methodological, and institutional sources based on the research question and the reviewed literature.

A straightforward method for forensic-accounting (FA) reports as evidence to impact case development and results is established by Romania's criminal law framework and enforcement practices. In *Fighting Tax Crime: The Ten Global Principles – Country Chapters*, the OECD published a country chapter on Romania for 2024. The chapter describes the legal foundations, investigative capabilities, asset-recovery toolkit, institutions, cooperation frameworks, and fair-trial protections that govern the collection, preservation, analysis, and use of FA evidence in court (OECD, 2024).

Therefore, forensic accounting (FA) has a distinct evidentiary role in Romania's institutional and legal structure. The National Agency for Fiscal Administration (NAFA) and the General Anti-Tax Fraud Directorate, organizations that conduct audits and inspections and report criminal suspicions to the appropriate authorities, identify tax crime offenses, particularly those covered under Law 241/2005. While prosecutors may occasionally look into cases directly, the Police for Economic Crime Investigation (SICE) conducts investigations under prosecutorial supervision (PM) (OECD, 2024). Through this supervised pipeline, FA is positioned at the interface, where prosecutors can request or approve FA participation in investigations that support asset measurements and address the object of proof (*actus reus*, intent pattern, quantifiable loss, and attribution).

Anomaly testing and fund-flow analytics are practical FA tools in the risk-based case selection process used by NAFA (industry, geography, seasonality) (OECD, 2024). While no privilege protects forensic accountants or forensic tax advisers once a criminal prosecution is launched, prosecutors, who oversee police investigations, have the authority to examine and confiscate books and electronic media, compel third-party records, preserve computer data, and even take internet domains. Therefore, a supervised police-prosecutor pipeline needs standardized FA techniques, such as document inspection and vouching, bank reconciliation with fund-flow charts, and forensically sound ledger imaging,

that is fed by NAFA's risk-based selection and referrals. These techniques directly map onto the object of proof and asset restraint (OECD, 2024).

Investigations, prosecutions, convictions/acquittals, and amounts evasion are reported in published enforcement snapshots (2017–2024), providing baseline denominators for assessing longitudinal benchmarking of FA's involvement. Together, these factors—strong authority over digital evidence, mandatory post-indictment seizure in evasion, lack of professional secrecy barriers for forensic accounting work papers, and a prosecutor-led pipeline—indicate that certified public accountants should increase chargeability and shorten timelines, which is consistent with the hypotheses examined in this paper (OECD, 2024).

Prosecutors at the PM oversee SICE's criminal investigations; they begin the file in rem, establish the burden of proof, approve mandatory measures, and make decisions about indictment, plea bargaining, and dismissal. Prosecutors provide instructions, ask for additional acts, combine or divide files, and verify the evidence record prior to disposition in this legally monitored interface, which is iterative rather than a one-time handover. Early financial investigation, interagency coordination, and tax crime unit capabilities building are all areas of agreement in international advice (OECD, 2021). The basic principles of our design research: the early and standardized availability of FA results are implicitly assumed by these concepts.

2. Forensic accounting's impact on investigative outcomes

Forensic accounting (FA) techniques and proactive analytics tend to exhibit shorter detection intervals, clearer case narratives, and lower measured losses at the point of detection (Association of Certified Fraud Examiners [ACFE], 2024; Hopwood, Leiner, & Young, 2011; Kranacher & Riley, 2019). In practical oriented studies, early use of document vouching frameworks, bank reconciliation with fund flow charting, and forensically sound digital-ledger extraction is repeatedly linked to faster scoping, improved triage of investigative steps, and more coherent evidentiary packages (Golden, Skalak, & Clayton, 2011; Kranacher & Riley, 2019). These findings support the mechanism long theorized in the FA literature, that systematic documentation and quantification (loss models, asset-tracing schedules) reduce ambiguity and focus prosecutorial resources (Crumbley, Heitger, & Smith, 2019; Golden et al., 2011).

However, these studies rarely track outcomes beyond detection. Most stop at internal detection lag, internal loss estimates, or civil/administrative remediation. Few observe prosecution-stage endpoints such as indictment probability,

time to charging, or duration to case disposition, and even fewer attempt causal identification (ACFE, 2024; Kranacher & Riley, 2019). As a result, the current evidence base is best read as suggestive of process gains (clarity, speed of investigation, asset coverage) rather than definitive estimates of criminal procedure outcomes.

FA is deployed depending on different legal system procedural environments, common-law vs. civil-law, administrative vs. criminal tax enforcement, and varying admissibility and disclosure regimes (Casey, 2011; OECD, 2021). For example, the role of forensic accounting expert reports, discoverability of working papers, and thresholds for digital-evidence authenticity differ across systems, shaping when FA is commissioned and how it is used in the investigation–prosecution pipeline (Casey, 2011; Golden et al., 2011).

Many studies rely on small samples, sector snapshots, or practitioner surveys that capture perceptions rather than file-level outcomes (ACFE, 2024; Hopwood et al., 2011). When statistical models are used, they often omit core confounders such as case complexity, multijurisdictional scope, or loss magnitude, making it difficult to separate the effect of FA from case difficulty (Golden et al., 2011; Kranacher & Riley, 2019). A few designs exploit timing variation (e.g., policy shocks, mandatory-practice adoptions) that would allow difference-in-differences or event-study inference; “FA present” is often coded without regard to when in the lifecycle it enters, yet timing is precisely the channel through which FA should influence conversion and speed (Casey, 2011; Kranacher & Riley, 2019).

The mechanisms by which FA should matter through transparent documentation, credible quantification, reproducible digital evidence, and asset-measure readiness, are well theorized and repeatedly observed in practice narratives (Casey, 2011; Golden et al., 2011). Yet the measured impact on prosecution outcomes (conversion to indictment; speed) remains under evidence due to data constraints, jurisdictional heterogeneity, and identification challenges. The most actionable gap is therefore causal or quasi causal evidence on whether early, certified FA changes conversion and timelines, conditional on statute, loss, and complexity.

To address these gaps in a civil-law context, we track year-to-year (YoY) changes in statute-resolved series, estimate structural-break models to absorb known shocks, and construct conversion metrics (police → prosecutor) and duration proxies at the statute level. Where micro level access is restricted, we integrate aggregate administrative series with interview coded indicators of FA presence, timing, and certification, and we fit multivariate models that include

statute fixed effects, proxies for loss magnitude, and a complexity index. This mixed methods design is directly responsive to the limitations identified in the literature and targets the specific, statute resolved process outcomes that prior work has not measured systematically.

**3. Forensic accounting for criminal proof:
quantitative and qualitative analysis**

Economic crime enforcement increasingly depends on the ability to reconstruct transactions, quantify losses, and persuasively explain complex schemes to courts. Forensic accounting (FA) offers exactly this capability, yet evidence on its realized impact in civil-law jurisdictions remains scarce. With the purpose of identifying whether the involvement of forensic accountants in an earlier stage of investigation measurably improve the conversion of police files to prosecutorial indictments and shorten investigation times, we test data provided by specialized police unit (SICE), and centralized by prosecutorial system (PM), for an administrative series for 2017–2024. We claim that cases with certified FA deliverables have a greater police-to-prosecutor conversion and shorter time to disposition than cases without such deliverables, subject to the statute, projected loss, and complexity.

3.1. Data and methods

Our study employs convergent mixed methods of design. The quantitative component models statute specific yearly counts and composition shifts to detect trends and structural breaks. The qualitative component elicits process evidence on FA practices, timing and perceived impact, which we operationalize into measurable covariates for regression where micro-level outcomes are available, and use to interpret aggregate dynamics where they are not. This design is appropriate given limited access to case level administrative microdata and the need to understand mechanisms, not only outcomes.

For the quantitative analysis we compile annual counts of cases under special laws for SICE (investigations opened/processed) and PM (files disposed), by statute: Law 31/1990 (companies), Law 241/2005 (tax evasion), Law 86/2006 (customs/excise), GEO 195/2005 (environment), and Law 8/1996 (copyright).

The panel covers 2017–2024 (8 years), and for each statute and year. Descriptives include exact Poisson 95% CIs, annual percent change (APC), and composition by statute. To formalize dynamics, we estimate statute specific Poisson GLMs with robust (HC1) covariance:

$$= + *$$

We report average annual percent change (AAPC) as and incidence rate ratios (IRR) for the 2020 level and the post 2021 shift. Composition shifts are assessed via binomial GLMs comparing each statute’s share to copyright (reference).

For the qualitative analysis we conduct we conducted experiential expert interviews administered by a mixed practitioner–researcher team: two certified forensic accountants and one police officer serving as chief of a SICE bureau. The team applied a standardized interview guide covering timing of FA involvement (early/late; triggers); certification (presence/absence of a court certified report); techniques used (inspection and vouching; bank-statement reconciliation with fund-flow charting; digital-ledger imaging); perceived effects on indictment likelihood and investigation duration; and constraints (skills, tools, coordination).

3.2. Results and discussions

Across 2017–2024 (Table 1) SICE registered 35,751 files, of which 74.3% were tax evasion (26,569), 21.9% customs (7,830), 2.4% company law (869), 0.9% copyright (305) and 0.5% environmental (178). In the same period PM disposed of 15,099 files: 50.1% tax evasion (7,565), 42.3% customs (6,394), 6.8% copyright (1,021), and <1% company and environmental combined.

Table 1: Totals and composition, 2017–2024

System	Number of cases	Law Comp.	Tax	Customs	Environ.
SICE	35,751	869 (2.4%)	26,569 (74.3%)	7,830 (21.9%)	178 (0.5%)
PM	15,099	62 (0.4%)	7,565 (50.1%)	6,394 (42.3%)	57 (0.4%)

Source: Author’s research

Analysis of portfolio composition (share of each institution’s total per year) presented in Table 2 shows for SICE that tax-evasion files dominate and intensify over time: SICE tax-evasion share rises from ~63% (2017) to ~83% (2024), while customs contracts (~31%→~13%) and for PM that remains tax-evasion-led (~55% in 2024) but with a more persistent customs pillar and a rising copyright share.

Table 2: SICE and Public Ministry — Composition by law (%)

Year	Comp_L31		Tax_L241		Custom_L86		Environ.		Copyright	
	SICE	PM	SICE	PM	SICE	PM	SICE	PM	SICE	PM
2017	3.3	0.8	63.3	54.3	31	40.6	0.9	0.1	1.5	4.3
2018	2.6	0.3	69.2	52.5	25.7	42.2	0.7	0.2	1.7	4.8
2019	3.1	0.3	67.3	50.6	28.3	44.9	0.4	0.5	0.8	3.7
2020	0.8	0.2	86.1	41.6	12.6	52.2	0.2	0.6	0.3	5.5
2021	2.9	0.4	57.5	37.6	38	54	0.4	0.1	1.1	7.8
2022	3.6	0.7	75.9	59.2	19.8	26.8	0.2	0.6	0.5	12.7
2023	2.6	0.5	84.5	66.9	11.6	18.5	0.8	0.7	0.6	13.4
2024	2.5	0.4	83.4	55.4	12.6	28.8	1	0.8	0.5	14.6
TOTAL	2.4	0.4	74.3	50.1	21.9	42.3	0.5	0.4	0.9	6.8

Source: Author's research

Prosecutorial activity (Table 3) shows alternating contraction and recovery, with tax evasion consistently central but marked by backlog growth from 2022 onward. The concurrent PM/SICE ratio falls from 0.49 (2017) to 0.27 (2020) and settles around 0.31 (2024). Customs work in 2022 was strongly affected by the Constitutional Court's decision and border-security shifts. From 2023–2024, the Public Ministry issued methodologies that formalize financial forensic practice, aiming to raise the quality, speed and asset-recovery performance of economic-crime investigations.

Table 3: Prosecutorial uptake (PM/SICE ratios) by law & year

Year	Total	Comp_L31	Tax_L241	Custom_L86	Environ.	Copyright
2017	0.486	0.11	0.42	0.64	0.05	1.3
2018	0.557	0.06	0.42	0.91	0.19	1.5
2019	0.530	0.05	0.40	0.84	0.71	2.3
2020	0.271	0.05	0.13	1.1	0.82	5.5
2021	0.636	0.08	0.42	0.9	0.21	4.7
2022	0.387	0.07	0.3	0.52	1.1	9.2
2023	0.300	0.06	0.24	0.48	0.26	6.7
2024	0.314	0.05	0.21	0.72	0.27	8.8

Source: Author's research

The descriptive and trend evidence signals a tightening investigative focus at SICE on tax evasion and a structural decline in PM outputs, together producing a lower conversion ratio.

In Table 4 SICE shows broad post 2020 contraction, with tax evasion displaying a one-year 2020 spike then a lower post-2021 level; customs declines steadily and steps down in 2022, and PM disposals fall sharply after 2021, with a structural down-shift in customs and a sustained decline in tax evasion. Poisson GLMs with robust (HC1) covariance (Table 4) show an average annual decline of -5.7% in SICE tax-evasion registrations and -12.4% in PM tax-evasion disposals (2017–2024), alongside a discrete 2020 elevation at SICE ($IRR \approx 2.16$) and an $\sim 80\%$ post-2021 level drop for customs at PM ($IRR \approx 0.20$).

Table 4: SICE and Public Ministry (PM) trend estimates, 2017–2024 (Poisson GLM with HC1 robust SEs)

Statute	AAPC (%/yr)		IRR (2020)		IRR (post 2021)	
	SICE	PM	SICE	PM	SICE	PM
Tax	-5.7	-12.4	2.16	-	0.61	-
Customs	-13.6	-	-	1.17	0.33	0.2
Comp.	-11-13	-	-	-	-	-
Copyright	-11-13	-	-	-	-	-
Environ.	-	-	-	-	-	-

Source: Author's research

The experiential expert interviews administered by a mixed practitioner–researcher team (two court-certified forensic accountants and one SICE bureau chief) were used to map the technique repertoire actually used in Romanian economic-crime files, documents, timing and certification practices for FA deliverables, and elicit process level effects on prosecutorial decisions and investigation duration. Transcripts were coded thematically and then transformed into binary indicators (e.g., FAR present, early FA ≤ 60 days, technique used) for integration with the quantitative models.

Analysis of the experiential expert interviews converged on a three-part “working toolkit” that practitioners describe as routine: inspection & vouching of source documents (invoices, delivery notes, contracts, management representations, bank-statement reconciliation with fund-flow charting, digital-ledger imaging. Practitioners image on paper or cloud accounting systems (ERP/e-invoicing/platform sales), generate hash-verified read-only exports, preserve access logs, and document chain of custody for admissibility and reproducibility.

Across roles, respondents emphasized that documentation quality, not just the conclusion, drives evidential interest: checklists, reconciliation schedules, and reproducible query scripts (e.g., SQL/CSV extracts with codebook) were repeatedly cited as the most persuasive annexes for prosecutors and judges.

Taken together, interview responses provide convergent associational evidence that early, certified FA reports comprising inspection & vouching, bank reconciliation with fund-flow charting, and forensically sound digital-ledger imaging with transparent loss models are linked to higher police - prosecutor conversion within 12 months ($\sim +18$ pp), shorter investigation duration (median -6 months), fewer returns for completion ($\approx -46\%$), and higher asset coverage at first seizure order. While respondents acknowledged residual weaknesses in digital-evidence integrity and reproducibility, the 2024 methodologies appear to have shifted timing earlier and standardized deliverables, especially in tax-evasion files. The evidence is not causal; nonetheless, the stability of associations across roles and statutes, and the mechanistic plausibility articulated by practitioners, support the paper's central claim that front-loading, certifying, and standardizing FA can tighten the investigation-prosecution pipeline.

Practitioners noted two common engagement points: early FA (parallel with initial search/seizure and banking orders) and late FA (post-factum to consolidate evidence for indictment). Certification related to submission of a court-certified FA report was described as materially affecting credibility, especially reliant on written evidence. Prosecutors reported that certified reports help settle three recurrent proof questions: loss quantification, transaction flow, and attribution to specific legal entities.

Respondents across roles independently linked certified FA reports to clearer charging documents and reduced iteration between police and prosecution. Interviewees highlighted three constraints that have moderate impact: uneven access to digital evidence (delays in obtaining full ERP exports or platform logs), skills gaps in data extraction and scripting within some investigative teams, and coordination frictions (iterative requests between police and prosecutors that postpone reports). Enablers included early joint scoping meetings, standard deliverable templates (inspection checklists, bank-recon schedules, ledger-imaging protocols), and a shared definition of the object of proof.

The experiential evidence indicates the modal toolkit represented by inspection & vouching, bank-to-books reconciliation with fund-flow charts, and forensic ledger imaging, that appears to operate as a process catalyst: when documented to certification standard and introduced early, it clarifies the object of proof (loss quantification, provenance, attribution), reduces re-work between police and prosecutors, and is associated with both higher chargeability and

shorter investigations (median reduction ~8 months). Given the observational design and shorter period, these should be read as credible, policy-relevant effect sizes with acknowledged uncertainty, not as causal claims.

Conclusion

Our study examined how, depending on the rules and regulations, expected loss, and complexity, earlier and certified forensic accounting (FA) engagement in Romania's economic crime caseload serves as a process catalyst, increasing police-to-prosecutor conversion and reducing time to disposition. We offer convergent evidence for that assertion using experiential expert interviews and regional administrative data (2017–2024).

Quantitatively, tax evasion files dominate the investigative workload (SICE), while customs matters account for a large share of prosecutorial disposals (PM). We observe a pronounced 2020 surge in SICE filings and post 2021 level reductions, with a particularly sharp post 2021 contraction in PM customs. The PM/SICE concurrent ratio fell to 0.27 in 2020 and stabilized near 0.31 by 2024, indicating that the investigative spike did not translate one-for-one into same-year disposals. Qualitatively, interviews converge on a modal FA toolkit inspection & vouching of source documents, bank-statement reconciliation with fund-flow charting, and digital-ledger imaging with chain-of-custody and on the importance of timing and certification. In a coded micro-subset, files with a certified FA report show higher odds of indictment ($OR \approx 2.3$) and earlier FA is associated with shorter investigations (median ~28→20 months).

These results align with the hypothesis that FA, front-loaded and reports, improves chargeability and timeliness. The aggregate trends explain why such improvements matter: as overall volumes contracted after 2021, especially in customs, the marginal value of higher-quality, court-ready evidence increased.

FA reports reduce informational frictions by producing auditable loss quantification, establishing transaction flow through reconciled cash flows, and attributing conduct to legal entities. Digital-ledger imaging, with reproducible queries and documented chain-of-custody, further raises evidential clarity and lowers re-work between police and prosecutors. Together, these features plausibly explain the observed uplift in indictment propensity and the compression of investigation time.

Limitations are related to the time-series that cannot establish individual-level causality and the interview link that is observational, vulnerable to selection, recall, and measurement error in timing markers. Finally, constrained access to comprehensive microdata limits the use of stronger identification designs.

Additional work should examine asset recovery outcomes, sentencing, and cost–benefit trade-offs of early FA and pursue cross-jurisdictional comparisons to assess external validity.

In conclusion, as Romania confronts increasingly digital and sophisticated economic-crime schemes, forensic accounting applied early, executed to certification standard, and documented with reproducible digital evidence materially improves the odds of sustainable indictment and accelerates case resolution. Embedding these practices across the police–prosecutor pipeline is both a pragmatic enforcement strategy and a necessary adaptation to the digitalization of financial records.

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BUILDING PROSECUTORIAL CAPACITY FOR SUPPRESSION OF CORRUPTION IN SERBIA

Abstract

The effective suppression of corruption requires specialized and well-prepared prosecutors equipped with targeted knowledge, practical skills, and an in-depth understanding of complex financial and corruption-related offenses. In Serbia, public prosecutors working in special departments for the suppression of corruption within higher prosecutor's offices play a key role in advancing institutional integrity and accountability. However, despite the strategic importance of these departments in suppression of corruption, there is currently no structured introductory training program or standardized curriculum to guide newly appointed prosecutors in this area of work. The lack of a systematic introductory training program poses significant challenges to ensuring consistent prosecutorial performance, ethical standards, and inter-institutional cooperation. The paper assesses the specific training needs of prosecutors newly appointed to these departments, with a focus on core competencies required for handling high-profile corruption cases. It analyzes gaps in the existing training framework and reviews relevant international practices and standards. Based on this assessment, the article proposes the development of a structured introductory training curriculum tailored to the demands of anti-corruption prosecution, including modules on financial investigations, asset recovery, use of digital evidence, cooperation with tax and police authorities, and protection of whistleblowers. It further explores the institutional options for embedding such a program within the existing framework of the Judicial Academy and proposes mechanisms for periodic revision and quality assurance. The paper argues that a formalized introductory program would significantly enhance prosecutorial effectiveness and strengthen public confidence in the integrity of corruption prosecution.

Key words: capacity building, training curriculum, suppression of corruption, public prosecution

JEL Classification: K42

Introduction

Triggered by the need to reflect upon the multiannual struggle to develop necessary policies, improve legislation and strengthen institutional and admini-

nistrative capacities needed to properly deal with the corruption, this paper explores the recent and ongoing efforts to ensure that the effective suppression of corruption is based on a specialized and well-prepared prosecutors equipped with targeted knowledge, practical skills, and an in-depth understanding of complex financial and corruption-related offenses.

In relation to this, this paper explores legal and institutional set up associated with the training of public prosecutors working in special departments for the suppression of corruption within higher prosecutor's offices who play a key role in advancing institutional integrity and accountability. In addition to this, this paper provides for the contextualisation of the state policies in this field in relation to the accession negotiations to the European Union.

The legal and policy analysis is followed by the presentation of the findings of the recently conducted training needs assessment, including not just the main gaps, but also the presentation of the main attitudes on how to bridge them through the implementation of the training program and curriculum the initial training of public prosecutors working in special departments for the suppression of corruption which has been recently developed by the authors of this paper.

1. Normative and policy framework governing the professionalism and specialization of public prosecutors in Serbia

1.1. The relevant normative framework

The above-mentioned need to have specially trained prosecutors who deals with investigation and prosecution of all corruption cases was addressed through the Serbian normative framework almost ten years ago and consequently reflected in the institutional system.

Namely, while so called high corruption cases are in competence of the Special Prosecutors Office for the Organised Crime and Corruption (SPOOCC) the special departments of higher public prosecutor's offices for the suppression of corruption were formed in March 2018 based on the Law on the Organization and Competence of State Authorities in the Suppression of Organized Crime, Terrorism and Corruption (Official Gazette of the RS, no. 94/2016, 87/2018, 10/2023, hereinafter: LOCSASOC). These departments were established in four higher public prosecutor's offices in Belgrade, Novi Sad, Niš and Kraljevo, and have jurisdiction over criminal prosecution of corruption, economic crime and money laundering in the territory of the four appellate courts (Belgrade, Novi Sad, Niš and Kragujevac). Through establishing those special departments, the concentration of specialized knowledge and the efficiency of criminal prosecution was enabled.

The heads of the special departments are appointed by the Prosecutor General who, when appointing the head of the department, takes care of the candidate's competences, namely the necessary professional knowledge and experience in the field of combating economic crime and combating crimes against official duty and corruption. The process of filing the posts in those special departments is done through the referral process. The prosecutors are referred to a special department of the higher public prosecutor's office for combating corruption in accordance with the annual schedule of the prosecution's work brought by the chief public prosecutor, according to the previously obtained opinion of the department, determines the number and composition of the department and assigns public prosecutors, assistant prosecutors and trainees, who perform work within a special department (Article 20 of the Rulebook on Administration in Public Prosecutor's Offices, Official Gazette of the RS, no. 110/2009, 87/2010, 5/2012, 54/2017, 14/2018 and 57/2019). The Supreme Public Prosecutor makes the decision on temporary referral to work in another prosecutor's office, for a maximum of three years. (Article 69 of the Law on Public Prosecution, Official Gazette of RS, no. 10/2023)

The training of prosecutors and employees in public prosecutor's offices is entrusted to the Judicial Academy. The Judicial Academy implements an annual program of permanent training for public prosecutors and employees of public prosecutors' offices, based on obtaining the consent of the High Prosecutorial Council (Law on Judicial Academy, Official Gazette RS no. 104/2009, 32/2014, 106/2015, art. 46 and Law on High Prosecutorial Council, Official Gazette RS no. 10/2023, art. 17).

Recognising the importance of the advanced skills needed to deal with corruption cases, the applicable legislation obliges the public prosecutors who perform their duties in special departments of higher prosecutor's offices for the suppression of corruption to attend the continuous training program conducted by the Judicial Academy (Art. 24 of LOCSASOC). The continuous training program of the Judicial Academy envisages a large number of trainings important for improving the knowledge and skills of public prosecutors and prosecutorial staff working in these departments in the field such as professional ethics in the prevention and fight against corruption, efficient management of proceedings in cases of corruption prevention, money laundering prevention, financial investigations, use of circumstantial evidence, corruption in public procurement, confiscation of property resulting from criminal offense, etc.

1.2. The relevant policy framework

The currently applicable normative framework is not the only indicator of how high the specialization of public prosecutors for dealing with corrupt cases is placed in the state policies. Namely, for the full perception of this, relevant state policy documents should be analysed.

In this regard, the two parallel policy tracks should be followed:

- The policy documents adopted in the context of the accession negotiations with the European Union (EU)
- The national policy documents in the specific areas relevant for the suppression of corruption.

1.2.1. European integrations as a framework for strengthening prosecutorial capacities

The decision of each state to start its journey towards (EU) shapes has its repercussions regarding the process of creating the public policies in all areas vital for the functioning of the state and the society.

The Republic of Serbia has opened accession negotiations with the EU in 2016. Anyway, the process of aligning its legal and institutional framework with EU acquis and the relevant international standards had started much earlier and became very intensive since 2013 after the coming-in screening phase. The Screening of Serbian normative and institutional framework with relevant acquis within chapters 23 and 24 started in September 2013 with explanatory screening (presentation of the relevant acquis and EU standards to the Serbian institutions. This stage has served as a starting point for assessment of an alignment level of the Serbian legislative and institutional framework with the acquis and EU standards, during the bilateral screening in December 2013. The screening process resulted in publishing the Screening Report by the European Commission (hereinafter: EC) in 2014 which addresses issues related to the anticorruption policies and practices. Chapter 23 (hereinafter: Ch. 23) deals with the anticorruption issues through the whole subchapter (Fight Against Corruption). Recommendations provided in the Screening Report obliged Serbian authorities to draft, (in inclusive and transparent process that assumes inclusion of all relevant stakeholders and CSOs) but also to adopt and implement the detailed action plan to serve as a “reform road map” and starting point for adoption and implementation of dedicated policy documents in various fields relevant for anticorruption in general as well as in specific fields such as financial investigations. The Action Plan for Chapter 23 (hereafter: AP Ch. 23) was adopted in July 2016 to address recommendations from the Screening Report.

The negotiations in Chapter 23 officially started in July 2016 by the adoption of the Common Negotiation Position for Chapter 23. In addition presenting the breakdown of the reform processes achieved to the moment of its adoption, the Negotiation Position also sets out the comprehensive list of the so called Interim Benchmarks (hereinafter: IBMs), namely the targets to be achieved in order to prove the reform progress made, before issuing the Interim Benchmark Assessment Report (hereinafter: IBAR) which should define the list of closing benchmarks for the finalization of the accession negotiations in Ch. 23.¹

In terms of the reform requirements relevant to the position of victims, the Negotiation Position has brought, among others, three very important IBMs:

„...33. Serbia makes an analysis of its organisational structures and bodies prior to amending the Law on Organisation and Jurisdiction of State Authorities in the fight against organised crime, corruption and other particularly serious criminal offences.

Serbia pays particular attention to capacity building in the prosecution service and the police and ensures the necessary financial and human resources and training. It substantially improves inter-agency co-operation and intelligence exchange in a safe and secure manner.”

In its last feedback on the level of implementation of the IBMs, the European Commission insisted on further reforms in two directions relevant for the prosecutorial capacities for dealing with suppression of corruption:

- Fill all vacant positions for prosecutors and judges in anti-corruption departments and in special prosecutor’s office for organised crime, and special department of the higher court and of the appellate court in Belgrade for organised crime, per the agreed step of the Reform Agenda.
- Ensure adequate training for all staff, as well as suitable premises to undertake their functions.
- Fill the vacant financial forensic expert positions.

It is also worthy to be mentioned that as the EU has introduced a new accession methodology in 2020 which has been accepted also by the Western Bal-

1 For more info. on the evolution of the methodology applicable to the accession negotiations in Ch. 23, see: Matić Bošković, M., Kolaković-Bojović, M. (2022). New Approach to the EU Enlargement Process - Whether COVID-19 Affected Chapter 23 Requirements? International Scientific Conference “The recovery of the EU and strengthening the ability to respond to new challenges – legal and economic aspects” in Osijek, 9-10 June 2022, 6. pp. 330-350 and Kolaković-Bojović, M., Simonovski, I. (2023) The Accession Negotiations of North Macedonia to the EU: Between New Methodology and Old Challenges. In: International scientific conference “Law between the ideal and the reality”. Faculty of Law; Institute for Comparative Law, Priština: Belgrade, pp. 103-115. ISBN 978-86-6083-087-8

kans countries that have been already in the accession negotiation process (Montenegro and Serbia). This consequently required accommodation within the existing negotiating frameworks with both countries during the next Inter-governmental Conferences. The main elements of the new methodology will be as follows: a more credible process, a stronger political steer/monitoring, dynamics determined by the cluster approach and predictability of the process.

One of the specificities of this recognition is that fundamental reforms are needed, EC is reflected through the completely new position of combating corruption as a prerequisite for the progress in accession negotiations. Namely, according to the methodology, this aspect of the reform process has been granted a special status of the horizontal issue, crossing all the negotiation chapters/clusters.

However, this does not prevent the EC from efficient monitoring of reform progress in the candidate countries. (Kolaković-Bojović, 2019) Contrary, according to the new methodology, the Commission decided to, in addition the existing mechanisms to follow legislative, institutional and developments in terms of the track record achieved under negotiation chapters 23 and 24, introduce this issue to the agendas of almost all the negotiation chapters. The very purpose of such decision is to ensure comprehensive and horizontal screening of anti-corruptive mechanisms in various fields of the state functioning such as education, science, health care, public administration, etc. This approach allows the Commission a comprehensive insight into all measures implemented by the candidate country to suppress corruption. (Kolaković-Bojović & Simonovski, 2023) Such an approach speaks itself on the importance of making additional efforts in order to strengthen necessary capacities for suppression of corruption.

1.2.2. National policy framework

Adopted to ensure a reform continuity in this field the National Anti-Corruption Strategy for the period 2023 – 2028 and the Action Plan for 2024-2025 for its implementation address the issue of the administrative capacities of the prosecutors' offices and the public prosecutors themselves comprehensively and from two different perspectives:

- a) In terms of filling the remaining vacancies in the Special Departments for Corruption Suppression and the Public Prosecutor's Office for Organized Crime, to ensure more efficient enforcement of the Law on the Organization and Competence of State Authorities in Suppression of Organized Crime, Terrorism and Corruption. These activities are planned for both, vacancies for public prosecutors, but also for financial investigators.
- b) Regarding the capacity building of the existing and newly appointed public prosecutors in several fields of knowledge and skills relevant for more effi-

cient investigation and prosecution of high corruption cases, such as: (activities 2.1.7-2.1.12)

- competencies of the Special Departments for Corruption Suppression and the Public Prosecutor's Office for Organized Crime;
- special evidence gathering procedures for proving corrupt criminal offenses;
- on financial investigations that run in parallel with criminal investigations and procedures for the temporary and permanent seizure of proceeds of crime;
- in the area of public procurement.

The comprehensiveness of these activities is a clear signal that the current state of play in terms of the capacities to investigate and prosecute high corruption cases, especially when it comes to the knowledge and skills of the public prosecutors is a subject of serious concern.

2. Methodology applied to assess the current gaps in the capacities of public prosecutors dealing with suppression of corruption in Serbia

The rationale for the proposed introductory training curriculum rests upon the findings of a targeted Training Needs Analysis (TNA) conducted by the Prosecutors Association of Serbia in July 2024, within the framework of the project *Use of Independence Safeguards to Fight Organised Crime and Corruption*. The main objective of this analytical exercise was to map the existing competencies, identify skill gaps, and assess the preparedness of public prosecutors assigned to the special departments for the suppression of corruption, thereby establishing an empirical basis for curriculum design.

The TNA adopted a qualitative research methodology, relying on in-depth, semi-structured interviews with eleven public prosecutors currently assigned to the special departments for suppression of corruption. The composition of the sample was intentionally composed to reflect a diversity of professional experiences, thereby facilitating a nuanced understanding of training needs across different stages of professional development. It included three heads of special departments, whose managerial responsibilities provided insights into institutional-level challenges; five prosecutors with more than three years of experience in special departments, including one who previously held a leadership position; and three prosecutors who had been working in these departments for less than one year, whose experiences reflect the transitional challenges faced by newly assigned staff.

This stratified approach served a dual purpose. First, it enabled the collection of data reflecting both strategic and operational dimensions of prosecutors, ranging from institutional coordination and case management to evidentiary strategies and courtroom experience. Second, it allowed for the identification of differentiated learning priorities: foundational skills required by newly appointed prosecutors, and advanced competencies essential for experienced practitioners confronting increasingly sophisticated forms of corruption. This methodology thus provided a robust evidentiary basis for aligning the proposed training curriculum with the practical realities of corruption prosecution in Serbia, ensuring that the program addresses both the immediate operational demands and the longer-term professional development of prosecutors within these specialised units.

By grounding the proposed training in systematically gathered practitioners' insights, the TNA not only strengthens the relevance and applicability of the curriculum but also reflects an evidence-based approach consistent with contemporary principles of judicial capacity building.

3. Findings of the assessment

3.1. Individual attitudes

Asked to describe their previous experience in terms of gathering specific knowledge and skills in this field, as well as the main challenges they have experienced in their daily work, among others, the prosecutors highlighted the following:

- There is a serious gap in implementation of the interdisciplinary approach while teaching criminal law and procedure, criminalistics as well as the commercial and tax law in the law schools, which results in a massive incapability of graduate lawyers to interconnect knowledge gathered in those law disciplines in practice.
- Those prosecutors who started their career through the traditional model of mentoring the assistants underlined that a lack of specific knowledge and skills among older professionals who were their mentors before establishing above-described specialisation of the state authorities resulted in their own non-readiness to deal with corruption cases effectively. A bit different was the attitude of the prosecutors who finished an initial training in the Judicial Academy which involves various aspects of combating corruption.
- Almost all involved prosecutors emphasised that the most challenging issue is taking over the post in the special department for combating

corruption, namely the transition to the specific tasks without any kind of uniform introductory training to make it smoother.

- Many of involved prosecutors also said that they took part in several different training courses relevant for this field of work, but they were not organised with the aim of introducing them to their new posts, but rather in a form of advanced training in different, more narrow fields, mostly at the later stage when they have already gained some practice.
- One of the most frequently repeated answers was also “complexity”. Namely, the prosecutors said that it was extremely demanding for them to deal with the management of investigations that involves financial and digital forensic, especially in the context of cross-border dimensions of corruption cases.

3.2. Joint findings

Despite the strategic importance of anti-corruption efforts and the increasing complexity of corruption-related cases, Serbia currently lacks a coherent, structured approach to the training of public prosecutors working in this field. One of the most critical gaps is the absence of a specialized introductory training program for newly appointed public prosecutors or those who have been assigned to work in special departments for suppression of corruption. There is no formalized pathway for building the technical and procedural knowledge necessary for the effective investigation and prosecution of corruption-related offenses.

Although some progress has been made through the development of *ad hoc* or advanced training modules, for instance, within the framework of the donor support projects focusing on capacity-building for special departments, both for public prosecutors and financial forensics,² these initiatives remain fragmented and are typically targeted at more experienced prosecutors.³ They do not address the learning needs of prosecutors who are new to the field and often lack exposure to complex financial, procedural and cross-border dimensions of corruption cases. Furthermore, these trainings are not designed to offer systematic progression from foundational to advanced competence.

2 Efforts to enhance forensic capacity are currently being supported through externally funded initiatives. The INL (Bureau of International Narcotics and Law Enforcement Affairs) is supporting the Faculty of Economics at the University of Belgrade in the development and provision of academic-level training in forensic accounting through the project Building Forensic Accounting Capacity in Serbia. Available at: <https://nicef.ekof.bg.ac.rs/projekti/medjunarodni-projekti/inl-building-forensic-accounting-capacity-serbia/>

3 For example, US DOJ and OPTAD is supporting organization of 10-day peer exchange workshops. See: Annual report of the Supreme Public Prosecutor Office, 2024. Available at: <http://www.vrhovnojt.gov.rs/docs/Izvestaj-VrhJT-za-2024-godinu.pdf>

Another major institutional shortcoming lies in the limited operational integration of financial forensic experts into the work of special departments (Matić Bošković & Kostić, 2019). While financial forensics is indispensable in the investigation and prosecution of corruption cases, special departments still operate without adequate access to forensic experts or lack familiarity with the full potential of financial investigation tools (Matić Bošković & Kostić, 2024). This results in underutilization of financial data, and weaker asset recovery outcomes. Prosecutors also report difficulties in coordinating effectively with other actors involved in financial investigations, such as Tax Administration, Financial Intelligence Units, or the Directorate for Management of Seized Assets.

In light of these challenges, there is growing consensus among practitioners and institutional stakeholders on the need for a structured introductory training program. Such a program should not only provide a solid grounding in the legal framework governing corruption offenses but also include practical training on investigative techniques, inter-institutional cooperation, financial forensics, and asset recovery.

The TNA findings revealed a shared perception among prosecutors of the inadequacy of existing training formats in equipping newly appointed or reassigned prosecutors with the knowledge and skills necessary for managing complex corruption cases. In particular, interviewees emphasized the need for structured training in financial investigations, asset tracking and recovery, digital evidence analysis, and mechanisms of inter-agency cooperation involving tax authorities, police units, and financial forensic experts. Furthermore, prosecutors expressed a strong interest in deepening their understanding of international legal standards, especially those relevant to Serbia's EU accession requirements, including the protection of the financial interests of the European Union and the practical implications of the PIF Directive⁴ and European Public Prosecutor's Office (EPPO) Regulation.⁵

The current training architecture does not reflect the specialized nature of anti-corruption work, nor does it meet the operational demands placed on prosecutors in these departments. Without a coherent training pathway and better integration of supporting expert profiles, Serbia's efforts to suppress corruption will continue to face institutional and technical limitations. The development

4 Directive (EU) 2017/1371 of the European Parliament and of the Council of 5 July 2017 on the fight against fraud to the Union's financial interests by means of criminal law.

5 More on EPPO Regulation (Council Regulation (EU) 2017/1939 of 12 October 2017 implementing enhanced cooperation on the establishment of the European Public Prosecutor's Office ('the EPPO')) in Matić Bošković, M., (2024). Protection of EU financial interests: EPPO's cooperation with non-EU states. *Revija za kriminologiju i krivično pravo*. 62 (3), 27-44.

and formal adoption of a structured introductory training curriculum represents a necessary step toward professionalizing the anti-corruption prosecution service and aligning it with European and international standards.

4. Ongoing efforts and the future steps

Based on a comprehensive assessment of training needs and institutional challenges, this article proposes the development of a structured introductory training curriculum tailored to the specific requirements of the special departments for suppression of corruption in higher prosecutor's offices in Serbia.

Drawing on TNA findings, the proposed curriculum is designed as a three-day modular training program, to be organized once per year, targeting newly appointed prosecutors or those reassigned to the special departments. Each thematic module follows a consistent pedagogical structure, including defined learning objectives and outcomes, relevant legal sources (international and domestic), and a combination of instructional methods such as lectures, case analysis, and group discussions. The curriculum is organised according to a progressive logic, from general institutional and legal frameworks to more specialized and technical aspects of corruption prosecution, thereby facilitating the gradual accumulation of knowledge.

The program comprises six core thematic units. The first unit introduces participants to the organization and procedural functioning of special departments, including inter-agency cooperation and data access mechanisms. The second unit addresses substantive criminal law issues, focusing on the catalogue of corruption-related offenses under domestic legislation, their alignment with international standards, and sentencing practices. The third unit deals with procedural aspects of corruption prosecution, including admissibility and legality of investigative actions, and comparative lessons from completed domestic and foreign cases. The fourth unit examines mechanisms of cross-border cooperation and mutual legal assistance, providing prosecutors with tools to navigate complex transnational investigations. The fifth unit focuses on financial investigations and forensic methods, including the role of financial forensic experts, and legal procedures for the temporary and permanent confiscation of illicit assets. The final module covers EU-specific anti-corruption frameworks, offering insights into the institutional mandates of bodies such as European Anti-Fraud Office (OLAF), EPPO, and the jurisprudence of the Court of Justice of the EU.⁶

6 More information on these institutions in Matić Bošković, M., (2022) *Krivično procesno pravo EU*, Institute of Criminological and Sociological Research, Belgrade.

This proposed curriculum not only addresses critical knowledge gaps but also introduces methodological innovations by incorporating entry and exit assessments, interactive learning formats, and opportunities for peer learning and experience-sharing. The program is conceived as an integral part of the professional development trajectory for prosecutors and is intended to be embedded within the framework of the Judicial Academy. To ensure sustainability and adaptability, the periodic review mechanism should be established, involving practitioners and legal experts, which would allow for updates to training content in line with evolving legal framework, case law, and institutional priorities.

The formalization of such a curriculum would contribute significantly to enhancing prosecutorial effectiveness, improving the quality of case outcomes, and strengthening public trust in the integrity and professionalism of special departments for suppression of corruption. It would also serve as a critical vehicle for aligning national practice with European legal standards and best practices in the fight against corruption.

Conclusion

The findings of the research clearly indicate that the establishment of a structured introductory training program for all prosecutors entering the special departments for the suppression of corruption must be treated as an institutional imperative rather than a discretionary initiative. The absence of such an entry-level program has resulted in uneven preparedness among prosecutors, which in turn impacts the consistency and effectiveness of special departments for suppression of corruption. A standardised, comprehensive introductory training-grounded in both domestic legal frameworks and international good practices, would ensure that all newly assigned prosecutors possess the foundational knowledge, procedural skills, and ethical grounding required for the specialised nature of their work.

While an initial training program would provide the essential baseline competencies, further specialisation should be pursued through advanced training initiatives such as those currently supported by donors. The workshops, peer-exchanges, and capacity-building activities offer valuable opportunities for deepening expertise in areas such as complex financial investigations, international cooperation mechanisms, and advanced evidentiary techniques. In this way, a two-tiered training model, comprising an obligatory introductory program followed by targeted advanced programs, would foster continuous professional development and sustained institutional strengthening.

However, training interventions alone cannot address the full spectrum of capacity challenges. The long-term effectiveness of specialised departments will depend on their ability to operate without chronic personnel shortages or functional bottlenecks. This requires not only filling systematised positions for prosecutors and prosecutorial assistants but also ensuring the recruitment and retention of financial forensics experts. Financial forensics capacities are indispensable for the investigation and prosecution of complex corruption cases, and their absence imposes an unsustainable workload on prosecutors while limiting the evidentiary robustness of cases. The concurrent strengthening of human resource capacities across these three professional profiles, prosecutors, assistants, and financial forensics, will be essential to avoiding overburdening existing staff and ensuring that the special departments are both effective and sustainable.

Finally, the findings show that there is a lot of space for future research on how to improve curricula and methodology used for teaching in law schools and Judicial Academy in order to achieve a better level of preparation for dealing with this particular topic even in the capacity of prosecutorial assistants and consequently, to allow them to prepare for future prosecutorial tasks also in this way.

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FORENSIC ACCOUNTING AS AN INSTRUMENT FOR DETECTING FRAUD IN FINANCIAL REPORTS

Abstract

In its long history, financial reporting has faced problems of manipulations in financial statements. Undoubtedly creative accounting practice, which as a rule was in the background of major financial scandals, is present in both developed and under-developed economies. Most often under pressure from management, whose motives are of a lucrative nature, accountants show inexhaustible creativity when recording business transactions and preparing financial reports. Although there are numerous examples in the world where creative accounting practice has been recognized and prosecuted in many well-known companies (Enron, Parmalat, Tyco, Satyam, Toshiba, etc.), it seems to us that it is reasonable to assume that there are more in which manipulations were not discovered.

The accounting profession, investors, creditors and other interest groups are making great efforts to prevent major damages that arise in fraudulent processes. The first line of defense consists of legal and professional regulations and an independent external audit of financial statements. Long-term practice shows that these are necessary, but not sufficient preconditions for the protection of the public interest, primarily the interests of investors, creditors and the state. After all, there are examples where even independent auditors, with an unprofessional approach to auditing financial statements, actively participated in financial scandals. Forensic accounting and forensic accountants, with extensive accounting and other related forensic knowledge, strive to use their expertise to detect fraud occurring in financial statements. In this way, they contribute to the reduction of damages, help institutions in the fight against organized crime and partly restore lost credibility to the accounting profession. Forensic accounting finds room for action in all situations where objective, independent and professional assessments are necessary, whether companies in suspicious situations have complied with the requirements regarding true and fair reporting or whether their activities have crossed the limit of the allowed room for maneuver and resorted to manipulations, fraud and false financial reporting.

Key words: financial reports, forensic accounting, creative accounting, manipulations, audit, fraud, damages

JEL Classification: M41, K13

1. Definition and understanding of forensic accounting

The modern business environment, as a result of global processes and the increasing volume of cross-border trade, in addition to general benefits, has also brought an increased threat to the integrity of financial systems and the ethical business operations of business entities. Business entities are increasingly exposed to various types of fraud and accounting manipulations, which require their careful research, analysis and understanding in order to recognize, prevent and combat them in a timely manner.

Fraud protection issues have become particularly topical and have gained importance among capital owners after major financial frauds and scandals at the beginning of this millennium, in the cases of *Enron* (2001), *WorldCom* (2002), *Parmalat* (2003) and others. However, the companies mentioned are just the beginning of a long list of defrauded and damaged companies and their owners who have experienced a fiasco, despite well-paid management and “positive opinions” on the audit of their financial statements.

Major financial scandals have shown that auditing financial statements only partially protects capital owners from the abuses of “creative accounting”, but not enough. After all, not all companies are required to audit their financial statements, as is the case in the Republika Srpska, where small and medium-sized enterprises are not required to conduct an audit. This raises the question: how to protect yourself from creative accounting, i.e. deviations from “true and fair” reporting? The answer would only be to engage persons who possess the knowledge and skills of forensic accounting and who can provide:

- advisory services as experts or consultants,
- investigative services using the skills of forensic accounting experts, where they may, but do not have to, testify at scheduled court hearings (Kraniker & Rajli, 2023).

Forensic accounting can be practiced by individuals who apply their knowledge and skills from accounting, auditing, finance and other related professions to clarify financial facts, relationships and transactions that may be or are already the subject of legal proceedings. These include auditors, financial investigators, internal auditors, certified appraisers, financial court experts, as well as tax and market inspectors.

Regardless of what creative accounting was originally intended for, long-term practice has shown that it is less and less a tool for a “fair” and “honest” presentation of the state and results of business operations of business entities in financial statements. One of the reasons for this situation is the fact

that many IAS/IFRS standards are set very flexibly, leaving reporting entities the opportunity to choose one of several options offered. Although this flexibility of IAS/IFRS is necessary, because business entities operate under different conditions and restrictions, which requires different approaches and methods of valuation, they undoubtedly make it difficult to compare financial statements.

It is precisely this flexibility that has led to the misuse of creative accounting, often for the purpose of fraud. In the literature, due to the different motives of fraud and their connection with accounting, different classifications of fraud are given. One of them divides fraud into:

- embezzlement and misuse of assets,
- presentation of falsified financial statements (Davia, as cited in Škarić Jovanović, 2009).

The question of the causal relationship between these groups of frauds arises. For example, does misappropriation of assets result in the presentation of false financial statements, and vice versa - whether falsified financial statements are created to conceal misappropriation of assets.

In the event that the theft of inventory is recorded as a deficit at the expense of the entity, or as an increased cost of materials (increased reporting of waste, dispersal or breakage), the reports will accurately reflect the inventory situation, but the financial result will not be accurate, because an increased expense is recorded instead of a claim from the responsible person, which of course reduces the financial result. On the other hand, incorrect reporting of financial results through understatement or overstatement of assets or liabilities makes the financial statements false, even though no misappropriation of assets has occurred (Škarić Jovanović, 2009).

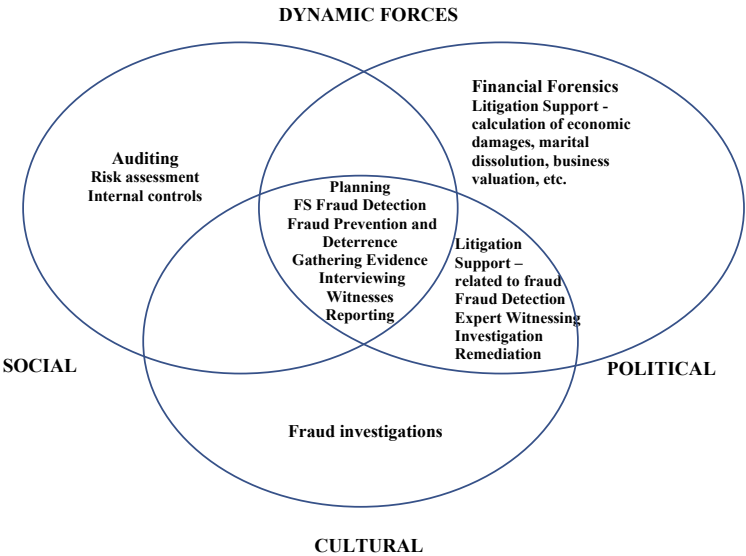
Any falsification of the balance sheet leads to an inaccurate representation of the financial, assets and income position, which is a violation of the principle of the truthfulness of the balance sheet. For this reason, creative accounting is often called “manipulative accounting”, which has caused a series of financial scandals and enormous damage to owners, employees, creditors, suppliers, the state and other users of the report. Although manipulative accounting is legally and professionally unacceptable, its application is not uncommon. Since it can serve as “profit management”, various effects are achieved - from tax deferral to creating conditions for management bonuses. The most responsible managers often directly participate in these actions. Therefore, the forensic accounting sector in large companies must be organizationally above management, and not under its control.

In addition to the aforementioned forms of fraud, some authors also add corruption (Wels, 1997), because it “prevents growth, reduces investment and affects the poor”. However, it still seems that corruption has no direct connection with accounting, but accounting can only provide indirect evidence of its existence. For example, favoring one supplier when making payments may indicate corruption, but accounting data in themselves are not evidence. In such cases, internal control and increased transparency of business operations can help preserve credibility.

Forensic accounting, unlike auditing, is not strictly limited to standards and rules, but relies on the profession and relevant evidence. Its primary role is to assess the actual state and performance of an entity from the perspective of investors and creditors, who are at the same time both the customers and the users of these findings.

Here it seems interesting to point out the differences between auditing, fraud investigation and forensic accounting, which can be illustrated by the following Figure 1.

Figure 1: Auditing, fraud examination and forensic accounting



Source: Kraniker & Rajli, 2023

From the previous picture, it can be concluded that, despite certain differences and specificities between traditional auditing, fraud investigations and forensic accounting, there is a significant level of their mutual connection and dependence. Their mutual relationship is dynamic and changes over time due to political, social and cultural movements and pressures. In doing so, the audit of financial statements seeks to provide reasonable assurance that the financial statements, viewed as a whole, are free from material errors in presenting the financial position and performance of business entities (IAS 240). Of course, it is necessary to make a distinction between the concepts of fraud and error. While an error can be the result of omissions resulting from shortcomings originating from certain individuals and the existing environment, fraud is the result of intent or is initiated to deceive someone with a specific motive of the perpetrator.

International Auditing Standard 240 emphasizes that audit procedures that are effective in detecting errors are not necessarily effective in detecting fraud, because detecting fraud requires very complex verification mechanisms, which may or may not yield results of the investigation. Therefore, there is always an inherent risk that fraud will remain undetected. However, if the auditor doubts, for example, the authenticity of a document or the like, he is obliged to continue the investigation in order to possibly confirm the suspicion of fraud.

If the suspicion is confirmed (the auditor has, therefore, noticed the so-called “red flags”), the auditor usually leaves the further procedure to forensic accountants. Such and similar cases often end in the initiation of legal proceedings, where auditors may be called to court to testify on behalf of the client or to defend their audit report. This represents a kind of starting point where auditing, fraud investigations and forensic accounting intersect.

In doing so, fraud investigations seek to obtain documentary evidence, interview witnesses and potential suspects, write an investigation report, testify about the findings made during the investigation, and provide appropriate assistance in building or improving a fraud detection and prevention system.

Finally, the task of forensic accounting is to calculate and assess economic damage, assess the value of a business or assets, and provide advisory services in litigation and the like, and ultimately submit its report. In doing so, appropriate software (Excel, Access, IDEA, Tableau, R, and the like) is often used.

A more complete overview of the differences between auditing, fraud examination, and forensic accounting can be seen in Table 1.

Table 1: Differences between auditing, fraud examination and forensic accounting

Issue	Auditing	Fraud Examination	Forensic Accounting
Time Frequency	Recurring	Nonrecurring	Nonrecurring
	Audits are conducted regularly and periodically.	Fraud investigations are conducted only if there is a basis for suspicion.	Forensic accounting engagements are conducted only after allegations of unprofessional conduct.
Scope	General	Specific	Specific
	Examination of financial statements for material misstatements.	The purpose of the investigation is to resolve specific allegations.	The purpose of the investigation is to resolve specific allegations.
Objective	Opinion	Affix blame	Determine financial impact
	An audit is generally conducted to express an opinion on the financial statements and related information.	The goal of the investigation is to determine whether fraud occurred and who is most likely responsible.	The objective of the forensic accountant is to determine, based on financial evidence, whether the allegations are substantiated and, if so, what the financial impact of the allegations is.
Relationship	No adversarial but skeptical	Adversarial	Independent
	Historically, the audit process has been inquisitorial. Since the introduction of the SOX Act and the American Auditing Standard SAS 99, auditors have been guided by professional skepticism	Fraud investigations are accusatory in nature because they involve efforts to establish liability.	The forensic accountant calculates the financial impact based on standard assumptions.

Methodology	Audit techniques	Fraud examination techniques	Forensic accounting techniques
	Audits are conducted primarily by examining financial data using GAAS.	Gathering the required financial and nonfinancial evidence to affix culpability.	Gathering the necessary financial and non-financial evidence to independently examine the allegations and determine their financial impact.
Presumption	Professional skepticism	Evidence	Evidence
		Fraud examiners approach the resolution of fraud by attempting to gather sufficient evidence to support or refute the allegations of fraud.	Forensic accountants will attempt to gather sufficient evidence to support or refute the allegations and related damages.

Source: Kraniker & Rajli, 2023

From the previous review of the differences between these three disciplines, it is reasonable to conclude that all three disciplines use almost the same tools in their work, that skills and abilities from one discipline are useful in another and vice versa, but their differences in scope, goals, basic assumptions and responsibilities are different and mutually independent.

Although there is no generally accepted and unique definition of forensic accounting in the professional community and literature, it can be defined as “the application of investigative and analytical skills with the aim of detecting manipulations in financial statements that deviate from accounting standards, tax laws and other legal provisions” (Belak, 2011). The previously cited definition of forensic accounting was created after major financial scandals at the beginning of this millennium, where forensic accounting was primarily focused on detecting fraud in financial statements.

However, in practice, forensic accountants provide a much broader scope of services, as they are expected to participate in any legal action involving money, tracking money, measuring performance, assessing asset values, estimating cost amounts, and any other aspect related to finances, financial performance, and/or the financial condition of the parties to a legal dispute. (Kraniker & Rajli, 2023).

In accordance with the above, forensic accounting, as one of the new specialized services, encompasses two broad areas of activity: through: a) investigative accounting and b) judicial support. (Crumbley, as cited in Petkovic, 2011).

For this reason, forensic accounting can be defined more broadly, as “the application of accounting, auditing and all other financial skills and knowledge in clarifying financial relationships, facts and transactions that may be or are already the subject of legal proceedings”.

What is quite certain is that this term (forensic accountant) cannot be exclusively linked to accounting theory and practice, because it is a much broader term that serves the function of truth and justice. Therefore, those who deal with forensic accounting should have good intuition and additional education, because here, in addition to research practice, knowledge and skills from accounting, auditing, finance, law and other related professions are required.

2. Forensic accounting in the function of detecting fraud in financial statements

The purpose of financial statements is to provide their users, and primarily investors, with a true and fair view of the performance, assets and financial position of the reporting entity. However, due to errors or fraudulent motives, financial statements may be prepared in a way that gives a false picture of the performance, assets and financial position of the reporting entity. Whether these are errors or intentional fraud by the preparers of financial statements and/or the management of the reporting entity, the consequences for users of financial statements – and above all for investors – are the same: a deviation from the true balance sheet with the aim of obtaining an unlawful financial gain to the detriment of users of financial statements. The key determinant that makes a significant difference between an error and fraud is found in the word “intent”. Usually, errors arise from negligence, i.e. in the absence of an intention to include or omit information in the financial statements, and may arise:

- during the collection of documentation or its processing during the preparation of financial statements,
- through unreasonable accounting estimates,
- through incorrect application of accounting principles regarding amounts, types and manner of presentation or disclosure. (Golden, Skalak & Clayton, 2006)

Unlike errors, fraud is committed by falsifying financial statements with the intention of realizing illegal material benefits of the preparers of financial statements and managers to the detriment of the users of financial statements. In this regard, the risk of exposure to fraud depends on:

- the achieved level of corporate culture, which depends on the history of the reporting entity, the values that are nurtured in business practice, the set goals, management style, etc. In entities where a high level of corporate culture is present, the risks of fraud are lower, and vice versa;
- the way in which the assessment is made, because accounting estimates of values can significantly affect the objectivity and reliability of information from financial statements. If the goal of preparing financial statements is fraud, then accounting estimates become instruments (leverages) for the realization of the motives of fraud, given that they lead to undervaluation or overvaluation of assets and financial results, which is difficult for users of financial statements to notice;
- the way in which the right of choice (options) is used in the process of financial reporting. When applying the legislative framework and IAS/IFRS, various options are available that can affect the amount of reported profit. Opting, for example, for an aggressive accounting policy, one can “manage profits” and, in this way, by declaring profits lower than the real one, postpone the payment of a certain amount of tax to the next period. (Golden et al., 2006)

Forensic accountants work to prevent and detect fraud and manipulation in financial statements, and they must take into account all three of the aforementioned risk areas in their work. Although financial statement fraud has a long history, each new case that is discovered brings many new surprises. Unfortunately, many major financial scandals are only discovered when companies, banks, insurance companies, and other reporting entities are on the verge of financial collapse. This makes the consequences of such a situation all the greater, because at that stage it is difficult to save anything or do anything to repair the damage that is caused to suppliers, creditors, the state, employees, and others.

While falsifying financial statements also implies fraud, fraud does not have to be associated with falsifying financial statements, because the committed fraud does not always have to be recorded and visible in accounting. It is obvious that the number and prevalence of financial scandals in the world has encouraged the development of forensic accounting, primarily in countries where major financial scandals have occurred with enormous negative consequences for owners, creditors, employees and the state.

Therefore, the question is justified: how important is forensic accounting today? The fact that forensic accounting has a promising future is also shown by long-standing forecasts. As early as the end of the last century (1996), a group of authors in the magazine *U.S. News and World Report* ranked forensic accounting jobs among the twenty most sought-after jobs of the future, describing

them as “sniffer dogs that sniff out criminal activities in the financial statements of corporations”. (Group of authors, 2013)

The importance attached to these tasks is also shown by the current practice of the largest accounting firms in the world, which, as a rule, have special departments for forensic accounting. When performing their tasks, forensic accountants must never assume, because things often look completely different than they seem at first glance. If they are in the courtroom, forensic accountants must possess the so-called “sixth sense”, which they use to reconstruct the details of past transactions, creating with their talent and value a high level of self-confidence, ability and readiness to immediately answer any questions that may be asked. This means that they must be interested and determined to continuously improve their knowledge and skills in order to always be ready to recognize, document and analyze information from the opposite side. Since we have previously stated that this is a much broader concept, forensic accounting tasks can be separated, or grouped, into two major areas of interest:

- Investigative accounting – used when there is a suspicion or possibility of criminal activity in financial statements, or when preventive checks are carried out on a client’s business.
- Judicial support – may refer to financial expertise, consulting and other services provided by persons who possess accounting and auditing knowledge and skills, as well as knowledge and skills of other related professions (certified appraiser, internal auditor, tax advisor or expert, etc.).

3. Typology of fraud in financial statements

To facilitate and accelerate forensic fraud detection, it is necessary to know the basic types of financial statement fraud. It is important to distinguish between temporary and permanent accounting manipulations.

- Temporary accounting manipulations are those situations where a reporting entity transfers expenses or revenues from one accounting period to another, trying to keep the final long-term result unchanged. This happens, for example, when a reporting entity increases expenses by increasing provisions in one accounting period, and in a subsequent period recognizes revenues from the cancellation of those provisions, whereby the long-term financial result remains unchanged, but the results for individual accounting periods are manipulated and, ultimately, inaccurate. Although at first glance such an operation may seem harmless, this is not true. For example, by hiding losses through manipulations in one accounting period, business partners can be misled

into entering into business cooperation, where, due to insolvency or “unexpected” financial collapse of the reporting entity, they may suffer losses and get into financial difficulties.

- On the other hand, permanent accounting manipulations are considered to be false entries and payments “justified” on false grounds, with the help of forged documents or without any supporting documentation. This type of manipulation permanently changes the picture of the income, assets and financial position of the reporting entity, and their discovery often causes an accounting scandal with significantly greater negative consequences than is the case with temporary manipulations.

In forensic literature, the following types of manipulations in financial statements are most often cited as causing significant negative consequences:

- concealing losses through various manipulations,
- falsely increasing profits,
- falsely decreasing profits,
- falsely increasing revenues without changing profits (so-called reverse trading),
- concealing debts through falsifying balance sheets.

For the purpose of falsifying financial statements, manipulators use “creative accounting” through which they:

- manage profits, with the aim of presenting higher or lower profits, or higher or lower revenues, in order to achieve personal benefits for certain interest groups in the reporting entity,
- apply aggressive accounting, with the intention of increasing or decreasing the financial result of the reporting entity through accounting estimates and techniques in a way that suits the goals and wishes of management,
- balance profits and revenues in a series of successive periods (increasing or decreasing revenues, delaying revenues recognition, recognizing revenues ahead of time, delaying and concealing expenses, fictitious creation of inventories, falsely increasing expenses, and the like) in order to create the impression of continuity of business without visible oscillations, which would, even if only seemingly, indicate business stability,
- manipulate and falsify financial statements through a network of fraud, which is especially evident in consolidated financial statements, where it is possible to omit or add items contrary to standards and regulations

on consolidated balance sheets. In doing so, secretly connected or “friendly” entities are often used to hide debts, increase or decrease revenues and expenses, manipulate stocks and cash flows, thus creating a complex web of fraud.

Regardless of the fact that they are, as they say, “short-legged lies”, it is likely that many manipulations and falsifications of financial statements would not have been discovered if the reporting entities, after presenting lies and frauds as the truth, had not fallen into a state of insolvency and inability to settle their obligations, or, after seemingly “good and successful” business, had not reported a loss.

The lack of funds, in addition to being a warning signal for possible fraud and falsification of financial statements, is often a bitter moment of truth, when the entire system collapses like a house of cards. Then the owners of capital lose significant assets, while other financial or political goals are also called into question, which often leads to bankruptcy and complete degradation (entropy) of the reporting entity.

4. Ratio analysis in the function of detecting fraudulent financial reporting

A careful analysis of financial statements can lead to a review of many disclosed indicators, which may ultimately become indicators of fraud. For this purpose, it is possible to use:

- vertical analysis,
- horizontal analysis,
- ratio analysis,
- cash flow analysis,
- analysis of non-financial information. (Kraniker & Rajli, 2023)

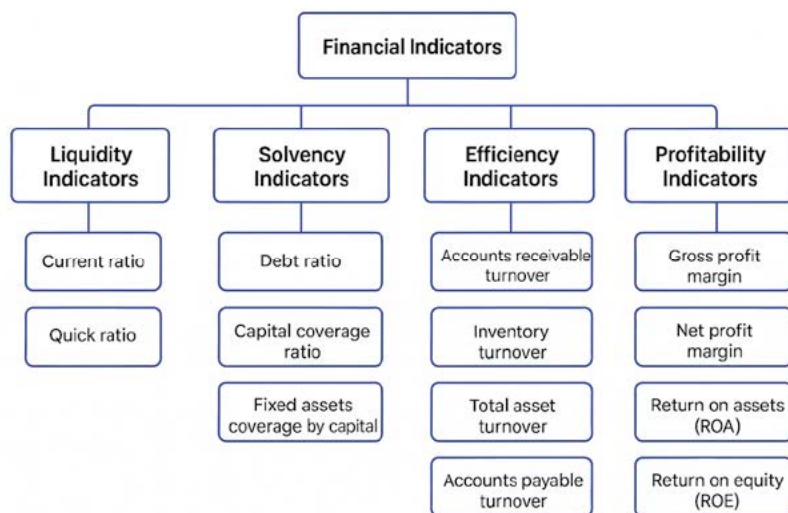
Without diminishing the importance of vertical, horizontal or other methods of analysis, the following will focus on the most commonly used – ratio analysis. The number of possible ratio indicators is very large, so for the correct selection, a good knowledge of the activity and characteristics of the specific company (reporting entity) is necessary.

Before selecting indicators, the forensic accountant should familiarize himself with the key business operations, possible business segments, basic principles of organization (territorial, business or combined), equipment used and other relevant factors. In other words, it is necessary to understand the strategy and objectives of the reporting entity in order to select an appropriate set of indicators, and compare them with the industry average or with competing entities.

The rule “*the more indicators, the better*” does not apply here - because expertise is reflected in the ability to select from the multitude of available indicators those that are relevant to the purpose of the analysis, i.e. detecting fraud in the financial statements of a specific entity.

In order to be able to observe the trends of individual indicators of income, assets and financial position, it is necessary to analyze financial statements for a period of at least three to five years. As with all other analyses, changes in trends can often be justified by real changes in business, but ratio indicators often represent a valuable tool for discovering the so-called “red flags” in fraud investigations (Kraniker & Rajli, 2023). For the purpose of detection, a number of financial indicators could be used and an overview is presented in Figure 2.

Figure 2: Overview of financial indicators that can be used in fraud detection



Source: Authors

Since these are well-known indicators, and given the limited space, we will omit the explanation of individual indicators below. However, it is reasonable to emphasize at this point that economics, and especially microeconomics, is an empirical science. This means that all findings that microeconomic theory has reached should be empirically tested, in order to show to what extent they can really explain reality. In this regard, empirical verification of theoretical findings (hypotheses) is extremely important, so that the theory can be further developed and thus it is easier to come to a conclusion, if some of the theo-

retical findings are not appropriate, in which direction the possibility of their correction should be sought. Of course, the economic theory of crime and its theoretical economic analysis, including the use of ratio analysis, is no exception in this regard.

Clearly, it should be borne in mind that in some investigations there will not be a need to use all of the above indicators, but only certain ones, depending on the subject of the investigation, as well as the competence, knowledge, experience and abilities of the forensic accountant.

Illustrative example of using ratio analysis in financial reporting fraud investigations

Let's assume that company "X", based on an analysis of financial statements for the previous three years, has the following calculated ratios, or indicators as presented in Table 2.

Table 2: Indicators for 2022-2024

Indicator	2022	2023	2024
Current liquidity ratio	2.6	1.9	1.5
Reduced liquidity ratio	1.5	1.2	1.1
Inventory turnover ratio	19.0	21.0	17.0
Average inventory holding time	19.0	17.0	21.5
Receivables turnover ratio	8.0	10.0	11.0
Average receivables binding time	45.6	26.5	33.0
Debt ratio	22.0	65.0	70.0

From the above, it is clear that both the current and reduced liquidity ratios will decline in 2023 and 2024. The reasons for the decline in these ratios in the last year should be sought in the extension of the number of days of inventory tying up (21.5 days) and in the growth of the company's indebtedness (70%) compared to 2023, when indebtedness was 65%, and in 2022 only 22%. This growth in indebtedness, of course, had to cause an increase in current liabilities to creditors and suppliers.

The permanent growth of the receivables turnover ratio and the related reduction in the number of receivables binding days, and on the other hand the growth of the average inventory holding time, indicate probable problems for the company in the coming period. If we have an increase in the receivables turnover ratio (which means that customers pay faster and receivables are con-

verted into money faster) while simultaneously extending the average inventory holding time (which means that goods are stored in the warehouse longer), this may indicate several potential problems:

- Decline in sales – inventories are moving slowly because demand is lower, even if customers pay on time.
- Problems with market competitiveness – products may not be competitive in price or quality, so inventories are piling up.
- Wrong purchasing policy – too many quantities have been purchased in relation to sales opportunities.
- Obsolete or unsold inventories – goods may be seasonal, technologically outdated or out of market trends.
- Working capital risk – although receivables are quickly included in cash flow, assets are “trapped” in inventories, so liquidity may be at risk.
- Possible manipulative signals – in a forensic context, faster collection of receivables with rising inventories is sometimes the result of temporary “pumping” of sales to related parties or special arrangements, while actual demand is weakening.

In financial analysis, this is often considered a warning combination, as it is better to have both fast collections and fast inventory turnover. When only receivables are moving in the right direction, but inventories are stagnant, it means that future cash flow may be at risk.

The significant increase in indebtedness in the last two years is a consequence of companies borrowing from creditors due to reported operating losses in 2023 and 2024. Despite the decline in both liquidity ratios, they are still within acceptable limits, although liquidity difficulties, due to negative income statements in 2023 and 2024, are very close.

In order to assess the solvency of a company, i.e. its long-term liquidity, and also for forensic investigations related to possible manipulations with inventories and liabilities to suppliers, it seems useful to determine the state of the company's net working capital. In short, there is a need to analyze the percentage of inventories financed by long-term sources of financing. If, however, it were to happen that long-term sources of financing were insufficient to cover fixed assets, this would be an unambiguous signal of serious financing problems, because part of the fixed assets is financed from short-term sources, which would, of course, lead to serious upcoming problems in the liquidity of the company's operations. Any manipulation that leads to an increase in inventories or receivables, given long-term sources of financing, results in

a decrease in net working capital, because its level can be influenced by a decrease/increase in current assets, i.e. a decrease/increase in long-term sources, or both.

On the other hand, fictitious sales have the opposite consequences, leading to a decrease in inventories of finished goods and merchandise, as well as increased write-offs of receivables, which leads to a decrease in current assets, and consequently, given long-term sources of financing, to the reporting of higher net working capital. Also, possible manipulations with the amount of long-term assets can be carried out by intentionally misclassifying short-term liabilities into long-term liabilities and vice versa, or by understating or overstating long-term liabilities. Suppose a company has the following balance sheet, presented in Table 3.

Table 3: Balance Sheet for Illustrative Case Company

ASSETS:		CAPITAL AND LIABILITIES	
1. Intangible investments	200.000	1. Capital	1.000.000
2. Assets	900.000	2. Capital reserves	200.000
3. Financial investments	300.000	3. Revaluation reserves	100.000
FIXED ASSETS	1.400.000	4. Retained earnings	250.000
4. Inventories	400.000	EQUITY	1.550.000
5. Accounts receivable	500.000	5. Long-term liabilities	400.000
6. Cash	150.000	6. Short-term liabilities	500.000
CURRENT ASSETS	1.050.000	TOTAL LIABILITIES	900.000
TOTAL	2.450.000	TOTAL	2.450.000

Based on the assumed balance sheet, a net working capital of 550,000 was determined $(1.550.000 + 400.000) - 1.400.000$.

In conditions where the excess of long-term sources over the coverage of fixed assets of 550,000 is compared with the value of current assets of 1,050,000, the degree of coverage of current assets by long-term sources of financing is obtained. In this case, current assets are financed with 52.4% from long-term sources. Whether this percentage of financing of short-term (tied) assets by long-term sources is good or sufficient depends on the activity in which the company is engaged and the operating conditions, as well as on the time (3–5 years) and spatial analysis of the company (average of the industry or the best competitive company).

If the company's management were to use financial reporting manipulations to show a higher financial result, and for that purpose ostensibly increase the quantity or value of inventories by, for example, 80,000 or increase receivables (also fictitious revenues) by 170,000, then the increase in current assets would result in a decrease in net working capital. Namely, the available surplus of long-term financing sources of 550,000 would be used to cover the increased volume of current assets from 1,050,000 to 1,300,000 ($80,000 + 170,000$).

In this way, the degree of coverage of current assets by long-term financing sources is also reduced, which now amounts to 42.3%, which represents a decrease of 10.1 percentage points compared to the previous situation (before the manipulation).

Therefore, it is reasonable to conclude that possible manipulations through overvaluation of inventories and receivables (which is often done) can be identified and verified by monitoring changes in net working capital over a series of successive periods.

Conclusion

In the last three decades, forensic accounting as a concept has managed to go from anonymity to recognition, without a clear content. Based on theoretical works in this field, as well as the response of "artificial intelligence", it is reasonable to assert that forensic accounting is a combination of science, law and research practice that serves the function of truth and justice. As a specialized branch of accounting, this concept combines accounting, auditing and investigative skills in order to detect and document financial irregularities, fraud and illegal actions. Among other things, forensic accounting is, above all, an emerging profession that requires certain professional qualifications, licensing and continuing education. When we previously emphasized "among other things", we mean that forensic accounting is also a "general concept" that encompasses a wide range of different activities: from the analysis of financial statements, the identification of manipulations, to participation in court proceedings as an expert. At the same time, it is also an "occupation" because it is engaged in by an increasing number of experts who are dedicated to the detection and prevention of criminal acts. This is also about "theory" because forensic accounting relies on accounting principles, internal control and audit standards, and legal acts. Also, there are those authors who say that this is a kind of "style and art", because in order for a forensic accountant to be successful, he must also possess talent, analytical intuition, the ability to read between the lines, perspicacity and mobility in researching traces that are not always visible to the naked eye. In this regard, the analysis of fraud

cases can often be “the art of connecting seemingly unrelated data”. Despite the multiple meanings of this term, forensic accounting is gaining more and more importance, so we can state that its importance today is greater than it was yesterday, and that in the future, with the development of new technologies, new products and market relationships, it will be even greater. Since financial statements were key in fraudulent actions at the beginning of this millennium, where owners of capital suffered enormous losses, for establishing business relationships between market actors in the coming period, it is reasonable to assume that there will be a greater increase in the engagement of forensic accountants for the purpose of preventive review of financial statements, in order to convince creditors and lenders that the presented financial statements reflect the real state of the reporting entities. Therefore, it is necessary for forensic accountants’ reports to be clear, with accurate and as much verifiable information as possible, so that the client who requested the investigation can make appropriate decisions, including the decision to initiate possible legal proceedings, improve the procedures and controls currently in force, dismiss or transfer employees from one job to another, and the like.

Clearly, reporting entities with poor corporate governance and low corporate culture are more exposed to the risk of fraud, because in that situation the first line of defense against fraud (management and internal audit) is weaker. In that case, the second line of defense against fraud (external audit) is particularly important for preventing fraud or detecting some of it. If, however, there is still suspicion of fraud, forensic accountants are engaged who, with their available tools, confirm the existence of suspicion of fraud in financial statements or dispel that suspicion. Therefore, based on the above, it is reasonable to assert that a greater presence of this type of forensic accountant in business life (both in prevention and in cure) will be a new step in increasing business culture and moral values, and a barrier to the erosion of reasonable egoism and business transparency, as essential postulates of any healthy competition in the market. However, the emergence of digital assets, such as cryptocurrencies and digital tokens, which will be increasingly integrated into business transactions while leaving wide discretionary space for their valuation will certainly increase accounting fraud and manipulation of financial statements, which will also represent a critical problem in protecting global financial markets. Therefore, and in the context of increasing demands for transparency and accountability, forensic accounting is becoming a key tool in detecting manipulation and fraud in financial statements. In addition, the analysis of financial statements through ratio analysis - using analytical tools - can certainly lead to the detection of fraud in financial statements.

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APPLICATION OF MACHINE LEARNING METHODS TO BENFORD'S LAW ANALYSIS: POTENTIALS, AND LIMITATIONS

Abstract

Benford's Law has long served as a valuable statistical tool for detecting anomalies in numerical datasets, particularly in fraud detection, auditing, and forensic accounting. Traditionally, its application relies on hypothesis testing methods such as the Chi-square test, Kolmogorov–Smirnov test, or the Mean Absolute Deviation. Recent years have seen growing interest in enhancing Benford's Law-based analyses through the application of machine learning (ML) techniques, particularly in contexts where traditional statistical methods face limitations. This study surveys the current state of the art at the intersection of Benford's Law and machine learning, examining both supervised and unsupervised approaches for detecting deviations from expected digit distributions. We also review methodological advances across diverse domains such as financial auditing, digital forensics, and fraud detection, and outline promising directions for future research and applications. Special emphasis is devoted to future research, addressing its possible directions and limitations, along with data-related and methodological challenges. We conclude by outlining promising avenues for further study and practical implementation.

Key words: *Benford's Law, anomalies, forensic accounting, auditing, machine learning (ML) methods, anomaly detection algorithms*

JEL Classification: *M40, C15*

Introduction

Reports of economic offenses, including tax fraud, money laundering, corruption, and the illegal diversion of public resources, frequently appear in society. Such white-collar offenses require advanced techniques for effective identification and legal action. In this context, Varian (1972) proposed the application of Benford's Law as a diagnostic tool for identifying economic and financial datasets that warrant more detailed forensic scrutiny.

Benford's Law was originally documented by the astronomer and mathematician Simon Newcomb in 1881 and was subsequently rediscovered by the physicist Frank Benford in 1938. The law describes a specific logarithmic pattern in the distribution of leading digits across many naturally occurring numerical datasets. Contrary to the assumption of uniformity, the law indicates that lower digits appear as the first significant digit far more often than higher ones. Benford's Law has been applied across various disciplines, such as forensic accounting and fraud examination, to assist in the identification of anomalies and instances of potential data manipulation.

The application of Benford's Law in the domains of finance and accounting is widely recognized and utilized. Nigrini (1992) introduced Benford's Law for identifying fraud in tax and accounting records, and later supported this application with additional scientific evidence. In particular, Nigrini (1994), asserted that "individuals, either through psychological habits or other constraints peculiar to the situation, will invent fraudulent numbers that will not adhere to the expected digital frequencies", while Nigrini and Mittermaier (1997) advocated for its adoption as a standard analytical tool in auditing practice.

Over time, a distinct line of inquiry within accounting research has emerged, applying Benford's Law to identify fraudulent activity or the artificial manipulation of numerical data in accounting and financial documentation (Be-neish, 1999; Durtschi, Hillison, & Pacini, 2004; Asllani & Naco, 2014). Several empirical studies illustrate this approach. For example, Quick and Wolz (2003) analysed income and balance sheet data from various German companies between 1994 and 1998, finding that the first- and second-digit distributions generally conformed to Benford's Law, both in annual analyses and when aggregated over the entire study period. Tam Cho and Gaines (2007) examined financial transactions in the context of election campaign financing, identifying subsets of data warranting closer scrutiny. Rauch, Götsche, Brähler, and Engel (2011) investigated macroeconomic data reported to Eurostat by EU member states and found that Greece exhibited the greatest deviation from Benford's Law among eurozone countries. Alali and Romero (2013) analyzed more than a decade of financial statements from U.S. public companies and found significant deviations in the distribution of current assets like equipment, property, and accounts receivable.

In some studies, the methodological strengths of Benford's Law have been emphasised. For instance, Günnel and Tödter (2009) characterized it as a simple, objective, and effective approach for identifying anomalies within large datasets. Nonetheless, there remains considerable debate regarding the

best practices for its implementation. Günnel and Tödter (2009) argued that analysis should primarily focus on the first digit, whereas Ramos (2006) contended that the first three digits should be examined. According to Ramos, such an approach offers a more comprehensive “electrocardiogram” of a dataset, enabling the identification of potential fraudulent activities at a granular level.

1. Proof of Benford's Law and basic properties of the distribution

For nearly nine decades, mathematicians and statisticians have advanced diverse explanations for the empirical regularity now known as Benford's Law. Raimi (1976) reviewed a range of less formal hypotheses, including Goudsmit and Furry's (1944) proposition that the phenomenon arises from “the way we write numbers” and Furlan's (1948) suggestion that it reflects a fundamental “harmonic” property of nature. A rigorous mathematical proof was not presented until Hill (1995), who demonstrated the law's applicability to domains such as stock market data, census figures, and certain accounting records. Hill (1995) emphasized that, similar to the normal distribution, Benford's distribution is an empirically observable regularity. His proof rests on the principle that datasets adhering to Benford's Law are formed by combining numbers from multiple different distributions. When distributions are randomly selected and samples are randomly drawn from each, the aggregated significant-digit frequencies converge toward Benford's distribution, even if the individual source distributions deviate from it (Hill, 1995, 1998). This convergence arises from the combination of heterogeneous numerical sources, producing what Hesman (1999) described as a “distribution of distributions,” representing a universal manifestation of numerical randomness.

Further, Boyle (1994) contributed to the theoretical foundation of Benford's Law by showing that datasets composed of random variables from varied sources, and subsequently multiplied, divided, or raised to integer powers, tend to follow Benford's distribution. This insight clarifies why certain accounting datasets often conform closely to Benford's Law, as accounting figures are frequently the product of multiplicative processes involving independent variables. For example, accounts receivable may be calculated by multiplying units sold (from one distribution) by price per unit (from another distribution), while the cost of goods sold often results from a combination of several values, each derived from different distributions.

1.1. Fundamental statistical characteristics of Benford's Law

Benford's Law (BL) describes the empirical phenomenon whereby, in many naturally occurring datasets in many naturally occurring datasets, whether derived from mathematical tables, real-world measurements, or a combination of both, the leading significant digits are not uniformly distributed, contrary to intuitive expectations. Instead, smaller digits occur with disproportionately greater frequency. Instead, smaller digits occur with disproportionately greater frequency. Specifically, BL asserts that the significant digits in many datasets follow a defined logarithmic distribution. In its most widely recognized formulation, which focuses on the first significant digit in base-10 numbers, this phenomenon is also referred to as the First-Digit Phenomenon (Benford, 1938):

$$P(D_1 = d_1) = \log_{10} \left(1 + \frac{1}{d_1} \right), \quad (1)$$

Where D_1 denotes the first significant decimal digit. For example, according to equation (1), $P(D_1 = 1)$ is approximately 0.301, while $P(D_1 = 9)$ is approximately 0.0457, indicating that the probability of the digit 1 appearing is approximately seven times greater than that of the digit 9.

In its more general form, Benford's Law describes the joint distribution of all decimal digits: for any positive integer m ,

$$P((D_1, D_2, \dots, D_m) = (d_1, d_2, \dots, d_m)) = \log_{10} \left(1 + \left(\sum_{j=1}^m 10^{m-j} d_j \right)^{-1} \right)$$

This holds for all m -tuples $(d_1, d_1, \dots, d_m)$, where $d_1 \in \{1, 2, \dots, 9\}$ and for $j \geq 2$, $d_j \in \{0, 1, \dots, 9\}$. Here, D_2, D_3, D_4 , etc., represent the second, third, fourth, and subsequent significant decimal digits.

Nevertheless, deviations from BL should not be automatically interpreted as evidence of manipulation or poor data quality. Such deviations may result from structural changes or data characteristics unrelated to fraud. However, significant departures from the expected distribution should be treated as red flags warranting further investigation.

Digit tests commonly include first-digit and first-two-digit (FTD) analyses, collectively referred to as first-order tests. The first-digit test is the most widely discussed but offers limited diagnostic precision. A poor fit to BL in the first-digit test may suggest anomalies, but it often results in impractically large audit samples. For this reason, the FTD test is preferred, as it offers

more targeted detection of potential biases while yielding smaller, more manageable samples.

Several goodness-of-fit measures are used to evaluate conformity with BL. The Z-statistic evaluates each of the 90 possible FTD combinations separately, taking into account the deviation magnitude, expected proportion, and sample size n :

$$Z = \frac{|OP - EP| - \frac{1}{2n}}{\sqrt{\frac{EP(1 - EP)}{n}}} \quad (3)$$

Where OP is the observed proportion, EP the expected proportion, and n the total sample size. The continuity correction term $1/2n$ is applied when smaller than $|OP - EP|$ to ensure a positive numerator. While effective for individual combinations, the Z-statistic is sensitive to large n , producing statistically significant results for trivial deviations.

The Chi-square (χ^2) test evaluates the overall fit of observed versus expected frequencies:

$$\chi^2 = \sum_{i=1}^K \frac{(OC - EC)^2}{EC} \quad (4)$$

where OC is the observed count, EC the expected count, and $K = 90$ for FTD analysis. The degrees of freedom equal $K - 1$.

The Mean Absolute Deviation (MAD) metric addresses large- N sensitivity by excluding N from its computation:

$$MAD = \frac{\sum_{i=1}^K |AP - EP|}{K} \quad (5)$$

Nigrini (2020) proposes interpretation thresholds for MAD values, categorizing them into close conformity, acceptable conformity, marginal conformity, and nonconformity.

In conclusion, while multiple statistical measures can assess conformity with Benford's Law, the FTD test—supplemented by Z-statistic, χ^2 , and MAD analyses—offers a balanced approach for detecting anomalies in large datasets. Although conformity tests yield valuable insights, a deeper analysis and more holistic interpretation are necessary.

2. Integration of Benford's Law into machine learning algorithms for anomaly and fraud detection

In the era of big data, the increasing complexity of financial information demands sophisticated tools for efficient anomaly detection. Benford's Law serves as a useful initial diagnostic method in auditing, and further investigation should be conducted using sophisticated auditing strategies. Recent advances in machine learning algorithms and the methodology of Benford's Law can intersect in meaningful ways, particularly in data analysis and fraud detection. When integrated with machine learning, Benford's Law exhibits potential to provide a powerful statistical feature for detecting deviations. By embedding these metrics into predictive models, these measures can potentially more effectively uncover irregularities, such as falsified financial statements, abnormal transaction patterns, irregular election data, or manipulated scientific results, etc. This intersection has attracted growing attention not only from the academic community but also from practitioners and industry, given its importance in financial fraud detection. Scientists have shown increasing interest in integrating Benford's Law with machine learning. Recent investigations have focused on integrating these approaches to enhance anomaly and fraud detection across various domains. Frameworks combining statistical analysis of digit distributions with advanced ML methods have been studied, leading to more interpretable detection systems. Detecting financial statement fraud is crucial for maintaining the integrity of financial systems and ensuring their proper functioning. However, traditional methods such as audits, internal controls, and regulatory oversight often prove to be insufficient.

2.1. Current advances in the application of Benford's Law within machine learning

Despite the existence of regulatory frameworks, financial fraud remains widespread due to the increasingly sophisticated nature of fraudulent schemes and the limitations of current detection methods (Beneish, 1999). As a result, there is a growing need for advanced, data-driven approaches to more effectively detect and prevent financial statement fraud. Traditional methods for detecting financial statement fraud primarily rely on audits and forensic accounting techniques. While these approaches are important, they are inherently limited by the scope of human judgment and expertise. Rule-based systems, dependent on preset thresholds and the detection of statistical anomalies, such as excessive revenue growth or irregular changes in financial ratios, are constrained by notable limitations. Fraud schemes often

evolve specifically to bypass these static detection mechanisms, as perpetrators adapt their methods to avoid triggering known alerts (Perols, 2011). Additionally, such systems tend to produce a high volume of false positives, overwhelming auditors and regulators and making it more difficult to isolate actual instances of fraud (Ngai et al., 2011; Hasan et al., 2024). Another significant challenge is the growing complexity of financial transactions and global supply chains, which have outpaced the capabilities of traditional detection methods.

Despite these advancements, current machine learning approaches still face notable limitations. One of the primary issues is the imbalance in fraud datasets, as fraudulent instances represent only a small fraction of all financial records. This imbalance can compromise model performance, often leading to a high rate of false negatives where fraudulent activities go undetected (Hossain et al., 2024). In addition, many machine learning models, particularly those based on deep learning, are often perceived as “black boxes,” offering little transparency or insight into how decisions are made. This lack of interpretability creates difficulties for auditors and regulators, who require clear, justifiable outcomes to support their assessments (Molnar, 2019).

Hybrid and unsupervised learning models may provide new ways to detect fraud patterns that traditional models might miss, offering valuable insights for academic researchers and professionals in auditing, compliance, and corporate governance. Song et al. (2014) indicated that statistical and machine learning techniques, such as logistic regression, artificial neural networks, and support vector machines, utilize historical data to identify anomalies, thereby enhancing the accuracy and reliability of fraud detection systems. In an effort to improve fraud detection accuracy, Le, L., & Mantelaers, E. (2024) employ learning methods, in particular K-means, to establish a framework for auditors to apply once anomalies are detected using Benford's Law. Graph representation learning has gained attention for its ability to capture complex relationships in financial data. Li's study (Li, 2023) on the integration of multiple relational graphs for fraud detection highlights the effectiveness of these approaches in capturing the complex interconnections within financial data, thereby improving the accuracy and reliability of fraud detection systems.

3. Conceptual frameworks for integrating Benford's Law within machine learning

Financial statement fraud has long represented a significant challenge for businesses, regulators, and investors due to its detrimental effects on market

confidence and economic stability. Over the years, a variety of methods have been developed to detect fraudulent financial reporting, ranging from traditional statistical approaches to modern machine learning techniques. This section reviews these methodologies, traces their evolution, and identifies gaps in the current research, particularly in the application of machine learning and artificial intelligence.

As a gap in traditional approaches, we underline the following fact. While traditional methods provide useful insights, they are limited by their reliance on fixed rules and thresholds, which can be bypassed by increasingly sophisticated fraud tactics. Additionally, many of these approaches generate high false-positive rates, overwhelming auditors with cases that may not involve actual fraud. A major drawback is their inability to learn and adapt over time—an essential capability in an environment where fraudulent strategies are constantly evolving (Ngai et al., 2011). As a result, detecting financial statement fraud now requires the adoption of more advanced, data-driven approaches, such as machine learning and artificial intelligence (AI).

3.1. Towards the incorporation of Benford's Law into machine learning frameworks

Researchers often draw on the Fraud Triangle Theory, introduced by Donald Cressey in 1953, to understand the core factors that contribute to financial fraud. The theory suggests that three key elements must be present for fraud to occur: (1) pressure, often arising from financial hardship or unrealistic performance targets; (2) opportunity, usually enabled by weak internal controls; and (3) rationalization, where the individual justifies their fraudulent actions as necessary or harmless (Dorminey et al., 2012). This framework remains widely used in fraud detection research, as it provides a theoretical basis for understanding the motivations and conditions that drive fraudulent behaviour.

In addition to the Fraud Triangle, researchers have identified specific financial statement indicators that may signal potential fraud. These include sudden shifts in financial ratios, discrepancies between reported earnings and cash flows, and unusual patterns in accruals (Beneish, 1999). Machine learning models can be trained to detect such red flags by analyzing large volumes of financial data, offering greater accuracy and sensitivity in fraud detection compared to traditional methods.

While machine learning holds great promise for improving fraud detection, addressing the challenges of class imbalance, data availability, model interpretability, and overfitting is essential for developing robust and trustworthy systems. Ongoing research plays a critical role in refining these models, ensu-

ring they remain effective in real-world applications while maintaining transparency and trustworthiness (Pan, 2024; Alarfaj et al., 2022). This section explores key machine learning techniques applied in fraud detection, including logistic regression, decision trees, random forests, support vector machines (SVM), and deep learning models.

Logistic regression is a foundational machine learning technique widely used in financial fraud detection due to its simplicity and ease of interpretation. This statistical model estimates the probability of a binary outcome, fraud or no fraud, based on input variables such as financial ratios and corporate governance indicators. Studies by Dechow et al. (2011) and Perols (2011) have demonstrated the effectiveness of logistic regression as a baseline method for detecting earnings manipulation and financial misstatements. However, despite its widespread use, logistic regression assumes a linear relationship between predictors and the outcome, which may not adequately capture the complexity of sophisticated fraud schemes.

Decision trees are a widely adopted machine learning technique in fraud detection, known for their ability to classify data by recursively splitting it into subsets based on the most informative features, forming a hierarchical, tree-like structure. Their high level of interpretability makes them especially valuable to auditors and regulators who need clear explanations for model decisions. Kirkos et al. (2007) applied decision trees to detect financial statement fraud among Greek firms, achieving promising results. However, decision trees can be prone to overfitting, particularly when dealing with complex datasets containing many variables, which can limit their ability to generalize to new data (Ngai et al., 2011).

Random forests address the overfitting challenges commonly associated with decision trees by constructing multiple trees from different subsets of the data and averaging their predictions. This ensemble approach enhances model robustness and has proven effective in a variety of applications, including fraud detection. In a comparative study of machine learning algorithms, Perols (2011) found that random forests outperformed other models in detecting financial statement fraud, notably achieving lower false-positive rates. Additionally, random forests handle high-dimensional data well, making them suitable for large datasets with many features. However, like decision trees, they can be difficult to interpret, particularly when a large number of trees are used (Breiman, 2001).

Support Vector Machines (SVMs) are a widely used machine learning algorithm in the field of fraud detection. They work by identifying the optimal hyperplane that separates fraudulent from non-fraudulent cases within a multidimensional feature space. One of the key strengths of SVMs is their ability

to handle high-dimensional data, making them well-suited for analyzing complex financial datasets. Cecchini et al. (2010) demonstrated the effectiveness of SVMs in detecting financial misstatements, particularly when combined with feature selection methods. However, SVMs can be computationally intensive and generally offer less interpretability than simpler models such as decision trees or logistic regression (Phua et al., 2010).

In recent years, neural networks, particularly deep learning models, have attracted growing interest for their potential in detecting financial statement fraud. These models consist of multiple layers of interconnected neurons, enabling them to capture complex, non-linear relationships between input variables and outcomes. Their ability to detect subtle patterns in large datasets makes them especially effective at identifying sophisticated fraud schemes (Zhou & Kapoor, 2011). However, deep learning models are often criticized for their lack of transparency, frequently being referred to as “black boxes,” which presents a major limitation for auditors and regulators who require a clear understanding of the model’s decision-making process (Molnar, 2019). The use of deep learning in fraud detection is still relatively new, with limited research fully exploring its capabilities. Some studies have applied convolution neural networks (CNNs) and recurrent neural networks (RNNs) to time-series financial data, achieving promising results. These models are capable of recognizing temporal patterns, allowing for the detection of fraudulent behavior that evolves over time. Nevertheless, challenges such as limited interpretability and the need for large, high-quality labeled datasets remain significant barriers to the widespread adoption of deep learning in this domain.

There is growing interest in developing hybrid models that combine multiple machine learning techniques to improve accuracy and reduce false positives. For example, Chen, Li, and Wu (2020) proposed a hybrid approach that merges logistic regression with decision trees and random forests. This model leverages the interpretability of logistic regression along with the strong predictive performance of ensemble methods, resulting in a more robust solution for detecting financial fraud. Additionally, hybrid frameworks that incorporate both supervised and unsupervised learning have been explored to detect not only known fraud patterns but also previously unidentified anomalies (Ngai et al., 2011). Toosi, F. G. (2025) investigates the Degree of Benford’s Law Existence (DBLE) in two language model methodologies and finds that model weights, regardless of optimizer, conform to Benford’s Law. Monkam, G. F., Yan, J., & Bastian, N. D. (2025) proposed a forensic-based framework to detect poisoning in machine learning models, showcasing enhanced detection performance and providing a robust, interpretable method for safeguarding models in real-world settings.

3.2. Advances in the state-of-the-art integration of Benford's Law with machine learning

In general, the object of analysis is the dataset which incorporates a combination of key financial and non-financial variables relevant to predicting financial statement fraud. Financial indicators included revenue growth rate, profit margin, current ratio, and total debt-to-equity ratio—all commonly linked to potential signs of fraudulent reporting (Batista et al., 2004). In addition, non-financial features such as audit fees are included, as they provide valuable insight into corporate governance practices that may influence the credibility of financial disclosures (Padmaja et al., 2007). The selection of these variables was informed by prior research that has consistently identified them as reliable indicators of accounting manipulation (Setiawan, 2023).

The performance of the model is usually assessed using a range of evaluation metrics, including accuracy, precision, recall, F1-score, and the AUC-ROC curve (Joudaki et al., 2014). Accuracy reflects the overall proportion of correct predictions, while precision and recall measure the model's effectiveness in correctly identifying fraudulent cases. The F1-score, which balances precision and recall, is particularly useful in scenarios with class imbalance—a common challenge in fraud detection (Polvimoltham & Sinapiromsaran, 2021). The AUC-ROC curve evaluates the model's ability to distinguish between fraudulent and non-fraudulent instances, with a higher area under the curve indicating better discriminatory performance (Phua et al., 2004).

Given the inherent class imbalance in fraud detection datasets, techniques such as SMOTE (Synthetic Minority Over-sampling Technique) are usually applied to increase the number of fraudulent instances by generating synthetic samples. Additionally, undersampling of the majority class is considered a complementary approach to mitigate imbalance, though this carries the risk of discarding informative data (Leevy et al., 2018). To ensure reliable model evaluation, the dataset is split into training and testing sets, usually using an 80/20 ratio, and K-fold cross-validation is implemented to enhance the model's ability to generalize to unseen data (Pozzolo et al., 2014).

An important step in analysis is comparison with existing methods. Conventional approaches, such as rule-based systems and statistical techniques like Benford's Law and Z-score analysis, are employed as benchmark models for comparison. While these methods are well-established in auditing and fraud detection practices, they often fall short in terms of scalability and adaptability to evolving fraud patterns.

An important area for future research is to extend the forensic framework combined with Benford's Law to larger-scale and real-world datasets, including those from autonomous systems. Additionally, the integration of advanced explainable AI techniques will be a key focus to improve interpretability.

Conclusion

The aforementioned studies reveal several key insights. First, machine learning models, especially ensemble methods, outperform traditional rule-based approaches in accuracy, recall, and AUC-ROC. Second, non-financial indicators such as corporate governance factors often play a more crucial role in detecting fraud than conventional financial metrics. Third, addressing class imbalance through techniques like SMOTE and undersampling is vital for improving recall and ensuring fraud cases are not missed. Lastly, while complex models like random forests excel in predictive accuracy, they pose interpretability challenges; however, tools like feature importance analysis and SHAP help provide transparency into their decision-making processes. The results of this type of study offer several valuable practical implications for auditors, regulators, financial institutions and forensic accountants. Machine learning models can be integrated into existing audit systems to identify high-risk financial statements, allowing auditors to prioritize and concentrate their investigative efforts more efficiently. By relying on model-generated risk scores, regulatory agencies can utilize machine learning models to detect potentially fraudulent financial statements earlier in the reporting cycle. Financial institutions can integrate fraud detection models into due diligence processes to assess risk, support informed decisions, and reduce exposure to financial loss. Forensic accountants can use machine learning to faster identify suspicious patterns in financial statements.

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FROM VALUE TO VERDICT: FORENSIC VALUATION AT THE CROSSROADS OF FINANCE AND LAW

Abstract

Forensic valuation services occupy a critical, yet often misunderstood space where financial analysis, legal context and expert judgment intersect. Unlike conventional valuation, forensic valuation demands more than technical precision, for it requires contextual interpretation tailored to courts proceedings and evidentiary standards. This paper explores the role of forensic valuation in Bosnia and Herzegovina's evolving legal and financial landscape, outlining its use in commercial disputes, family law and insolvency cases. Drawing on a case study and appraisers' insights, the paper illustrates how valuation outcomes are shaped not only by valuation method but by the context of court proceedings, assumptions and expected use of valuation. The study highlights methodological challenges, such as limited data, conflicting interests, and retrospective valuation and emphasizes the dual responsibility of appraiser: to provide objective valuation and remain ethically resilient in adversarial environments. The work points the need for more consistent application of professional standards, legal standardization of valuation and institutional mechanisms strengthening that would represent support for the appraiser in performing fair, objective and professional valuation in complex legal proceedings.

Key words: *forensic valuation, court proceedings, expert judgement, appraiser, forensic expert, fair value*

JEL Classification: *G32, K41*

Introduction

In contemporary legal and economic settings, forensic valuation refers to the estimation of economic value conducted specifically for purposes of litigation, regulatory proceedings or dispute resolution. Unlike traditional valuation, which is typically undertaken for internal decision-making, investment analysis or financial reporting, forensic valuation is distinguished by its legal anchoring, evidentiary standards, and the heightened scrutiny it must withstand in adversarial or judicial environments.

The field has gained particular relevance in post-transition economies, where institutional frameworks are still evolving, and legal disputes increasingly

involve complex questions of business value. The demand for forensic valuation services has expanded across commercial litigation, insolvency procedures, marital property disputes, and forensic accounting investigations, often placing valuation experts at the intersection of law, finance, and ethics. Forensic valuation demands both methodological rigour and procedural awareness, particularly when conducted under the pressures of litigation or judicial evaluation.

Forensic valuation is essential in a wide range of scenarios, including:

- *Commercial disputes*, such as shareholder oppression cases or damage quantification;
- *Bankruptcy and insolvency processes*, where asset tracking and fairness of asset sales must be assessed;
- *Family law proceedings*, notably in the valuation of business interests during divorce settlements;
- *Fraud or financial misstatement*, where valuation assists forensic accounting in reconstructing economic realities;
- *Tax disputes and transfer pricing issues*, where defensible valuations serve to support or contest tax assessments.

This paper aims to explore the methodological, legal, and ethical dimensions of forensic valuation within the context of family law disputes in Bosnia and Herzegovina, using a case study to illustrate the strategic application of valuation methods under adversarial conditions.

The structure of the paper is as follows: Introduction, Legal context in Bosnia and Herzegovina, Methodology framework and valuation setting, Forensic valuation in practice: The case of GInvest in marital dispute proceedings, Interpretation and discussion, Implications for Practice, Conclusion and Reference list.

1. Legal context in Bosnia and Herzegovina

The engagement of independent appraisers or expert witnesses in court cases where the subject is the assessment of the value of property, most often real estate or companies, and the problems that may arise during the division of such property in the event of a divorce have been researched in scientific and professional journals. Barson (2011) published a book that deals with all the important issues of hiring an accountant as a financial expert in determining the value of property. Feder (2022) dealt with similar topics in his book. Tumminio (2006), was analysing the American judicial system, emphasized how important it was that the courts relied more on the engagement of independent business appraisers as a source of reliable information.

Although there has been the Association of Certified Appraisers in Bosnia and Herzegovina (BiH) since 2010, there are no law or legal regulations that regulate specific areas such as real estate valuation or company valuation. Appraisers in BiH are generally hired by banks, insurance companies, private companies or investors, and the court can hire them only if the appraiser is also a court expert. In BiH, appraisers are obliged to act in accordance with International Valuation Standards in their work. Unlike appraisers, court experts must be officially appointed by the competent Ministry of Justice (Republic of Srpska, RS or Federation of BiH, FBiH) or the judicial commission if they are experts in the Brčko District.

The term „Court Expert” is much more common in legal regulations, and several laws define when and in what way court experts are hired, and this primarily refers to engagements in court processes. The legal framework for the field of expertise primarily consists of the relevant laws on experts, the laws on criminal procedure and the laws on civil procedure. Table 1 provides a brief overview of the mentioned regulation.

Table 1: Legal framework related to expert witness engagement

Legal framework	The scope of the law regarding the engagement of expert witness
The Law on Expert Witness	The conditions for performing the work of experts, the appointment and dismissal of experts, the rights and obligations of experts, the supervision of the work of experts and other important issues of importance for the work of experts are defined.
Criminal Procedure Code	A written order for expert testimony is issued by the prosecutor or the court. It is the duty of the expert to submit detailed explanations of their conclusions together with the report. False testimony is a criminal offense. Expertise of accounting records is also defined by these laws.
Civil Procedure Law	At the request of the involved party, the court may order the presentation of evidence by expert testimony. The expert opinion is generally performed by one expert, and the experts are obliged to respond to the summons of the court and to present their findings and opinion. No later than eight days before the main hearing, the court delivers the expert's findings and opinion to the parties. Experts have the right to reimbursement of expenses and a reasonable fee for the performed expertise.

Source: Authors' illustration based on the relevant legislation

Similar to BiH, other countries in the region do not have a legal framework that primarily deals with the appointment and role of appraisers, with the fact that in some countries, such as Croatia, Serbia and Albania, there are legal regulations that regulate the assessment of real estate values.

A lot has been written about the rights of spouses in divorce proceedings through court practice in BiH in the works of legal experts and scientists, but no research has been found that deals with the same subject of research as in this paper.

2. Methodology framework and valuation setting

As in this paper, in several earlier works the case study method was used to indicate the importance and challenges of engaging appraisers from the economic profession in court cases. For example, using an example from Finnish judicial practice, Savolainen (2012) describes how the use of the discounted economic income method can affect the value of a company, but also how important it is to take into account the legal aspects of each individual jurisdiction. In Finland, the valuation date is the date of the partition. The income after that date does not belong to the marital property. Haag, and Sund (2016) through the example of Swedish legal practice, emphasize how much a divorce can be costly for both the owners and the firm, and it can result in ownership changes that hamper the firm's development. Lohrey (2015) shows the basic differences between the market value and the strategic value of the company on the case study.

The following case study is based on a realistic litigation case study in BiH, where forensic valuation services are increasingly called upon in family law and commercial disputes. Courts in the region, in line with the procedural framework of the Republic of Srpska, tend to demand precise, single-point valuations, even in the presence of methodological uncertainty or ranges. This practice places pressure on expert witnesses and certified appraisers to simplify complex valuation realities into definitive conclusions, often influenced by legal strategy or party interest.

The case study underscores the interplay between legal expectations, professional judgment, and economic modelling in adversarial valuation contexts. Special emphasis is placed on contextualizing valuation methods within local legal standards, using a combination of discounted cash flow (DCF), adjusted book value, and multiples, with weighted average cost of capital (WACC) inputs derived from recognized sources and calibrated for BiH specific risks.

3. Forensic valuation in practice: The case of GInvest in marital dispute proceedings

The case illustrates the practical, legal, and ethical dimensions of forensic valuation, particularly in a country with a bank-dominated financial system, underdeveloped capital markets, and courts that require a single-point valuation, rather than a range. All monetary values in this paper are expressed in BiH official currency “konvertibilna marka” (KM); the ISO currency code is BAM.

3.1. Context and purpose

This case study presents a forensic valuation engagement situated in BiH, where courts increasingly rely on appraisers as experts in marital, commercial, and insolvency disputes. The case focuses on a contested valuation of a privately held construction firm as part of divorce proceedings. It demonstrates how the same firm can yield differing values depending on assumptions, methods and purpose.

3.2. Background

GInvest, a limited-liability company, is a construction firm based in RS, BiH. It was founded in 2010 by Mr M, who initially held 100% ownership. His wife, Mrs M, joined the firm in 2013 as financial manager and helped oversee major operational restructuring. By mid-2024, the firm had grown to 25 employees, with steady revenues from residential and municipal projects. The divorce proceedings included a legal dispute over whether, and to what extent, the value of GInvest should be considered marital property. Both parties engaged appraisers to estimate the firm’s fair market value as of the separation date.

Following the couple’s separation in December 2024, both parties claimed differing stakes in the firm’s value. The wife argued that the business’s success was substantially due to marital efforts and should be *subject to division*. The husband insisted it was *pre-marital*, and its current value reflects external market conditions, not joint contribution.

3.3. Valuation scope

Valuation Date: 30 December 2024

Purpose: Forensic valuation for marital property division

Requirement: As per court practice and legal requirements in BiH, the expert engaged for valuation must provide a definitive single valuation, supported by accepted methodology.

3.4. Valuation by wife's expert: Appraiser A

DCF valuation method, using WACC

The wife's expert argued for a forward-looking valuation that captures the firm's future income potential, emphasizing her own contribution to its growth during the marriage.

1. Base inputs, and assumptions:

Free cash flow (Year 1): KM 105,000

Growth rate: 6% annually over 5 years

Terminal growth rate: 2%

WACC: 13% (adjusted for BiH risk, using Capital Assets Pricing Model (CAPM) with Damodaran data)

Debt: KM 130,000

Forecast horizon: 5 years

2. WACC Calculation:

a) *Appropriate Risk-Free Rate (Rf) for BiH:*

For calculation of the cost of equity, the appraiser used CAPM. While German Bonds (2–2.5%) are stable, using BiH government bonds as Rf (~6% yield) can be justified. The firm's cash flows are domestic, so local Rf reflects currency and economic risk more accurately. However, that includes *both risk-free and country risk*, which overlaps with country risk premium (CRP). The appraiser's preferred approach was to use German Bond Rf (~2.3%) and separately layer country risk premium for clarity and methodological purity.

b) *Cost of Equity:*

From Damodaran database (Damodaran, 2024a, 2024b, 2024c) data are:

Default spread: 6.44%

Equity Risk Premium (ERP): 13.01%

Country Risk Premium (CRP): 8.68%

β (construction sector Small And Medium Enterprises (SME), unlevered): 0.9

Mature Market ERP = 5.5%

In this case study, an unlevered beta ($\beta = 0.9$) was used, consistent with sector data for construction SMEs. An unlevered beta was applied to isolate business risk from capital structure and financial risk, as often done in forensic or litigation contexts where the firm's actual debt/equity ratio may not be stable

or reliable. Alternatively, a levered beta could be derived using the company's D/E ratio. However, the expert's choice of unlevered beta reflects a conservative approach.

If an expert used levered beta, calculation would be: $D/E = 0.3 / 0.7 = 0.4286$.

$$\beta_{\text{levered}} = \beta_{\text{unlevered}} \times [1 + (1-T) \times D/E] = 0.9 \times (1 + 0.9 \times 0.4286) = 1.247$$

$$\text{CAPM} = 2.3\% + 1.247 \times 5.5\% + 8.68\% = 17.84\%$$

The levered beta would significantly increase the cost of capital and lower the firm value. The choice of unlevered beta aligns with the objective of producing a higher firm value, as a lower WACC leads to higher firm valuations. In this case, the expert was appointed in the context of a divorce settlement, where maximizing the value of the business, prior to division, was an explicit goal. Such assumption-based positioning is a recognized feature of forensic valuation practice.

$$\text{CAPM} = R_f + \beta (\text{ERP}) + \text{CRP} = 2.3\% + 0.9 \times 5.5\% + 8.68\% = 15.93\%$$

The applied CAPM formula follows the *additive CAPM approach*. The used unlevered beta is derived from the construction sector in a mature market (Damodaran, 2022), and thus does not capture country-specific risks associated with Bosnia and Herzegovina, such as sovereign instability, regulatory uncertainty, and legal enforcement concerns. Consequently, the Country Risk Premium is added separately, in line with Damodaran's methodology. This approach ensures a clean separation of global market risk (captured by $\beta \times \text{ERP}$) and local country risk (captured by CRP), aligning with best practices in emerging market valuation.

The cost of equity is 16%. This aligns with local risk perceptions and Damodaran's high equity risk premium (ERP) for BiH.

c) Cost of Debt:

Although average corporate lending rates in BiH hover around 4–6% (CBBH, 2024), a 7% pre-tax cost of debt is used to reflect firm-specific credit risk and market conditions consistent with contested ownership, time of borrowing and limited transparency. In forensic valuation, a slightly higher cost of debt can be seen as prudent to offset any upward bias in projected cash flows or terminal value. The appraiser explained it reflected an approach that resisted overvaluation - important when equity interest was disputed.

GInvest borrows at 7%, and with 10% corporate tax:

$$r_d (\text{after-tax}) = 7\% \times (1 - 0.10) = 6.3\%$$

d) *Weights (Debt & Equity):*

GInvest has following structure of capital: Equity: 70% and Debt: 30%

e) *WACC Calculation (Parino et al., 2021):*

$$WACC = \left(\frac{E}{(E + D)} \times r_e \right) + \left(\frac{D}{(D + E)} \times r_d \times (1 - T) \right)$$

E= Equity (70%)

D= Debt (30%)

r_e = Cost of equity $\approx 16\%$

r_d = Cost of debt $\approx 7\%$

T = Tax rate = 10%

$$WACC = 0.7 \times 16\% + 0.3 \times 6.3\% = 11.2\% + 1.89\% = 13.09\% \rightarrow 13\%$$

WACC is around 13% defensible for a mid-sized construction firm in BiH.

3. *Firm value:*

a) *Projection of discounted cash flows:*

Table 2: Projection of discounted cash flows for GInvest for 5-year period in KM

Year	Free Cash Flow	Discount Factor (13%)	Present Value
2025	105,000.00	0.885	92,920.35
2026	111,300.00	0.783	87,164.23
2027	117,978.00	0.693	81,764.67
2028	125,056.68	0.613	76,699.60
2029	132,560.08	0.543	71,948.30
Terminal Value	1,229,193.45		667,156.97
Total value			1,077,654.13

Source: Authors' calculation and adaptation

b) *Terminal Value:*

$$TV = \frac{FC_{2029} \times \text{growth rate}}{WACC - g} = \frac{132,560.08 \times 1.02}{0.13 - 0.02} = \frac{135,211.28}{0.11} = 1,229,193.48KM$$

$$PV_{TV} = PV \times \text{discount factor} = 1,229,193.48 \times 0.543 = 667,156.97KM$$

c) DCF Valuation Summary (Wife's Expert):

Present value of 5-year forecasted FCFs: 410, 497.16

Present value of Terminal value (discounted): 667,156.97

Firm Value (FV): 1,077,654.13

Less Debt: 130,000

Equity Value: KM 947,654.13

4. Equity Value:

Equity value = KM 947,654.12

Appraiser A commentary:

"The firm is stable and continues to grow. Given the regular inflow of public tenders and the management team's consistency, the DCF method provides a realistic reflection of its value. The growth assumptions are based on prior years' trends and planned contracts."

5. Sensitivity to WACC:

In discounted cash flow models, WACC acts as the discount rate, i.e.: lowering WACC increases the present value of both future cash flows and terminal value.

For example, reducing WACC from 13% to 11% can increase firm value by 10–15%, depending on the growth assumptions. This effect is even more pronounced on the terminal value, since it is a perpetuity formula: If WACC decreases, the denominator shrinks → TV increases sharply.

6. Implication for Practice:

A court or opposing party may challenge a WACC that is too high (deflating value) or too low (inflating value). That's why defensibility of assumptions and not just output is critical in forensic valuation. The wife's expert adopted a forward-looking valuation using the DCF method, based on the assumption that the firm's future cash-generating ability reflects both market opportunity and the managerial contributions made during the marriage.

3.5. Valuation by Husband's Expert: Appraiser B

Market Multiples Valuation Model

The husband's expert opted for a conservative valuation method based on market multiples to limit firm's value, arguing that it better reflects the firm's observable earning (Earning Before Interest, Taxes, Depreciation And Amortization, EBITDA) capacity in a relatively illiquid, privately held SME market

such as BiH. This approach avoids speculative future forecasting and relies on historical financial performance.

1. Base inputs and assumptions:

Table 3: Market Multiples Valuation Model

Item	Value in KM	Notes
EBITDA (3-year average)	195,000	Normalized, excludes owner-specific bonuses
EV/EBITDA multiple	4.2 x	Conservative SME construction multiple in BiH
Debt	130,000	Book value of financial obligations

Source: Authors' calculation and adaptation

a) Normalized EBITDA (3-year average):

Based on the firm's financial records, the average adjusted EBITDA over the past three years was calculated as:

EBITDA = KM 195,000

b) Selected Market Multiple:

A multiple of 4.2× was applied. This figure reflects private-sector construction companies in the South-Eastern Europe (SEE) region, adjusted for firm size, limited scalability, customer concentration and market illiquidity. The multiple is based on empirical benchmarks and transaction data - industry norms for emerging-market SME construction firms, generally ranging from 4× to 6× EBITDA. Damodaran's sector and regional datasets (Thompson Reuters Business Classification/Organization for Economic Cooperation and Development, TRBC/OECD) typically show EV/EBITDA multiples for engineering & construction between 9–16× in developed markets; where EV is equity value. For smaller private firms in BiH/SEE, multiples are significantly lower, often 4× to 5×, sometimes even 3× for risk-averse buyers. While 4.2× is defensible, it is more a mid-range assumption. The expert intentionally avoided global listed firm benchmarks, recognizing they would inflate value expectations beyond what is typical in the BiH private market.

2. Firm value (FV):

$FV = EBITDA \times \text{Multiple} = 195,000 \times 4.2 = \text{KM } 819,000$

Debt Deduction: The expert subtracted KM 130,000 in firm debt to arrive at the final equity value.

3. *Equity Value:*

Equity Value = EV – Debt = 819,000 – 130,000 = KM 689,000

Appraiser B commentary:

“The firm’s recent performance is consistent but does not justify a valuation based on aggressive growth projections. Given the firm’s reliance on public tenders, moderate regional activity, and its limited liquidity profile, a valuation anchored in market multiples is more appropriate. The chosen multiple reflects transactions in similar privately held construction businesses in Southeast Europe. The DCF method used by the opposing expert relies on speculative growth and underestimates risk exposure.”

4. *Sensitivity to Multiple Selection:*

Given that valuation via multiples is highly sensitive to the choice of multiplier, the following illustration shows the impact of modest variation:

At 4.0× multiple: Equity = KM 650,000

At 4.5× multiple: Equity = KM 747,500

Conclusion: A shift of 0.5× in the multiple changes the equity value by nearly KM 100,000, underlining the importance of defensible justification in expert testimony.

5. *Implication for Practice:*

Valuations based on EBITDA multiples can be challenged if the selected multiple lacks empirical grounding or sectorial justification. In forensic contexts, it is not the final number, but the credibility and transparency of the underlying data that often determines admissibility and influence in court.

3.6. Court Decision

After reviewing the financial documentation submitted by both parties, as well as the expert reports provided by their respective appraisers as documentary evidence, the court followed the legal procedure. Acting on request from parties, court appointed expert to appraise the value of the firm.

The court-appointed expert applied the third valuation method, incorporating adjusted book value and while also considering industry-specific risks and country’s macroeconomic context. The court-appointed appraiser found that both experts’ reports reflected assumptions aligned with the legal interests of the party that commissioned them. The final valuation by a court-appointed expert determined the total value of the firm at KM 960,000. After subtracting the debt, equity value amounted KM 830,000. The court

accepted the findings of the court-appointed expert as the primary basis for verdict, pursuant to the Civil Procedure Act.

Given the wife's contribution to business development and operational management, and based on documented shareholding and equitable considerations, the court awarded her a 40% share of the firm, entitling her to a compensation of KM 332,000.

4. Interpretation and discussion

Although both parties presented valuation reports prepared by privately engaged experts, the Civil Procedure Act treats such reports only as documentary evidence (*dokumentarna isprava*), not formal expert testimony (*vještačenje*). Only a valuation issued by a court-appointed expert, following a court order prompted by one or more parties, constitutes admissible expert evidence in the procedural sense. The burden of proof for the claims made lies with each party. Expert examination in the true sense of the word is conducted only by a court order, provided it was preceded by a proposal from one or more parties. Only such an expert report and opinion, issued upon court appointment, is treated as evidence i.e. expert testimony. Under our procedural legislation, the court establishes the procedural truth, which means that parties are obliged to submit evidence supporting the circumstances they claim.

This distinction highlights the importance of court-appointed expertise in valuation disputes. In practice, this means the court may either disregard party-provided valuations or use them only as supporting documentation, not as determinative proof. In the adversarial context of litigation, the appraiser's role resonates with the enduring legal principle of Roman law: "*Da mihi facta, dabo tibi ius*" or "*Give me the facts, and I will give you the law.*" This maxim, originating from the *Digest of Justinian*, underscores the division between fact-finding and legal interpretation. In forensic valuation, this principle demands rigorous factual grounding, as the value assigned may ultimately define rights, obligations, and justice itself.

This case study illustrates how valuation methods are not merely technical tools but often strategically selected instruments in litigation. In adversarial valuation, each report carries embedded judgments about the firm's future, risk profile, and economic context, which can diverge significantly even with access to the same financial data. Forensic appraiser's role as court-appointed expert is in following:

- Examine assumptions from both sides;
- Possibly apply a third method to cross-reference value;
- Investigate and confirm revaluation claims;
- Offer a single-point value.

This case study underscores the inherent tension between methodological rigor and adversarial legal contexts in which forensic valuation unfolds. The GInvest case study reveals persistent challenges: limited data reliability, diverging party interests, and the pressure of retrospective valuation, each capable of distorting the valuation narrative. In such environments, the appraiser carries a dual responsibility: to uphold technical objectivity and to navigate ethically amid conflicting legal strategies. The forensic valuation is a professionally exposed role within institutional fragility. The study emphasizes the pressing need for more harmonized professional methodologies, institutional safeguards and clearer legal standards by introducing the law regulating the valuation that would reduce the pressure on individual experts and support the delivery of balanced, court-acceptable valuations in complex proceedings.

5. Implications for Practice

Implications for the practice can be summarized in following:

- *Assumption sensitivity must be disclosed:* Experts should clearly document how small changes in key variables, such as discount rate, growth assumptions, or valuation multiples affect the final value (Pratt & Niculita, 2008).
- *Method selection reflects purpose and pressure:* The chosen valuation method must be not only technically sound but also contextually appropriate. In divorce cases, income-based methods (e.g., DCF) often favour the claiming party, while market or asset-based methods may support the defending party.
- *Court-appointed experts require forensic awareness:* When acting as neutral appointees, appraisers are expected to assess the plausibility of inputs, evaluate retrospective claims and ensure procedural fairness. A third, balancing method may sometimes be necessary to test and anchor competing results.
- *Local context demands adaptation, not imitation:* Application of International Valuation Standards (IVSC, 2025) must be tailored to local legal and economic conditions. Capital market inputs (CRP, ERP) and adjusted WACC must reflect BiH's structural realities.
- *Professional judgement is not a variable, but the core:* In jurisdictions like BiH, where financial reporting is often inconsistent and institutional pressures are high, the appraiser's ethical compass and capacity to withstand pressure become defining. Sound judgement, full disclosure of assumptions, and transparent rationale are extremely valuable to the court.
- *From Technician to Interpreter:* Ultimately, the forensic appraisers' work lives at the crossroads of evidence, ethics, and judicial expectation. Supporting their independence through clearer standards, legal recognition, and institutional protection is essential for fair outcomes in complex disputes.

Conclusion

Forensic valuation is as much art as science, anchored in method, shaped by purpose. Its relevance in transitional and developing legal systems is growing steadily. To ensure consistency, transparency, and credibility in litigated valuation, the profession urgently requires clearer guidelines, professional standardisation and stronger institutional support. Such support is particularly seen in legal recognition through the establishment of a dedicated law regulating the valuation profession in the Republic of Srpska and Federation of BiH. There is currently no statute or regulatory framework specifically governing the practice of valuation in BiH.

This case study illustrates that forensic valuation in divorce proceedings is shaped not only by methodology, but also by the strategic interests, narrative framing, and legal expectations of each party. While both DCF and market multiples are methodologically valid, their application becomes highly contextual in adversarial settings.

In BiH, where the legal system demands a definitive value and expert independence is critical, the role of the appraiser entails careful judgement, ethical resilience, and transparent reasoning. The contrasting results in this case underscore the inherent subjectivity of valuation when assumptions are contested and data are incomplete or asymmetric. Forensic valuation is not a mechanical task but a disciplined act of interpretation, performed within legal constraints, but guided by professional integrity.

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STUDY OF USER ATTITUDES TOWARDS THE USE OF PAYMENT CARDS ON THE SERBIAN MARKET

Abstract

A qualitative study of the use of payment cards on the Serbian market was conducted from June to October 2024. The purpose of the study was, on the one hand, the benefits and, on the other hand, the fears and pain points when using payment cards. The reason for this study is the still insufficient penetration of cards in total payment transactions, i.e. the high share of cash payments. A starting assumption is that besides the underdeveloped infrastructure, some potential aversions towards card payment exist. The study searches for what Serbian businesses fear when using payment cards.

The qualitative research was conducted, and presented in this paper in the form of 15 interviews with business people. During the interviews with business people in addition to the fear of whether the POS system works (so that they don't have a „system down” situation), they are most afraid of the liability of companies under the regulations on the protection of personal data. There is, of course, strong fear of the transaction costs regarding payment cards, too.

Key words: payment card, pain points, benefits, personal data, transaction costs

JEL Classification: L81, M21

Introduction

In today's global economy, payment cards are a powerful metaphor for digital exchange. This has been significantly reinforced by the COVID-19 epidemic, which has further suppressed cash exchanges in the long term.

According to the report of the National Bank of Serbia (NBS, 2025), electronic payments in the Republic of Serbia and the penetration of cards in Serbia are

growing, with 12.2 million cards issued at the end of 2024, which is 5.9% higher compared to the previous year, and a substantially higher (28%) compared to five years ago, 2020. This increase in the number of issued payment cards brings with it an increase in transactions made using cards. However, the participation of cards in the total number of transactions is not officially estimated yet, and one of the possible reasons may be a significant number of unrecorded transactions.

Micro, small and medium enterprises are listening to their consumers and want to get closer to them and increase their satisfaction in terms of payment methods as well. The driving factors affecting the acceptance of cashless payment by small and medium enterprises (SMEs) have been researched and generally quite recognized (Samat & Bashri, 2024). Card payments are of great importance to SMEs in terms of market competitiveness, convenience for users and opening up opportunities for growth. With 2.1 billion debit and credit card transactions in the UK alone in March 2023, comprehensive and stable (card payment) systems are essential (UK Finance: Card Spending Update for March 2023).

1. Literature review on payment cards and frauds connected

From the perspective of the company, among the positive effects of cashless payments, the literature highlights the acceleration of transactions and time savings, as well as the reduction of the costs associated with cash handling. Research indicates that among the factors that facilitate the acceptance of card and electronic payments, technological competence and compatibility stand out, exhibiting a statistically significant positive relationship with the adoption of cashless payments. Management support, a critical mass of positive people in the company, competitive pressure and the amount of information in the company also stand out (Mahfuzur & Ismail & Muhammad, 2022). In addition, the study found that competition, risks and ease of use are behavioural factors that influence the adoption of cashless payments (Samat & Bashri, 2024).

1.1. Benefits of switching to card payments

Users and customers have been recognized as an influential factor in the acceptance of card payments, which is one of the financial decisions of consumers. Despite the use of a wide range of innovative forms of payment, traditional forms are still present, among which cash holds a key position,

especially in emerging markets. Quite the opposite, in some developed countries, such as the Nordic countries, particularly Sweden, many retailers and hoteliers have abolished cash payments (Nexi/Nets, 2024). On the national level, eliminating cash would reduce the costs of its issuance, transportation, storage, recognition of counterfeits, the replacement of used banknotes with new ones, and more. Also, the elimination of cash offers great opportunities for monitoring transactions that are carried out, thus suppressing the grey economy (Stojmenović, 2020), but also creating wide opportunities for extensive tracking of consumers behaviour, raising concerns around privacy.

The choice of payment method falls under consideration within the framework of the Theory of Consumer Choice, which describes consumer behaviour. Preferences are particularly important for the choice of payment, which are a mirror of the subjective taste of consumers. Each consumer has their own personal preferences. The theoretical framework also includes Schumpeter's Theory of Innovation, 1980 (Scherer, 1986a, Scherer, 1986b), as well as Diffusion Theory (Rogers, 1995), which is widely recognized as an approach that explains the adoption of various innovative, and thus financial and mobile technologies, including electronic payments (Szmigin & Bourne, 1999). According to the diffusion theory, consumers will accept an innovation if they believe that it will improve and facilitate their usability.

In their cost significance analyses, Brits & Winder (2005) and Pshenajkowska & Polasik (2018) found that cash carries the lowest unit costs of making payments. Conversely, they showed that the increase in the number of electronic transactions reduced the total costs suffered by society as a whole, making it the cheapest form of payment in countries with high debit card usage, indirectly affecting consumer payment costs.

Despite the dynamic development of non-cash transactions, cash payments still occupy a significant place in the total number of transactions (Esselink & Hernandez, 2017; Rusu & Stix, 2017; Harasim & Klimontowicz, 2017), especially in low-value transactions. Studies from other countries, such as Italy or Germany, or the eurozone in general (Humphrey & Kim & Vale, 2001), also point to the strong position of cash. Germans still have a strong preference for cash. Of all direct payments in Germany in 2008, cash represented an astonishing 82% by number and 58% by value (Kalckreuth et al., 2014). In terms of value, the market shares of the main payment instruments were 54%, 39% and 7% for cash, cards and other instruments respectively, with some differences between eurozone countries.

Cash is mainly used for low-value transactions and in everyday payments (other forms of payment are more often used in higher-value transactions). Research shows that the choice of payment type is more influenced by transaction characteristics than sociodemographic factors. Kose (2013), using a survey of payment card consumers, identified the level of trust in financial institutions and singled out the assessment of the risk of fraud or data theft as the most important factors in the willingness to make cashless payments. Accordingly, the lower cashless turnover in Germany is understood as a consequence of the relative distrust in financial institutions, despite the high technological level of the country's financial sector.

1.2. Fraudulent activities as a barrier to the introduction of payment cards

Technological innovations, such as contactless payments and innovations in the field of communications, are increasing problems with credit card fraud. In the research of solutions to credit card fraud, big data analytics, large-scale machine learning, cloud computing, etc. are gaining significant attention. Technological developments, including improved connectivity, the use of mobile devices, online shopping through applications, and the spread of the Internet of Things (IoT), are affecting both the development and problems and fraudulent actions in payment card payment systems (Cherif & Ammar & Kalkatawi, 2023).

Payment cards are popular for online banking and mobile transactions. However, the evolution and spread of payment card use have led to the emergence of multiple forms of fraud (Cherif & Ammar & Kalkatawi, 2023). Premeditated deception committed with the intention of gaining monetary gain is called fraud. Fraudsters are using increasingly sophisticated approaches to carry out illegal transactions (Ranković, 2024), resulting in significant losses for cardholders and banks – and as a result of the expansion of activities and technological innovations, monetary losses are also growing. Since online payments do not require the physical presence of the card, card data is vulnerable to attacks. Card-not-present (CNP) fraud is another name for this type of fraud. These types of payments have become particularly widespread after the Covid-19 pandemic. Fraudulent actions are becoming easier than ever, and service providers are developing defensive solutions, most of which are based on machine learning (Dornadula, 2019). Credit card fraud detection systems represent a separate field of research (Shaikh et al., 2023).

At the same time, data normalization and the increased use of neural networks make the use of artificial intelligence (AI) and deep learning techniques very

useful for card issuers and banking services. Due to these changes and challenges, banks and payment processing companies are rapidly modernizing their technology, which can create security issues. According to the seventh report on the Single European Payments Area (SEPA) published in 2021 (Sepa report, 2022) and an analysis of data for 2019, the total value of fraudulent transactions was 1.87 trillion euros, of which 80% were payments via CNP. In contrast, the share of fraud at ATMs and POS terminals has decreased to 5% and 15% of the total value of fraud, respectively.

A credit card fraud detection system (FDS) consists of a series of detection modules that are performed to reject suspicious transactions (Kim et al., 2019, Dal Pozzolo et al., 2015, Dal Pozzolo et al., 2018). Few studies have investigated the design of a comprehensive framework for credit card fraud detection. The most well-known model was proposed by Andrea et al. (Dal Pozzolo et al., 2018) through five layers. First, customers perform their transactions through a terminal. These transactions are then passed to the Blocking Rules Module to perform an initial primary real-time security check against logical rules. This step consists of checking “If-Then-Else” rules to detect fraud patterns that have already been found by human investigators. These rules are kept confidential in the industry for security reasons (Dal Pozzolo et al., 2018). The next step is the Scoring Rules, followed by the Data Driven Model (DDM). This model involves investigators, which requires human intervention to double-check transactions.

DDM uses historical transaction data that has been previously trained to build a classifier or relies on another statistical model to detect fraudulent transactions. The results of legitimate transactions are evaluated. If the result exceeds a well-defined threshold, the transaction is rejected and then forwarded to experts for further analysis. DDM is typically trained on a labelled data set and is fully automated. DDM is expected to detect fraudulent transactions, overcoming the experience of investigators, which is lacking in a rule-based module.

If the classifier or statistical model does not detect fraudulent transactions, alerts are forwarded to investigators as soon as they are reported by the cardholder. The scoring module must return accurate alerts to reduce both the number of false positives and the number of predicted fraudulent transactions. Generally, the fraud detection problem consists of a binary classification problem. Incoming transactions must be classified as either fraudulent or genuine. A Fraud Detection System (FDS) that quantifies the degree of fraud is in use. Since the investigation of suspicious transactions is time-consuming

and the number of investigators is limited, the FDS should operate in a fully automated and distributed manner.

Blocking rules module should be supplemented with an intelligent model that assesses the risk of the transaction. If the risk is high, the transaction is rejected. Human intervention should be minimized as much as possible in order to feed the learning system and update its behaviour. This design also emphasizes the necessity of using multiple inputs for the learning module, including contextual information (e.g., location) and information about the user's behaviour (e.g., spending).

2. Empirical research on the use of cards with a focus on micro, small and medium-sized enterprises

2.1. Subject and goal of the research

Micro, small and medium-sized enterprises and entrepreneurs (SMEs) are recognized in both the Republic of Serbia and the EU as one of the main drivers of economic growth and development at the national, regional and local levels, (RZS, 2025). According to data from publication of the Serbian Statistical Office in 2023, there were 248,906 entrepreneurs, 94,078 micro enterprises, 12,613 small enterprises, 2,953 medium-sized enterprises, or 358,550 SME enterprises, or 99.8%, and only 643 large enterprises, or 0.2% of the total number of enterprises in the Republic of Serbia. According to the Statistical Office, SMEs recorded a 38% growth in gross value added in 2023 compared to 2021. SMEs also accounted for 57% of gross value added in 2023 compared to 43% for large enterprises.

The goal of field research presented in this paper, conducted in the form of structured interviews, was to understand attitudes of SME managers towards payment cards. An interview guide was prepared for the interviews listing some key topics, but with freedom of interviewers to conduct an open conversation and encourage the the comment, sharing of experiences and their own observations. The discussions were attended by representatives in the following business sectors: HoReCa (3), medical and dental services (2), retail (4), craft services (4), a hairdresser and one commercial bank. The discussion was launched on three topics: the current state and prospects of card payments in Serbia, the advantages of card payments and the problems of card payments. The method of analysis applied to the analysis of the respondents' responses is a qualitative discourse analytical method, basically aimed at the factual analysis of the content of the respondents' statements, but also at the analysis of individual inconsistent statements that indicate a hidden context (Talja, 1999).

2.2. General attitude towards payment cards

There is no complete agreement among interviewees about the share of cards in total payments, both currently and related to the future expectations.

The majority of interviewees noted an increase in the share of card payments, especially in the period from COVID onwards. The strengthening of all contactless procedures and card payments experienced their affirmation, especially the new e-card technologies (Ali et al., 2022). An illustrative statement is made by the director of a retail chain for the sale of FMCG goods in the Šumadija region: „*Before COVID 2019, cash payments prevailed with almost 80%, then 10% cards, and 10% checks and cards for deferred, transfer, deferred payment ... During 2024, the structure was 69.6% cash payments, cards 23% and the rest remained unchanged (a large jump in card payments). Cards are used by the working population and somewhat less by pensioners, and in a few years the share of cards will certainly be 40%.*” The manager of a pharmacy chain claims that they collect half of their turnover through payment cards and the other half in cash. A bank manager also believes that cards are prevailing over cash payments, estimating the share of cash payments very optimistically up to 30%: “*An ecosystem is being created that imposes a situation where those who do not accept cards lose customers. For a long time, efforts have been made to educate citizens to use cards, which is now yielding results*” (bank manager). The operations manager of a café chain says that young people predominate in the structure of guests, and cards account for 60% of payments. However, different problems are already emerging here, related to identity swapping: “*my younger daughter cannot get a card at the bank, but we can install mine on her phone*”.

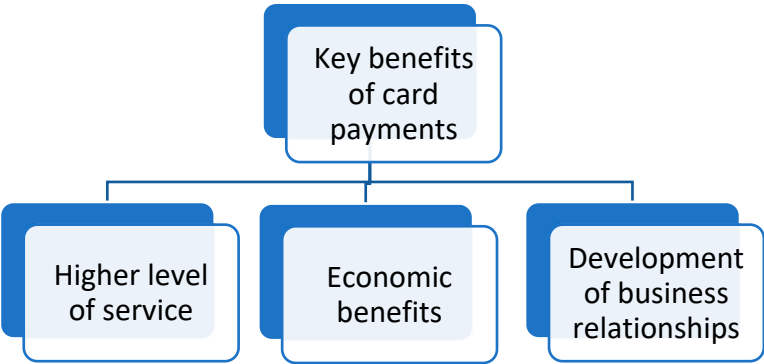
However, the popularity of cards or cash, records oscillations in time and business sector. Cash from savings (probably in foreign currency) is used to supplement the budget during periods of increased spending when the funds in the account are no longer sufficient: „*The ratio of cards vs. cash is variable, depending on the period of the month: at the beginning, there is a lot more card payments (some 70-75% goes via card, and 25-30% of turnover goes via cash); as the month progresses, card turnover decreases, and cash increases; there is also a lot of cash turnover during holidays (New Year, Christmas holidays, May 1st)*” (butcher’s shop owner). Some interviewees have the opposite impression, that cash payments increase the share in payment transactions. „*Some guests pay exclusively via cards, but some pay in cash, and as time goes by, cash increases. Some shops purchase legally, while other shops purchase in the grey market, and then the former are not competitive*” (catering manager).

A POS system is expected to be simple (up to 2 clicks) and reliable, especially in conditions of increasing employee turnover. *“An additional requirement is that any new application easily fits into the existing transaction systems used by the company, otherwise there is no point in having friendly and trained salespeople working on an unreliable and slow system”* (director of retail durable goods).

2.3. Advantages of payment cards

Payment cards bring many advantages and business people from different sectors most often cite some similar benefits that this type of payment brings. The development of card payments in the world is related to overcoming the gap between the consumer’s desire to buy something and the lack of cash at that moment, most often because it was not practical or wise to carry the necessary amount of cash with. This was the reason that payment cards were initially issued by tour operators and large retailers. Real comfort for customers occurs when specialized card operators stepped in, offering a universal payment instrument (Maixé-Altés, 2020). Key benefits can be described as a higher level of service, economic benefits and benefits in the development of business relationships, as shown in Figure 1.

Figure 1. Key benefits of card payments



Source: Author’s presentation

Business people from different sectors of the Serbian economy have described the benefits of payment cards as follows:

Cash payments symbolize the traditional method of trading. In contrast, the ability to pay by card raises the level of service that the seller provides to customers through:

- Being more accommodating to patients who “don’t have cash” and who have trouble paying for larger amounts; *“most people don’t carry cash”* (dentist, car service).
- The ability to choose a payment method - *“It’s good for people to choose how they will pay, people like to pay by card, but cash payments haven’t disappeared”* (paediatric physiotherapist).
- It solves the inconvenience of returning change – *“there are no problems with a lack of “change”, no errors in returning change”* (food retail manager).

Collecting money from customers by card has its economic advantages reflected in the cost and some business risks reduction. Our interviewees expressed it this way:

- Security reasons – *“to avoid having a large amount of cash in the facility”* (dentist; food retail manager).
- Many prefer and almost all their payments are made via cards, or via accounts because it:
 - o reduces the costs of handling cash (hotel director);
 - o does not burden the business significantly *“because the bank’s commission for card payments is around 1.5%, which is acceptable compared to the benefits we get from this method of payment. The cash inflow and the work of paying it in are much more burdensome”* (car service);
 - o enables exit from the grey zone, fair conditions on the market *“which is in the interest of all of us who operate legally”* (dentist).
- The cost of cash on delivery is equal to the cost of the commission for card payments – *“for online businesses there is no big difference in costs, considering the cost of the payment service with courier services”* (tailoring salon).
- Business automation - “handing over of purchases” is avoided, various obligations are reduced and time is saved, and the accountant receives all the necessary documents since *“the bank did that part for me”* (dentist). *“There is no error and each error is immediately visible, but still it costs 1 to 1.5%”* (butcher’s shop owner).
- It secures money in the company’s account immediately - through crediting by the bank, and *“the cost is not too high to immediately receive*

money, while patients independently regulate their relationship with the bank - credit, payment in instalments”, etc. (dentist, tailor’s salon). “Payment by card (or online) is faster because the funds arrive slowly from the courier service” (tailor’s salon).

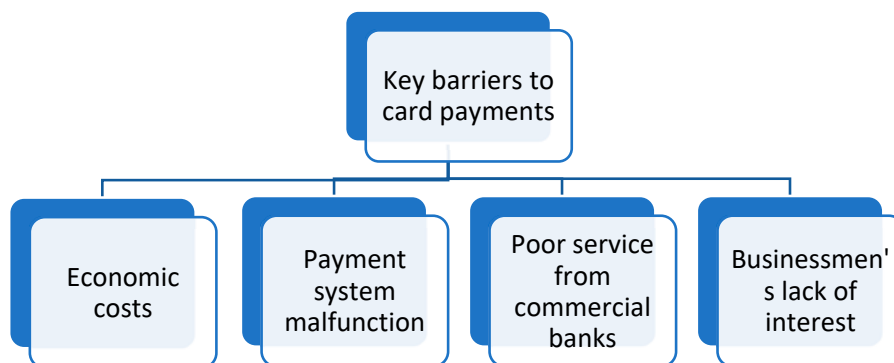
Payment via payment cards opens up opportunities for further development of business relationships with customers and the commercial banks, recognized in literature (Krstić & Tešić, 2016), but also by our interviewers:

- Increases the buyer’s ability to pay at the time of purchase - *„Well, we get a lot by doing this by enabling customers to pay by card - because if the customer does not have enough cash, he feels frustrated; but, the cost is high (the owner of the butcher’s shop).*
- Basis for developing cooperation with a commercial bank – *“crediting (paying in instalments) for more expensive interventions on the vehicle, reminding the client of periodic interventions (replacing tires, etc.) and other tasks for which the bank and the repairer have a common interest with a common client” (car service).*
- „Enhanced” cards (with a loyalty program) *“can be very attractive at this time, because payment cards have fully rooted in Serbia and occupy a significant space in payment transactions, largely displacing cash as a means of payment. On the other hand, awareness of the benefits of loyalty programs has matured and has become an important motivational driver for modern customers” (bank manager).*
- Security of transaction completion – *“when paying by card (or online), there is no cancellation, unlike the delivery of an online order by cash on delivery, where there is cancellation with the resulting costs of delivery and return of goods” (tailoring salon).*

It is important to note that economic benefits contain many statements that have to do with the control of certain business risks.

2.4. Problems caused by payment cards

Card payments cause various concerns and problems in different business sectors. Analysing the experiences of entrepreneurs, we can classify the obstacles to more intensive card penetration in Serbia into obstacles caused by costs, malfunctions in the card payment system and poor service from banks as intermediaries supplying businesses with POS devices. A particular barrier to the acceptance of POS devices is the perception of entrepreneurs that it is not necessary for their (small) businesses. All barriers are shown in Figure 2.

Figure 2. Key barriers to card payments

Source: Author's presentation

One of the key issues is certainly the cost of card payments. These costs are not unknown as a barrier in other markets, such as the US market where the share of cash payments is much higher compared to Scandinavian countries or Australia where transactions are “cheap” (Fumiko, 2021).

- Costs in terms of bank commissions represent a key barrier and inconvenience. Here is how local business people describe it:
 - o It is always a struggle to keep the bank commission low, “so many hotels do not accept American Express due to the high commission. Visa and Mastercard cards were used in 95% of cases, and Dina as a domestic card is meaningless” (hotel director).
 - o “Our commission is around 1ml dinars per month, although the commission is 0.5% at a local bank and 0.9% at a bank with national coverage. We throw out POS terminals of other banks where the commission is 1.1%” (food retail director).
 - o “A specific problem with commissions is with goods that have prescribed low margins, such as cigarettes” (food retail director).
 - o “Cash would suit us best, because it causes the lowest cost, and the percentage that banks take is extremely high” (butcher shop owner).
 - o “The commission is around 1%, which is why we prefer cash payments. We can still accept a bank where our largest suppliers have an account, because we save on bank fees when we pay those suppliers for goods.” (director of retail sales of durable consumer goods).

- o *“The lack of card payments is a bank fee that reduces our earnings, and in this respect, payment through e-banking is much better”* (tailoring salon).
- o *“Fixed prices and small rebates on cigarette sales, high bank fees (2 to 2.4%) and reliance on cigarette sales at small stores, makes the introduction of POS devices to be very risky move for small retailers”* (shop owner).
- o *“Bank fees are 1.3-1.7% and are significantly higher than in Europe. The costs of working with cash are negligible in comparison”* (owner of a pharmacy chain).
- Minimum fixed fee to the bank – *“when a merchant has multiple devices from multiple banks, he sometimes warns store managers to direct more payments to a specific POS device because we will definitely pay a fixed fee, and it is not realistic to do this constantly because the merchant has other, more important tasks to do”* (director of retail sales of durable consumer goods).
- Different exchange rates (and therefore prices) during booking and payment collection cause specific problems with cost perception among customers. *“Online reservation platforms for booking are not aligned with our financial operations, so complications arise due to different exchange rates - the price is not immediately expressed in dinars but in euros* (hotel director).

The disruptions in the functioning of the card payment system appear in the thoughts of the interviewees as fears of possible failures (primarily data security) but also as bad experiences from previous situations:

- Security requirements: There are complications with non-confirmation of cards and payments without the physical presence of the card. *“It can happen that the card number is stolen, for example, the card was photographed, all the data was filled in online or at the hotel, and the payment is made with pre-authorization. We now do not allow payments without the presence of the card in the hotel”* (director of hotel).
- (Un)reliability of the system – is often commented by business people.
 - o *„For a long time we had a POS from only one large national bank, but their software and support were unreliable, and occasional and long-term downtimes had a very bad effect on our best customers - those who come with a full basket.”* (director of a food retail store).
 - o *„Cash only creates problems from counting, payment of purchases, logistics, control... it's still not bad for a customer to carry cash „in case something goes wrong”* (operations manager of a coffee shop chain).

- o „Card payments reduce sales when the system „goes down” - if we send a customer to an ATM, they most often don't come back” (tailoring salon).
- Electronic payment cards on mobile phones are risky “because phones are easily lost and stolen” (owner of a pharmacy chain).

Commercial banks are not a high-quality intermediary in the development and expansion of card payments, given the large number of complaints about their way of working. Inadequate way of providing services, added to the aggressive and intrusive sale of POS devices for transferring funds, along with the already mentioned perception of high costs, may explain the reserved attitude of many businessmen towards cards:

- The service of commercial banks is commented unfavourably by a number of businessmen:
 - o although businesses do not want to abolish cards because guests also demand this form of payment, they sometimes view it as a necessary evil. „Banks are inflexible, and we are in a business where customer service is important: I sit in the bank for two hours, they say you did not enter the number, when I ask which one they say 'I am not obliged'. I cannot change banks, I need a branch nearby, I cannot park elsewhere”.
 - o „With the previous business bank, card operations were so complicated that we didn't even try” (car service).
 - o The banking services market has a problem of pushy, repulsive sales, rudeness, lack of commitment, care and advice. „The quality of customer service is determined by procedures, work with people and quality interlocutors, and hence there is a big problem of intense fluctuation” (bank manager).
 - o How the bank manager sees quality work with clients –is illustrated by the statements that intensive cooperation with Serbian Business Registers Agency has been developed, which is the starting point for further active communication with prospective clients via email: „Clients are targeted based on their core business, to which the bank's offer of adequate products is adjusted.”
- Payment to legal entities via business cards is not developed – “many companies do not have business cards or do not use them. This would be highly desirable, especially with a deferred payment service” (car service).

Finally, there is a widespread view that cards are not necessary in small businesses, especially in the micro-enterprise sector:

- The perception of large number of entrepreneurs and small business owners is like:
 - o „we do not have such a large turnover to introduce a POS. We had a portable POS, now we inform in advance that the payment is in cash and there is no problem because we issue a fiscal receipt, we do not work illegally” (massage salon).
 - o „Customers have accepted cash payments and do not ask about cards, and I only accept new customers by recommendation and I cannot employ another person because of the costs” (hairdresser).
 - o „We generate a large part of our turnover by having charitable foundations pay on account. Patients come prepared and have the necessary amount; sometimes patients do not pay at the end of the visit but at another time - there have been no problems with that so far” (paediatric physiotherapist).
 - o „More than half of the turnover is paid by legal entities into an account” (car service).
 - o „We make the largest part of payments through online banking” (tailoring salon).
- The restriction on card payments is related to the grey economy because „there are customers who are more comfortable paying in cash” (hairdresser). „Card payments in our market have never exceeded 45%, cash is dominant over 50% due to the significant presence of the grey market and because employees receive part of their income in cash.” (bank manager).

Conclusion

Literature on barriers to accepting card payments in the economy of different countries mainly deals with consumer behaviour and barriers caused by their habits or demographic characteristics (Chen et al., 2022; Gupta, Kiran & Sharma, 2023) Liu, Wang & Hu, 2025). Part of the research deals with the regulatory framework (Constantin, 2024; Lobo & Mourão & Duarte, 2025) or the costs of the card payment system (Ho & Xu & Zhang, 2022).

Only the last topic overlaps with the views of business people in Serbia, for whom payment card costs are the most frequent and important barrier to implementing this form of payment. In this way, it could be concluded that the

cost of payment card transactions is the key barrier to the spread of the card payment according to businessmen in the SME sector in Serbia.

Another problem that causes hesitation among business people regarding cards in Serbia is related to fears related to the functioning of the payment system. These are caused, on the one hand, by distrust in technological features, called by one name „system crash”, and on the other hand, by business processes in commercial banks that are characterized as inefficient and unreliable.

The limitation of this research is certainly the qualitative research method used, which does not allow for drawing conclusions without quantitative testing. An additional limitation comes from the limited number of respondents (15).

Further penetration of cards in the Serbian business community critically depends on overcoming the bad image of payment cards among those business people who have not introduced them and see them as an expensive and unreliable means of payment.

In this sense, future research should be devoted to quantitatively verifying the conclusions drawn on a larger number of respondents. Additionally, it would be useful to conduct similar research on citizens as consumers of payment card services.

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CORPORATE FRAUD RISKS IN SERBIA: PERCEPTIONS OF TOP AND MIDDLE MANAGEMENT

Abstract

Numerous internal and external fraud risks have been documented in both academic and professional literature. This research aimed to investigate how top and middle management in Serbia perceive these risks. The study surveyed a total of 191 participants from various industries, including 90 individuals holding top or middle management positions. The remaining respondents were employees or specialists without managerial roles, or those occupying lower-level management positions.

Findings revealed statistically significant differences between top and middle management and other respondents across several key areas: perceptions of the likelihood of fraud perpetrated by external actors; assessments of the probability that their organization would encounter specific types of fraud within the next two years; evaluations of the vulnerability of certain processes and activities to fraud risk; and the identification of factors believed to contribute to fraudulent behavior. Significant differences also emerged in their views on the roles of various actors in strengthening fraud risk management in the future, with additional variations within the top and middle management group itself—primarily based on gender, and secondarily on company ownership (foreign vs. domestic) and company size.

Keywords: corporate fraud, top management, middle management, fraud perception, Serbia

JEL Classification: L20, M10, M20, M30

Introduction

Recent global statistics clearly show a significant rise in registered corporate fraud cases. This raises an essential question: Is fraud more prevalent today, or were we simply less aware of it in the past? The reality is that a larger global population inevitably leads to an increased number of potential fraudsters. Furthermore, the expanding array of opportunities and the heightened complexity of today's business environment undeniably provide greater incentives and avenues for fraud.

The issue of fraud is intriguing and very delicate for many reasons. By its very nature, it should attract the interest of a wide range of researchers and constitute the subject of numerous studies. Why, then, do we know so little about it? From the corporate perspective, fraud can be found as management's incompetence or negligence, managerial unethical conduct, lack of diligence by controllers, inadequate/underdeveloped policies and procedures for risk detection and management, easy targets (victims), and so on. Understandably, a company would rather not disclose such information. It is also clear that perpetrators of fraud are even less interested in such information being published. Does that mean these events should be swept under the rug, treated as a business secret, and completely ignored? Does concealing such information represent a proper and fair approach? And who benefits from that?

According to the Association of Certified Fraud Examiners (ACFE), fraud is defined as "any intentional or deliberate act to deprive another of property or money by guile, deception, or other unfair means." Although boundaries sometimes may be blurred, a distinction is made between corruption, asset misappropriation, and fraudulent reporting (ACFE, 2024).

There are numerous classifications of fraud types. Frauds may be directed at individuals or at organizations. This paper focuses on the latter - that is, corporate fraud. Within corporate fraud, a distinction is drawn between internal and external fraud, depending on the origin of the perpetrator. The first type includes fraudulent acts committed by organizational insiders, such as employees and management. At the same time, external fraud encompasses a much broader spectrum of external stakeholders, such as business partners (suppliers, distributors, clients), as well as other actors, such as hackers, organized crime, and so forth.

This study builds upon previous research regarding the perceptions of managers and employees about corporate fraud in Serbia (Veljković & Kuč, 2024). It aims to enhance the understanding of this significant issue from the viewpoints of individuals who encounter these risks in their day-to-day operations and strategic decision-making.

1. Overview of empirical studies

The most comprehensive global research on fraud is conducted by the ACFE. The latest available report, published in 2024, covered 138 countries and revealed significant findings. According to the report, organizations lose an estimated 5% of their annual revenue to fraud, with the median loss per case amounting to \$145,000. Asset misappropriation schemes are the most frequent type

of fraud (89% of cases), yet they tend to be the least costly. In contrast, financial statement frauds are the rarest but also the most expensive, with nearly half of all reported cases involving corruption. A typical fraud case lasts for 12 months before being detected (ACFE, 2024). The typical fraudster is a male between 36 and 55 years of age, who is highly respected and has long tenure within the organization (KPMG, 2025).

Valuable evidence on this topic derives from studies undertaken by major international consulting and auditing firms (the Big Four) that specialize in providing forensic services. The findings often differ significantly across regions. In the United Kingdom, growing concern exists across both the public and private sectors that fraud has reached unprecedented levels. Professional criminals are the most frequent perpetrators of fraud, followed by insiders - among whom managers are more commonly involved than employees (KPMG UK, 2025). In contrast, findings from India indicate that most frauds are committed by lower- and middle-level management, while senior management and external actors are significantly less represented as perpetrators (Deloitte India, 2020). Whereas consumer fraud is relatively rare in the United Kingdom, PwC's global study shows that it ranks second among external fraud types (29%), just behind cybercrime (31%), which is the most prevalent; other external perpetrators include organized crime (28%), suppliers (20%), and others (PwC, 2022).

Although fraud is a global issue, most extant studies originate from developed economies, with a high level of collaboration amongst scholars in these countries. A bibliometric analysis of 7,750 Scopus-indexed publications on corporate fraud research from 1957 to 2022 revealed that the academic literature on corporate fraud has predominantly focused on identifying its determinants and examining its association with corruption (Owusu, Koomson & Donkor, 2024).

Several studies from various countries have investigated whether the gender of senior managers affects the risk of corporate fraud. ACFE global research (2024) found that male perpetrators outnumber female perpetrators by nearly three to one and cause median losses that are 58% higher than those caused by female perpetrators. Companies with women in executive positions tend to have a lower risk of corporate fraud, greater risk aversion, enhanced transparency, and higher levels of ethical behavior. For instance, a study conducted in the Czech Republic found that female CEOs tend to view business ethics as more important than their male counterparts (Procházková & Mičák, 2023). Similarly, research in Vietnam revealed that companies led by female CEOs are associated with reduced risk-taking and increased profits (Vo et al., 2023). Additionally, a study in China examined the influence of CFO gender on corporate fraud related to financial reporting. The results showed that companies

with female CFOs are less likely to engage in risky and unethical fraudulent activities compared to those led by male CFOs (J.-h. Luo et al., 2020).

Ownership structure significantly affects corporate governance and the risk of fraud. Liang, Liu, and Wang (2022) found that foreign investment in Chinese firms leads to a notable reduction in fraudulent activities. They suggest that foreign investors, especially from countries with strong investor protections, effectively monitor management, enhancing transparency and accountability. Utomo and Mawardi (2024) examine the effects of ownership structure and firm size on financial fraud in manufacturing companies listed on the Indonesia Stock Exchange. Their findings indicate that ownership structure significantly influences fraud, with domestic ownership associated with higher fraud risk. In contrast, foreign ownership provides stronger monitoring and supervision, reducing the likelihood of fraudulent activities. Additionally, larger firms are less likely to engage in fraud, as greater company size is linked to better-quality financial reporting and stronger internal controls, which minimize opportunities for manipulation.

Most studies on corporate fraud primarily focus on large companies. However, due to unique factors such as market position, company size, organizational structure, and resource availability, some researchers have turned their attention to small and medium-sized enterprises (SMEs). For example, research conducted in Malaysia involved interviews with 126 managers from SMEs to identify the key drivers of fraud prevention. It was found that a culture of integrity, anti-fraud controls/processes, and oversight functions is positively and significantly associated with effective fraud prevention in Malaysian SMEs (Mohammad, Basiruddin, and Rasid, 2018). Hossain (2025) investigates the role of internal control systems (ICS) in preventing financial fraud in SMEs in Bangladesh. The study shows a strong inverse relationship between the effectiveness of ICS and the occurrence of fraud, indicating that robust control mechanisms significantly reduce both the likelihood and impact of fraudulent activities. Key components, such as segregation of duties and monitoring processes, are highlighted as the most effective in preventing fraud. Other elements, such as risk assessments and communication strategies, also aid in fraud prevention, but to a lesser extent.

The scarcity of information and empirical research on fraud in less developed and developing countries can largely be attributed to the underdeveloped financial market and, consequently, to the lack of pressure for transparency in business operations and the absence of advanced corporate governance. Ultimately, the absence of the rule of law and strong and independent institutions, together with insufficient promotion of good practices

and weak sanctioning of poor practices, creates fertile ground for various fraudulent activities.

Deeply rooted and widespread corruption represents one of the chronic problems of Serbia's economy. Although it is often apparent to the naked eye, as evidenced by months-long mass protests, the problem is also underscored by international institutional indicators, which consistently point to a worsening trend. According to the 2025 Index of Economic Freedom, Serbia's ranking dropped from 60th to 64th among 178 countries, primarily due to inadequate institutional reforms aimed at reducing corruption and strengthening a judicial system that continues to be exposed to political interference (The Heritage Foundation, 2025). Furthermore, the Corruption Perceptions Index (CPI) 2024, released in early 2025, places Serbia at 105th out of 180 countries, one point lower than the previous year's score, marking its worst performance since the current methodology was introduced in 2012. Serbia now ranks alongside Ukraine (Transparency International, 2025).

Public procurement in Serbia has been recognized as an area with high corruption risks. A study analyzing 54 procurement procedures annulled in Serbia in 2021 and 2022 identified a range of risk indicators in different stages of the public procurement process (Pantelić & Živanović, 2024). The results show that the most prevalent indicator of possible misconduct is the vague and contradictory content of tender documentation, followed by irregularities during the bid opening and expert evaluation stages. A recent survey of managers in Serbia's public and private sectors revealed that integrity violations are more common in the public sector. However, levels of inefficiency and favoritism are similar in both sectors (Jelovac & Šuleić, 2025).

Forensic accounting resources play an important role in the fight against fraud. In Serbia, the development of forensic accounting capacities is still in its early stages. A survey of external auditors in Serbia revealed a strong professional awareness of the need to involve forensic accountants in external audits, as well as to simultaneously enhance auditors' own competencies in the field of fraud detection (Vučković Milutinović & Ribić, 2024).

The study conducted in Serbia in 2024, on a sample of 120 respondents in both managerial (59.2%) and non-managerial (40.8%) positions, revealed a low level of awareness regarding the frequency and trends in fraud cases (Veljković & Kuč, 2024). Approximately 60% of respondents could not answer whether the number of frauds in the past two years had increased, stagnated, or decreased. It is particularly noteworthy that this lack of awareness was equally present across different managerial levels as well as among employees. It is diffi-

cult to believe that any of us would not be interested in knowing how often, to what extent, and in what ways fraudsters might target our work. A lack of knowledge and awareness may stem not only from the absence of available information but also from the absence of education on this important issue. The study also showed that most respondents (60.8%) believe that fraud is equally likely to be committed by internal and external actors. In comparison, 34.2% view insiders as the greater threat, and only 5.0% perceive external actors as the greater threat. Furthermore, the perceived probability of fraud risk was positively correlated with hierarchical level, leading respondents to identify the highest level of management as being most exposed, where the potential damage is most significant. Among external actors, hackers, organized crime, and competitors were perceived as the most serious threats. The prevailing perception is that all employees, not only management, are responsible for detecting fraud. However, the primary role in detection is attributed first to internal audit, and only thereafter to external audit.

2. Methodology and sample

This study investigates how top and middle managers (senior managers) perceive the occurrence of fraud, key actors involved, organizational vulnerabilities, and governance mechanisms. Accordingly, the following research questions have been formulated:

- RQ1: How do senior managers perceive the occurrence of corporate fraud in their industry, and what trends do they anticipate for the future?
- RQ2: Which internal and external actors are perceived as most likely to commit fraud within organizations?
- RQ3: What types of fraud may the organization experience in the near future?
- RQ4: Which organizational processes are considered most vulnerable to fraud risks?
- RQ5: How effectively do organizations employ the current fraud risk management frameworks?
- RQ6: What are the key drivers of fraud?
- RQ7: Which stakeholders are seen as most capable of enhancing fraud risk management?

The research was conducted from May to July 2024. Drawing on a range of prior studies presented in the first section, conducted in various contexts, both within academic literature and by research agencies and consulting firms, a survey instrument was developed. Its clarity and comprehensibility were

pre-tested before distribution to respondents. The survey was designed to capture attitudes related to the types, methods, and perceived likelihood of corporate fraud occurrence.

The first part of the questionnaire collected data on the business demographics of the respondents and their companies. Key questions focused on the respondents' gender, age, years of work experience, hierarchical position, and sector of employment, as well as the primary industry of the company, ownership structure, and company size.

Following this, the survey included questions and statements aimed at assessing respondents' attitudes and awareness regarding corporate fraud, both in their industry and within their own company. This included considerations of fraud initiated internally and externally. The questionnaire mostly contained closed-ended questions, with the option for respondents to provide additional comments. For selected questions, five-point and seven-point Likert scales were applied.

The analysis primarily focused on top and middle managers in Serbian companies, with comparisons made to the responses of others (first-line managers, specialists, and employees). Additionally, within the senior management group, the analysis examined differences in responses based on gender, ownership structure, and company size, ensuring that each subgroup analysed included a minimum of 30 respondents. Data were analyzed using SPSS v25, employing descriptive statistics, correlation analyses, and inferential tests, primarily independent-samples t-tests, to determine statistical significance at the conventional alpha threshold of $p < 0.05$.

A total of 494 potential respondents were approached via the LinkedIn social network. Over the three-month data collection period, 191 valid responses were obtained. This represents a response rate of 38.7%, which is considered relatively high when compared to similar studies of this type.

Table 1 presents the sample structure. Statistically significant differences were observed in terms of respondents' age and years of professional experience. As expected, individuals occupying higher managerial positions tended to be older and more experienced, reflecting the time required to advance within the corporate hierarchy. While the gender distribution among senior managers was balanced, the proportion of women was lower than the overall sample average and considerably below the proportion observed among employees, specialists, and first-line managers. Regarding company size and ownership structure, no statistically significant differences were found between the two groups of respondents.

Table 1: Sample characteristics

	Senior managers (Top and Middle management)	Others (Employees, Specialists, or Lower-level management)	Whole sample
Total	90	101	191
Age			
Up to 30	18	56	74
31-40	30	34	64
41-50	31	9	40
Over 50 years	11	2	13
Work experience			
Up to 5 years	10	52	62
6–10 years	22	32	54
11–15 years	25	6	31
16–20 years	13	7	20
Over 20 years	20	4	24
Gender			
Female	45	77	122
Male	45	24	69
Size of the company			
Small	20	17	37
Medium	31	28	59
Large	39	56	95
Type of company by ownership			
Foreign (51–100% foreign ownership)	51	61	112
Domestic (51–100% domestic ownership)	39	40	79

Source: Author's research

Focusing on the subsample of 90 middle and top managers, several noteworthy patterns emerged. The gender distribution was equal, and the number of respondents below and above the age of 40 was nearly identical. Years of profe-

ssional experience were relatively evenly distributed, with the smallest proportion represented by those with up to five years of tenure. The dominant categories included respondents with 11–15 years of experience, followed by those with 6–10 years and more than 20 years, then those with 16–20 years, and, as expected, the fewest with less than five years of experience. Finally, company size showed a similarly balanced distribution, with a slightly higher representation from foreign-owned firms, which is consistent with the overall sample distribution.

3. Results and discussion

According to the research questions presented, the analysis of the results focuses on the following topics, which will be elaborated below:

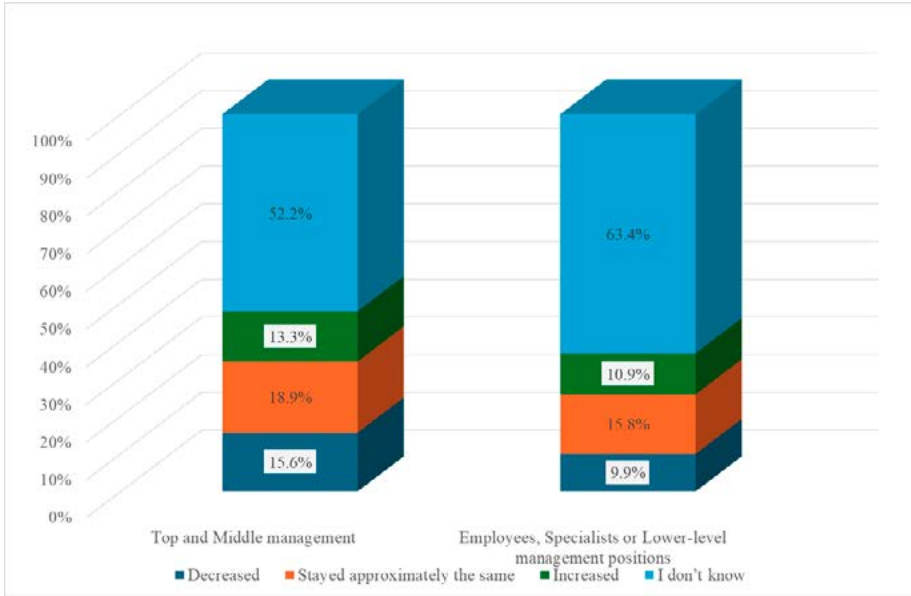
- Perception of the number of frauds in the branch in the recent past and assessment of trends (RQ1)
- Perceptions of which internal and external actors are most likely to commit fraud (RQ2)
- Perception of the types of fraud that the organization may experience in the near future (RQ3)
- Vulnerability of organizational processes to fraud risks (RQ4)
- Effectiveness of organizations' existing fraud risk management frameworks (RQ5)
- Perceived drivers of fraud (RQ6)
- Stakeholders who could enhance fraud risk management (RQ7)

Perception of the number of frauds in the branch in the recent past and assessment of trends

The study examined respondents' perceptions regarding the prevalence of fraud in the industries where their companies operate, both over the past two years and in relation to expectations for the upcoming two-year period.

Most respondents in both groups (Senior managers and Others) indicated that, in the past two years, no significant changes occurred, while a somewhat smaller proportion reported either an increase or a decrease in the number of fraud cases (Figure 1). However, notable differences emerged in the proportion of respondents unable to provide an assessment (52.2%) in the senior managers group compared to the others (63.4%). This discrepancy is understandable, as higher-level management typically has greater insight into company operations and industry dynamics.

Figure 1: Perceptions of the number of fraud cases in the industry/sector over the past two years



Source: Author's research

A closer examination of the senior managers group reveals additional insights when responses are broken down by gender, company size, and ownership structure. A statistically significant gender difference is evident: women showed substantially lower levels of awareness and/or exhibited greater caution in making assessments, with 62.2% selecting "I do not know," compared to 42.2% of men. Differences were also observed based on company size. Most senior managers' respondents from small enterprises (55.0%) were unable to provide an estimate, compared to 35.5% in medium-sized companies and 23.1% in large firms. This pattern suggests that larger companies, due to their greater resources and more developed information systems, procedures, and monitoring mechanisms, are better positioned to evaluate fraud trends within their industries.

Regarding projected losses from fraud in the next two years, just over one-third of the respondents among senior managers and nearly half of the respondents in the 'Others' group reported being unable to provide an estimate. Among those who did estimate, most senior managers expected losses of less than 1% of revenues. In contrast, the largest share of the comparison group anticipated losses in the range of 1–5% of revenues (Table 2).

Table 2: Estimated average loss due to fraud across companies in the industry over the next two years

	Less than 1% of revenue	1–5% of revenue	More than 5% of revenue	Cannot estimate
Senior managers	31.1%	26.7%	7.8%	34.4%
Others	17.8%	28.7%	5.9%	47.5%

Source: Author's research

Gender differences also emerged within the senior managers' group concerning expected fraud-related losses. Female respondents demonstrated greater caution and lower levels of certainty, with 46.7% unable to estimate expected losses, compared to 22.2% of male respondents. Among those who provided estimates, 54.2% of senior manager women projected losses of 1–5% of revenue, while 60% of senior manager men anticipated losses of less than 1%.

The patterns by company size are also interesting: senior managers from small businesses were the least able to estimate expected losses, with only 45% providing an estimate, compared to 64.5% in medium-sized companies and 76.9% in large firms. Ownership structure also influenced the ability to assess potential losses, with a higher proportion of respondents from foreign-owned companies (70.6%) providing estimates compared to 59% from domestically owned firms.

When it comes to the findings of other studies, it should be noted that there are very few investigations of trends (in terms of number and/or value) of corporate fraud at the country level. What further complicates comparisons is the fact that these studies differ substantially in terms of samples, data, time horizon, and methodology. For example, a study conducted in the United Kingdom shows an increase in the number (and decrease in overall value) of fraud cases over the past two years, specifically in 2023 and 2024 (KPMG UK, 2025). However, these figures refer to registered cases of fraud and factual data rather than people's perceptions. Moreover, the study covers only frauds with damage exceeding £100,000. This criterion provides a strong explanation for why customer fraud is reported at very low levels compared to fraud committed by other internal and external actors. In contrast, Deloitte's 2020 study in India, based on a perception survey, found that the vast majority of respondents (80.3%) expect the number of fraud cases to increase over the next two years, while 30.83% of respondents were unable to quantify average fraud losses of firms in their industries in the next two years (Deloitte India, 2020).

Perceptions of internal and external actors most likely to commit fraud

The results of the independent samples t-tests indicate that there are no statistically significant differences between senior managers and other employees regarding their perceptions of the likelihood that internal actors (top management, middle management, lower management, or specialists/non-managerial staff) might commit fraud. For top management, the mean scores were 3.16 for senior managers and 3.37 for others, showing no significant difference. The scores for middle management were also close, at 3.12 for senior managers and 3.21 for others, with no significant difference. In the case of lower management, there was a slight difference (2.84 in the group of senior managers vs. 2.93 in the group of others), but this difference was still not statistically significant ($t = -0.60$, $p = 0.55$). Lastly, the evaluation of specialists/non-managerial staff showed almost identical means (2.94 for senior managers vs. 2.95 for others), confirming no difference. Levene's test established that the assumption of equal variances was met for most comparisons, except for lower management ($p = 0.013$). However, even when adjusted, the t-test results remained non-significant. Findings in relevant studies on this matter differ. For example, some studies find that managers are more involved in fraud than employees (KPMG UK, 2025), while others identify lower-level managers as the primary perpetrators (Deloitte India, 2020). According to the ACFE global survey (2024), fraud committed by owners or executives accounted for 19% of cases. Still, they resulted in the highest median losses, with a median loss of USD 500,000, over eight times that of staff-level employees (USD 60,000) and nearly three times that of mid-level managers (USD 184,000). In contrast, fraud by employees and lower managers was more frequent, accounting for 37% and 41% of cases, respectively.

Table 3 compares the rankings of external actors perceived as most likely to commit fraud among senior managers and other employees, and with results from the PwC Global Survey (2022). In all three groups, hackers occupy the top position, highlighting the widespread recognition of cyber threats as the main external fraud risk. Similarly, organized crime groups consistently rank among the top three perceived threats across all contexts. However, there are notable differences when comparing Serbian respondents to the global benchmark. Both senior managers and other employees in Serbia rank competitors as the third most likely source of fraud, while globally, customers or buyers hold this position. Furthermore, Serbian respondents rate customers/buyers relatively low (in 6th to 7th position), whereas they are considered a primary risk category in the global context.

Another interesting pattern is observed in the mid-tier risks. In Serbia, agents/intermediaries and joint venture partners are viewed as moderately risky, whereas the global survey places more emphasis on suppliers and external service providers. This discrepancy may reflect structural differences in market dynamics, supply chain dependencies, and trust in intermediaries between Serbia and the global context. Lastly, consultants/advisors and foreign governments are consistently ranked as the least likely sources of fraud across all groups, indicating a consensus that these actors are perceived as less immediate threats.

Table 3: Probability that some of the external actors will commit fraud

Likelihood ranking	Senior managers (Serbia, 2024)	Others (Serbia, 2024)	PwC global (2022)
1	Hacker	Hacker	Hacker
2	Organised Crime	Organised Crime	Customer/ Buyer
3	Competitor	Competitor	Organised Crime
4	Agent or Intermediary	Joint Venture Alliance Partner	Supplier
5	Joint Venture Alliance Partner	Agent or Intermediary	Agent or Intermediary
6	Supplier	Customer/ Buyer	Competitor
7	Customer/ Buyer	Supplier	External Service Provider / Outsourcing
8	External Service Provider / Outsourcing	External Service Provider / Outsourcing	Joint Venture Alliance Partner
9	Consultant Advisor	Consultant Advisor	Consultant Advisor
10	Foreign Government	Foreign Government	Foreign Government

Source: Author's research and PWC (2022)

A comparative analysis was conducted to evaluate the perceptions of external actors as sources of fraud between senior managers and other employees, employing independent samples t-tests. The results revealed a few statistically significant differences. Notably, significant differences were found regarding hackers ($p = 0.024$) and organized crime groups ($p = 0.010$). In both cases, other employees perceived a higher likelihood of fraudulent activity ($M = 4.20$ for hackers and $M = 3.84$ for organized crime) compared to senior managers ($M = 3.79$ for hackers and $M = 3.27$ for organized crime).

These findings suggest that employees in non-managerial positions may have a heightened awareness of operational vulnerabilities and security risks, likely due

to their closer involvement in daily business processes. In contrast, senior managers seem to adopt a more optimistic or detached view of these threats. Despite statistically significant differences, the two actors in both categories of respondents were placed at the top in terms of the probability of committing fraud.

Additionally, marginal differences approaching statistical significance were noted for competitors ($p = 0.074$) and foreign governments ($p = 0.092$). In these instances, other employees also rated the probability of fraudulent activity slightly higher than senior managers, although these differences do not meet the conventional 0.05 significance threshold.

Additional analysis within the category of senior managers, dividing them by company size, origin of ownership, and gender, indicates only one statistically significant difference, namely that female senior managers perceive the threat of hacker fraud at a significantly higher level than men.

Perception of the types of fraud that the organization may experience

Regarding fraud, irregularities, and/or abuses that respondents believe their organization may face over the next two years, cybercrime (including data theft, intellectual property theft, etc.) ranks highest. As many as 40.3% of respondents indicated an above-average likelihood of this type of fraud occurring in the near future. In the next group, based on perceived probability, are biases toward suppliers/customers/business partners, misuse of confidential information, insider trading and espionage, and bribery and corruption, noted by slightly more than a third of respondents (34%), followed closely by inadequate financial reporting (29.8%). A significantly smaller number of respondents perceive a high likelihood of risk from regulatory non-compliance, fraud related to the use of artificial intelligence and related technologies, fraudulent business valuation, supply chain fraud (including counterfeiting and inventory theft), asset theft and money laundering, and consumer fraud. In line with these results, the fraud schemes that are most likely to be experienced in the future, according to the Deloitte India report (2020), include cybercrimes, vendor/business partner favoritism, bribery and corruption, and supply chain fraud, including counterfeiting and inventory pilferage.

Upon closer examination, the group statistics and independent samples t-tests reveal significant differences in perceptions of certain types of corporate fraud between senior managers and other employees. Senior managers consistently report lower mean scores compared to other employees across most fraud categories. Notably, statistically significant differences were observed for inadequate financial reporting ($t = -2.669$, $p = 0.008$), misuse of confidential information, insider trading, and espionage ($t = -2.152$, $p = 0.033$), asset theft and

money laundering ($t = -2.414$, $p = 0.017$), regulatory non-compliance ($t = -2.125$, $p = 0.035$), and fraudulent business valuation ($t = -3.496$, $p = 0.001$).

These results suggest that senior managers perceive these fraud types as less prevalent or less risky than other organizational members do.

Within the group of senior managers, the results from independent samples t-tests indicate significant differences in how managers from large companies and SMEs perceive the likelihood of various types of fraud.

Specifically, senior managers in large companies consistently view the risk of several fraud categories as higher, at a statistically significant level, compared to their counterparts in SMEs. The differences are observed in the following categories:

- Bribery and Corruption: Large-company managers assigned a higher likelihood of occurrence ($M = 2.95$) than SME managers ($M = 2.33$).
- Supply Chain Fraud, Counterfeiting, and Inventory Theft: Again, large-company managers perceived this risk more strongly ($M = 2.87$) compared to SME managers ($M = 1.86$).
- Bias Toward Suppliers, Customers, or Business Partners: This was rated higher by large-company managers ($M = 3.15$) than by SME managers ($M = 2.43$).
- Consumer Fraud: Large-company managers perceived a greater risk ($M = 2.38$) compared to SME managers ($M = 1.61$).

For other fraud categories, differences between senior managers of large companies and SMEs were not statistically significant.

These findings indicate that organizational **size** shapes perceptions of vulnerability to fraud. Senior managers in large companies appear to be more aware of the risks associated with complex supply chains, relationships with external stakeholders, and broader consumer interactions. In contrast, senior managers in SMEs typically perceive lower levels of fraud risk in these areas, potentially due to their more localized operations, simpler governance structures, and closer personal oversight.

When examining the ownership structures, a statistically significant difference is observed in relation to supply chain fraud, counterfeiting, and inventory theft. This type of fraud is more prevalent and ranks higher in companies with foreign ownership than in domestic ones. The likely explanation for this trend is the presence of longer supply chains and a greater level of international operations, as many partners are located outside of Serbia. As a result, the risks are higher compared to domestic companies, which generally have shorter supply chains and better knowledge of the local market.

Vulnerability of organizational processes to fraud risks

When asked to identify the business processes most vulnerable to fraud, senior managers highlighted supplier/partner selection and relationship management (28.9%) and procurement and supply chain management (26.7%) as top concerns. In contrast, lower-level managers, specialists, and non-managerial employees pointed to finance and accounting (32.7%) and IT (23.0%) as their primary areas of focus.

This divergence reflects distinct perspectives shaped by the roles within organizations. Senior managers, with responsibility for strategic partnerships, emphasized vulnerabilities in external relationships, consistent with research highlighting third-party risks as critical in modern supply chains (PwC, 2022; ACFE, 2024).

Effectiveness of organizations' existing fraud risk management frameworks

The opinions of respondents were examined regarding the effectiveness of their organizations' existing fraud risk management frameworks in identifying and mitigating potential internal and external fraud.

There were minimal differences in the assessments of organizational capacity to address internal and external fraud challenges when comparing responses from senior managers and other respondents. For internal fraud, senior managers rated their organizations at 3.36, while other respondents rated them at 3.28. For external fraud, the ratings were 3.34 for senior managers and 3.36 for other respondents.

However, notable differences emerged when analyzing specific groups within the category of senior managers. Senior managers in foreign-owned companies rated their organizations' preparedness to respond to external risks significantly higher than those in domestically owned companies, with scores of 3.67 compared to 2.92 on a 1–5 scale. A similar difference was found in the assessment of the ability to combat internal fraud, with foreign companies scoring 3.49 versus 3.18 for domestic companies. This finding is consistent with results from China and Indonesia (Liang, Liu, & Wang, 2022; Utomo & Mawardi, 2024), which indicate that foreign investment and ownership lead to lower corporate fraudulent activities due to stronger monitoring and supervision, as well as higher levels of transparency and accountability.

Additionally, senior managers from large companies rated their organizations' readiness to tackle challenges related to both internal and external fraud more favorably than their counterparts from small and medium-sized enterprises

(SMEs). The scores were 3.54 (large) compared to 3.22 (SMEs) for internal fraud and 3.54 (large) compared to 3.20 (SMEs) for external fraud, although these differences were not statistically significant.

These results align with the COSO Enterprise Risk Management framework (Committee of Sponsoring Organizations of the Treadway Commission - COSO, 2017), which emphasizes governance structures, resources, and risk oversight as determinants of effective risk mitigation. Larger and foreign-owned companies, often subject to stricter compliance regimes and equipped with more sophisticated risk controls, appear to embody COSO's principles more effectively than SMEs and domestically owned firms. The findings also correspond with research on corporate fraud and its prevention in SMEs in Malaysia and Bangladesh (Mohammad, Basiruddin, and Rasid, 2018; Hossain, 2025).

Perceived drivers of fraud

A special area of analysis was the drivers that can contribute to fraud in organizations. Both groups (see Table 4) identified insufficient communication and training, along with inadequate reporting mechanisms, as central drivers of fraud. However, senior managers placed greater emphasis on insufficient due diligence on employees and third parties (45.6% vs. 40.6%), while other respondents stressed reliance on static, outdated internal controls (46.5% vs. 32.2%).

Table 4: Perceived drivers of fraud

	Senior managers	Others
Unclear/irregular communication and training of employees on fraud, misconduct, and regulatory non-compliance	58.9%	61.4%
Inadequate mechanisms for reporting suspicious behavior	55.6%	49.5%
Asymmetric access to information, systems, and decision-making granted to only a few individuals	53.3%	51.5%
Insufficient due diligence on employees/third parties (partners, associates, etc.)	45.6%	40.6%
A reward system based on unrealistic targets	36.7%	37.6%
Limited understanding of new fraud risks that may result in gaps in the current risk management framework	35.6%	39.6%
Reliance on static, outdated internal controls	32.2%	46.5%
Lack of compliance with the code of conduct by senior management	25.6%	27.7%
Limited resources for building a robust fraud risk management system	21.1%	14.9%

Source: Author's research

These findings can be interpreted through the Fraud Diamond model (Wolfe & Hermanson, 2004), which extends the Fraud Triangle by adding “capability” as a critical element. From this perspective, inadequate due diligence heightens the capability of bad actors to exploit organizational blind spots, while outdated controls increase opportunity. Thus, both strategic and operational weaknesses contribute to heightened fraud risk, albeit in different ways.

Stakeholders for enhancing fraud risk management

respondents also evaluated the role of external stakeholders in strengthening fraud risk management. Both groups (Senior managers and Others) agreed on the importance of technology companies and IT experts (54.4% vs. 52.5%), underscoring the growing relevance of digital fraud detection tools. Senior managers emphasized independent managers/directors (40.0% vs. 29.7%), reflecting recognition of governance reforms. In comparison, other respondents highlighted external auditors (43.6% vs. 32.2%) and government institutions (27.7% vs. 17.8%), consistent with reliance on formal external oversight (Table 5).

Table 5: Stakeholders which could significantly improve the organization’s performance in managing fraud risks: Senior managers vs. Others

	Senior managers	Others
Technology companies / IT experts	54.4%	52.5%
Independent managers/directors	40.0%	29.7%
External auditors	32.2%	43.6%
Professional legal services	24.4%	31.7%
Government (police, prosecution, combating various forms of economic crime)	17.8%	27.7%
Forensic experts	13.3%	15.8%

Source: Author’s research

Table 6 presents senior managers’ perceptions of the stakeholders most likely to enhance organizational performance in managing fraud risks. The results highlight technology companies/IT experts as the most prominent group across all categories, with particularly high support from male respondents (60.0%) and managers in large enterprises (56.4%). This underscores the perceived centrality of technological expertise in combating fraud.

Table 6: Senior managers' perceptions of stakeholders that could significantly improve the organisation's performance in managing fraud risks

	Female	Male	MSE	Large	Foreign	Domestic
Professional legal services	26.7%	22.2%	29.4%	18.0%	21.6%	28.2%
Forensic experts	15.6%	11.1%	7.8%	20.5%	19.6%	5.1%
Technology companies / IT experts	48.9%	60.0%	52.9%	56.4%	54.9%	53.9%
Independent managers/directors	40.0%	40.0%	37.3%	43.6%	41.2%	38.5%
External auditors	40.0%	24.4%	31.4%	33.3%	33.3%	30.8%
Government (police, prosecution, combating economic crime)	24.4%	11.1%	19.6%	15.4%	13.7%	23.1%

Source: Author's research

A second tier of importance is attributed to independent managers/directors and external auditors. Both groups received balanced recognition, although external auditors were more highly valued by female respondents (40.0%) compared to their male counterparts (24.4%), suggesting gendered differences in trust toward traditional control mechanisms.

By contrast, professional legal services were cited by just over a quarter of respondents overall, with slightly stronger emphasis among managers from domestic enterprises (28.2%). Forensic experts received lower recognition, except in large (20.5%) and foreign-owned (19.6%) enterprises, which may reflect greater awareness of specialized investigative practices in more complex organizational settings.

Finally, government actors (e.g., police, prosecution) were generally seen as less significant, with relatively modest endorsement across all groups. This finding may indicate limited confidence in external regulatory or enforcement bodies as partners in organizational fraud risk management.

The help that women seek to a greater extent from outside (from government or external auditors) is associated with their greater aversion to risk and a higher level of business ethics, which has been confirmed in several studies (Procházková & Mičák, 2023; Vo et al., 2023).

Research in India indicates that various ecosystem players can significantly enhance Fraud Risk Management efforts. Respondents expressed a balanced perspective, identifying several key contributors: technology organizations that

aid in fraud prevention and prediction, forensic experts and law enforcement agencies involved in investigations, law firms that assist with fraud response and anti-fraud education, and independent directors responsible for fraud reporting (Deloitte India, 2020). In this sense, while raising awareness among managers and employees in Serbia about the importance of certain stakeholders in the fight against corporate fraud, it is necessary to distinguish between distinct phases (investigation, prevention, prediction, education, and reporting).

Conclusion and implications

This study offers new insights into how organizations in Serbia perceive fraud risks and assess their vulnerability. While most respondents indicated that there have been no significant changes in the prevalence of fraud over the past two years, a notable number, including senior managers, particularly women, those in small enterprises, and managers in domestically owned firms, could not provide clear assessments. This finding highlights ongoing gaps in fraud awareness and monitoring capacity, often related to organizational size, resources, and access to information systems.

Gender-based differences were evident. Female senior managers were more likely to either refrain from making assessments or anticipate higher losses related to fraud. This suggests greater caution but also hints at their potential exclusion from crucial information flows. Additionally, organizational size and ownership played a role in shaping perceptions. Managers in large, foreign-owned firms identified a wider range of external fraud risks, especially concerning supply chains, while those in small and domestically owned companies perceived a lower level of exposure.

Among all groups surveyed, cybercrime was recognized as the most likely fraud threat in the near future, followed by biases in business relationships, misuse of confidential information, insider trading, bribery, and inadequate financial reporting. Employees at lower hierarchical levels consistently rated cybercrime and organized crime as more pressing threats than senior managers did, reflecting their closer engagement with daily operations and their heightened awareness of vulnerabilities. These differences underscore how organizational roles and perspectives can shape risk perception.

Overall, the findings suggest that fraud risk management in Serbia is uneven across different types of organizations and managerial levels. Addressing these gaps necessitates targeted actions at both the policy and organizational levels.

The policy and managerial implications can be summarized in four key areas. First, systematic fraud awareness and training programs are essential, parti-

cularly for SMEs and domestically owned companies, with a special focus on reducing gendered information asymmetries. Second, developing standardized monitoring and reporting mechanisms would enhance organizations' ability to detect fraud trends and benchmark against peers. Third, given the prominence of cybercrime, firms should be incentivized to invest in advanced digital detection tools and IT security through shared platforms and partnerships. Finally, collaboration among companies, regulators, and law enforcement should be strengthened, including through public-private partnerships and specialized task forces, to combat organized crime and cyber-enabled fraud.

This study has several limitations that should be acknowledged. First, the findings rely on self-reported perceptions, which may be influenced by social desirability bias or limited access to information. Second, the sample is restricted to organizations operating in Serbia, which limits the generalizability of the results to broader regional or global contexts. Third, while the study included comparisons based on hierarchical levels and within the senior management group in terms of gender, company size, and ownership, it did not capture sectoral differences that may significantly influence perceptions of fraud risk.

Future research could address these limitations by combining perception-based surveys with objective data on detected fraud cases. Comparative studies across different countries or industries would help place the Serbian results within a broader context. Additionally, longitudinal designs could capture how perceptions of fraud evolve, particularly in response to regulatory reforms or technological changes.

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Abstract

Forensic accounting is increasingly becoming an important segment in the fight against financial crime, corruption and misuse of public funds, especially in regions with pronounced institutional weaknesses. This paper analyzes the importance and prospects for the development of forensic accounting in the Western Balkans, with a focus on Bosnia and Herzegovina, Serbia, Montenegro, Albania and North Macedonia. Through a comparative analysis of the existing institutional and legislative framework, key challenges are identified, including the lack of education, the legally unrecognized status of forensic accountants and insufficient cooperation with the judiciary. The paper particularly emphasizes the need for systemic reforms, the development of educational programs and the strengthening of professional standards. By comparing with practices in the European Union, possible directions of development are suggested that would enable more efficient application of forensic accounting as a tool in protecting the public interest and strengthening the rule of law in the countries of the region.

Key words: forensic accounting, financial crime, Western Balkans, corruption, institutional development, EU integration

JEL Classification: M41

Introduction

Forensic accounting is a specialized area of the accounting profession that deals with the detection, analysis and documentation of financial fraud and irregularities. It is an interdisciplinary field that connects accounting, auditing and legal aspects with the aim of detecting and documenting financial fraud, abuse and other forms of criminal acts. Its importance is particularly evident in societies that face a high degree of corruption, organized crime and abuses in the public sector. The countries of the Western Balkans - Bosnia and Herzegovina, Serbia, Montenegro, Albania and North Macedonia - face similar transition challenges: the legacy of insufficiently built institutions, the slow process of harmonizing legislation with European Union standards, and the lack of professional staff. In such environment, forensic accounting

becomes a necessary tool in the fight against financial crime and strengthening trust in institutions.

According to reports by organizations such as Transparency International (2024) and the European Commission (2020), corruption and the shadow economy continue to represent a serious problem in all countries of the region. The Corruption Perceptions Index (CPI) ranks 180 countries and territories around the world according to the level of corruption in the public sector on a scale from 0 (very corrupt country) to 100 (very clean and orderly country). According to this indicator for the year 2024, the countries of the Western Balkans are ranked as follows (Transparency International, 2024 Corruption Perceptions Index Report):

- Bosnia and Herzegovina (BiH) - 114th place (with a score of 33),
- Serbia - 105th place (with a score of 35),
- North Macedonia - 88th place (with a score of 40),
- Albania - 80th place (with a score of 42),
- Montenegro – 65th place (with a rating of 46).

As we can see, according to the CPI, Bosnia and Herzegovina and Serbia were ranked worst, while Montenegro took the best position when we look at the countries of the Western Balkans.

Irregularities in public procurement, financing of political parties, abuses in the banking sector and money laundering are just some of the forms of criminal acts that require a systemic reaction. Traditional forms of financial control, such as internal and external auditing, have proven to be insufficient, as they often do not include complex and hidden transactions behind organized criminal structures. This is exactly where forensic accounting has a comparative advantage, because it combines knowledge from the fields of accounting, auditing, law, and criminology.

When it comes to choosing a methodological approach to the research, the paper uses a comparative research approach that involves comparing the development of forensic accounting in the Western Balkans with the development of this profession in the European Union. The criteria that will be considered and used relate to the institutional framework, the level of education and the availability of professional staff, as well as the possibility of improving the profession through international cooperation and the process of European integration.

The aim of this paper is to present the current situation, and to provide an analysis of the importance and perspective of the development of forensic accounting in the Western Balkans, to identify key challenges and needs in practice, and to

compare the situation in the region with the practices and standards of the European Union in order to be able to propose improvements to this profession.

With this approach, the work aims to contribute to a better understanding of the role of forensic accounting as a tool in strengthening the rule of law, transparency and accountability. The analysis by country follows current trends, concrete cases from practice and recommendations of international organizations, which enables a realistic presentation of the potential and limitations of the development of this profession.

1. Theoretical framework

Forensic accounting includes the application of accounting, auditing and investigative skills for the purpose of identifying, preventing and documenting financial fraud and criminal activity. Unlike traditional accounting, which focuses on recording and reporting, forensic accounting has an analytical and investigative function. His results are most often used as evidence in judicial proceedings, which implies a high level of expertise, precision and ethical responsibility.

This discipline connects accounting with law and criminology, so it is often called „accounting in the function of justice”. His tasks include investigating suspicious transactions, detecting money laundering, assessing financial damages, reconstructing business books, and providing expert testimony in judicial proceedings. Due to such an interdisciplinary character, a forensic accountant must possess specific knowledge and skills that go beyond standard accounting.

Forensic accounting is often mistakenly identified with auditing, although there are significant differences. While internal auditing is aimed at improving business processes and internal control, and external auditing at expressing an opinion on the accuracy of financial statements, forensic accounting aims to detect irregularities and provide evidence of fraud. Auditors generally work according to predefined standards and sampling, while forensic accountants use research methods, detailed analysis and reconstruction of transactions. In this sense, forensic accounting builds on auditing, but has a broader and deeper research character.

In modern conditions, forensic accounting relies on digital technologies, software tools for big data analysis (big data), artificial intelligence and forensic methods of processing electronic traces. Digital fraud, cybercrime and complex international money laundering networks require new knowledge and work methods. In developed economies, such as the USA, Great Britain and Germany,

forensic accounting is already an established profession with clear educational programs, certifications and high demand on the labor market.

The special importance of forensic accounting is reflected in its role in judicial processes. The findings and opinions of forensic accountants are used as evidence in court proceedings, which requires that experts in this field possess knowledge of legislation, procedures and standards of proof. This further emphasizes the need to strengthen institutional cooperation between the accounting profession, the judiciary and regulatory bodies.

2. Comparative analysis of forensic accounting in the Western Balkans practice

Bosnia and Herzegovina. Bosnia and Herzegovina faces numerous challenges in the fight against corruption and financial crime, which makes forensic accounting particularly important. Its complex state structure, fragmented between entities, cantons and Brčko District, significantly complicates the construction of a unified system of control and supervision. Precisely, because of this, forensic accounting in Bosnia and Herzegovina has the potential to become a key instrument in strengthening transparency, trust in institutions and protection of the economic system.

When we talk about the institutional and legislative framework, the legislation in BiH recognizes the need to fight against financial crime, but there is a problem of fragmentation and uneven application of the law.

At the state level, the key institutions that deal with financial crime are the Agency for Forensic Investigations and Expertises, the Financial Intelligence Department of SIPA, and the Office for the Audit of BiH Institutions. Although there is an institutional network, cooperation between authorities is often limited by political pressures and a lack of coordination.

When we talk about the situation in practice, forensic accounting in BiH is still in the development phase and mostly depends on individual initiatives within audit firms and the academic community. Unlike some EU countries, where there are certified programs and specialized professions, in BiH there is no single regulation that defines a forensic accountant as a special profile.

The Law on Accounting and Auditing of the Republic of Srpska (Official Gazette of the RS, 94/15), in addition to accounting, defines other related titles in related professions to which it belongs, among others, the title „Certified Forensic Accountant”. In this way, this profession achieved legality, which created the conditions for its further development and improvement.

Following the modern needs and trends in the specialization of the accounting profession as well as the obligations arising from full membership in IFAC, the Board of Directors of the Association of Accountants and Auditors of the Republic of Srpska already in 2012 made a decision no. 731/12 of 30.11.2012. with whom introduced the professional title „Certified Forensic Accountant” due to the increased need for forensic accounting at the global level, and the need for its application in the territory of the Republic of Srpska. In this connection, the Rulebook on the conditions for obtaining a professional title and continuing education for „Certified Forensic Accountants” was adopted.

The Union of Accountants and Auditors of the Republika Srpska has so far successfully organized and conducted the VIII cycle (generation) of training and testing (in the period from 2013 to 2024), during which 178 candidates passed the prescribed exams and obtained the professional title of „Certified Forensic Accountant”.

In the latest reports of the European Commission, Bosnia and Herzegovina was assessed as a country with insufficient capacity for effective investigation of financial fraud, where the need for modernization of financial supervision is particularly emphasized.

The COVID-19 pandemic has particularly highlighted the weaknesses of the financial system in Bosnia and Herzegovina. One of the most famous cases relates to the procurement of respirators in the Federation of Bosnia and Herzegovina in 2020, when a company with no experience in medical equipment was awarded a contract worth millions. The investigation showed serious irregularities in the public procurement procedure, and forensic accounting could play a key role in analyzing cash flows, estimating the value of contracts and identifying conflicts of interest. This case became a symbol of the necessity of introducing professional analyzes and independent supervision of financial transactions.

At universities in Bosnia and Herzegovina, forensic accounting is increasingly appearing as an elective subject at the faculties of economics and law. However, system support is lacking, especially in terms of practical programs and certification. It is necessary to create a national framework that would enable the development of specialized forensic accountants, modeled on international standards (e.g. Certified Fraud Examiner - CFE).

When it comes to the perspective of the development of forensic accounting in Bosnia and Herzegovina, the following is key:

1. Improvement of legislation - introduction by law of a clear profile of a forensic accountant, because currently there is no clear legal recognition of a forensic accountant as an expert in legal proceedings.
2. Strengthening institutional cooperation - better coordination between tax authorities, auditing institutions, prosecutor's offices and police agencies.
3. Education and certification - development of specialized programs and training for experts.
4. Transparency of public finances - application of digital tools and artificial intelligence for monitoring public expenses.

Bosnia and Herzegovina faces deep-rooted corruption and political fragmentation, but precisely because of this, the development of forensic accounting can become an instrument for strengthening institutions and bringing them closer to EU standards.

Serbia. Forensic accounting in Serbia is becoming increasingly important in the context of the fight against corruption, tax evasion and organized crime. As a candidate country for membership in the European Union, Serbia is under pressure to improve the institutional and legislative framework in accordance with EU standards, especially in the area of financial transparency and strengthening of independent control bodies. Despite some progress, challenges remain, and the need to develop forensic accounting has never been bigger.

Although there is formally a developed framework, Serbia's problem lies in the implementation of laws and the independence of institutions, which is regularly stated in the reports of the European Commission.

Within the framework of the Law on the Organization and Competence of State Authorities in Suppression of Organized Crime, Terrorism and Corruption, in Part IV, Article 19, the Financial Forensics Service is provided for. Namely, in the Prosecutor's Office for Organized Crime and special departments of higher public prosecutor's offices, in accordance with this law, a financial forensic service can be established. The work of the financial forensics service is performed by financial forensics. According to this law, a financial forensic expert is a person who assists the public prosecutor in the analysis of money flows and financial transactions for the purpose of criminal prosecution. A financial forensic scientist is a civil servant who has special professional knowledge in the field of finance, accounting, auditing, banking, stock exchange and business operations, and who also completed specialized training at the Judicial Academy in the field of criminal law. Likewise, 15 certified fraud examiners who have earned the international

credential *Certified Fraud Examiner* of the *Association of Certified Fraud Examiners* work in public or state institutions in Serbia.

As we can see, Serbia has made certain strides in terms of education and awareness of the importance of forensic accounting. Certain schools and professional associations organize study programs, trainings and seminars, although there is no single certification program. The Association of Accountants and Auditors of Serbia, as an independent professional accounting organization and member of IFAC, has taken over the certification for the professional title „Authorized Forensic Accountant”.

The Faculty of Economics in Belgrade and the Association of Accountants and Auditors of Serbia (SRRS) have signed an agreement that will enable future graduates of the Forensic Accounting study program at the Faculty of Economics in Belgrade to be recognized and acquire the professional title of „Certified Forensic Accountant” by the Association of Accountants and Auditors of the Republic of Serbia.

Belgrade is also the headquarters of the International Association of Forensic Accountants and Auditors with members from Serbia, Bosnia and Herzegovina, Croatia, Montenegro and North Macedonia, which also conducts certification for obtaining the title „Certified Forensic Auditor” through training accredited by the American Council for Training and Development (ACTD), as well as the „Certificate in Forensic Accounting” which is obtained after successfully completing one of the courses of the GMK School of Forensic Accounting.

As we can see, there are trainings and specializations in the field of forensic accounting, but they are not systematically regulated. Professional organizations, such as the Chamber of Authorized Auditors of Serbia and the Association of Accountants and Auditors of Serbia, are launching initiatives to introduce forensic accounting into practice, but without adequate support from the state, progress is slow.

One of the most famous examples of the need for forensic accounting in Serbia is the case of „Agrobank”. This state-owned bank went bankrupt in 2012, after the discovery of a series of irregularities and uncollectible loans worth hundreds of millions of euros. Audit reports pointed to serious failures in management and concealment of financial losses. Forensic accounting in this case would be key to:

- analysis of credit placements and related parties,
- identification of fictitious collaterals,
- reconstruction of cash flows and hidden arrangements.

The case of Agrobanka illustrates how the lack of timely use of forensic methods can lead to the collapse of the financial system and large losses.

When it comes to the prospects for the development of this profession in Serbia, institutions such as the State Audit Institution point to financial irregularities, but cooperation with judicial authorities is still limited. The development potential lies in the integration of forensic methods in the work of tax and judicial authorities.

To strengthen forensic accounting in Serbia, it is necessary to:

1. Formal recognition of the profession - creation of a special legal category for forensic accountants, based on international standards.
2. Independence of institutions - ensure the political neutrality of the State Audit Institution, prosecutor's offices and courts in financial investigation procedures.
3. Strengthening the capacity to combat money laundering - especially through cooperation with EU institutions.
4. Introduction of digital technologies - development of software for forensic analysis and integration with public finance systems.

Serbia is facing a serious problem of systemic corruption and political influence on the judiciary, but precisely in this context, forensic accounting can be an instrument that would strengthen transparency, investor confidence and the process of European integration.

Montenegro. Forensic accounting in Montenegro plays an increasingly important role in the process of strengthening institutions and the fight against corruption, money laundering and organized crime. As a candidate country for membership in the European Union, Montenegro is in the process of harmonizing legislation and practice with European standards. Despite some progress, the challenges remain great, especially due to political influence on institutions, insufficient personnel training and the presence of the „gray economy”.

The role of the Special State Prosecutor's Office, which has intensified investigations into financial embezzlement and organized crime in recent years, is particularly important.

When we talk about the situation in practice, forensic accounting has not yet been developed as a separate profession in Montenegro. The role of the forensic accountant is not regulated by law. The lack of professional staff and the low level of transparency of the public sector make progress difficult. However, anti-corruption strategies and international programs provide an

opportunity to bring knowledge from this area into public institutions and academic programs. In the register of titles of the Institute of Certified Accountants of Montenegro, 42 persons with a valid „Forensic Accountant” license are recorded.

Montenegro is specific in that for decades it had the status of a „transit route” for illegal money flows, especially through the smuggling of cigarettes and other excise goods. This has created complex webs of financial transactions, where forensic accounting is key to uncovering irregularities.

One of the most famous examples that shows the importance of forensic accounting in Montenegro refers to cigarette smuggling. For many years, Montenegro was known as the main center for tobacco smuggling in the Balkans, and research showed that this business generated millions of euros in undeclared profits.

In recent investigations by the Special State Prosecutor’s Office and international partners, forensic accounting has played a key role in:

- tracking financial flows between companies connected to smuggling networks,
- identification of off-shore companies and their owners,
- analysis of tax obligations and attempts to conceal real income.

This case illustrates not only the importance of forensic methods in detecting financial malfeasance, but also the need for regional cooperation, since smugglers’ networks crossed the borders of Montenegro.

Forensic accounting in Montenegro has only recently begun to enter academic programs. At the University of Montenegro, there are courses in the field of auditing and financial crime, while special programs and certificates are still being developed. International certificates such as CFE (Certified Fraud Examiner) are present with a small number of experts. Professional organizations of accountants and auditors emphasize the need to include forensic accounting in the system of continuous education, especially for those working in the public sector and control institutions.

When it comes to the perspective of forensic accounting in Montenegro, in order to improve the application of forensic accounting, it is necessary:

1. Strengthening the capacity of the Special State Prosecutor’s Office and the State Audit Institution, especially through the employment of experts in the field of finance and forensic analysis.
2. Reduction of political influence on judicial institutions, so that the results of investigations have full credibility.

3. Development of academic programs at universities and encouragement of international cooperation with EU institutions.
4. Application of digital technologies and software for analysis of financial data and detection of irregularities in real time.

Montenegro has the potential to develop a strong system of forensic accounting, especially due to the process of European integration and international pressure to improve the fight against corruption. However, the key challenge remains the political will and willingness of institutions to ensure independent and impartial investigations.

Albania. Forensic accounting in Albania is gaining increasing importance due to the process of European integration, the need to strengthen the rule of law and the fight against organized crime. As in other Western Balkan countries, Albania faces complex challenges, including high-level corruption, tax evasion, money laundering and weak institutional transparency.

The introduction of specialized prosecutorial and investigative bodies, especially SPAK, represents an important step in the improvement of forensic methods in financial investigations.

It is particularly significant that Albania, due to its geostrategic position, is often the target of international criminal networks, so forensic accounting becomes necessary in monitoring the flow of illegal money.

One of the most striking examples in Albania concerns money laundering through the real estate market. Research has shown that a significant number of luxury apartments in Tirana and coastal cities were bought with money from criminal activities, especially from drug trafficking.

Forensic accounting in those cases played a key role in:

- connecting financial transactions with persons and companies without reported legal income,
- detecting discrepancies between reported earnings and real purchasing power,
- analysis of cash payments to banks and investment funds.

These investigations were also supported by international partners (EUROPOL, OLAF), which shows how crucial regional and international cooperation is in this domain.

As we can see, the Albanian social transition is marked by a high level of corruption and informal financial flows. In recent years, reform initiatives in the judiciary and the fight against crime have been noticeable, but the role of forensic accounting has not yet been recognized in the legislative framework.

Professional bodies, such as the Institute of Chartered Accountants of Albania (IEKA), emphasize the need for greater investment in training and cooperation with international organizations. In Albania, there is a growing interest in forensic accounting in academic circles. The universities of Tirana and Durrës have included courses in the field of forensic auditing and financial crime in their programs. However, the number of certified experts with international qualifications (CFE, ACCA forensics) is still small.

The following measures are crucial for the improvement of forensic accounting in Albania:

1. Further strengthening of SPAK and ensuring complete independence from political pressure.
2. Investing in technology to detect financial fraud, especially in the banking and real estate sectors.
3. Education of experts and strengthening of cooperation with the EU in the field of forensic accounting.
4. Transparency of public finances and digitization of tax records, in order to reduce the space for manipulations.

Although Albania shows some progress, success depends on the political will and readiness of institutions to apply the results of forensic analyzes in practice. Approaching the EU and international monitoring could accelerate the institutionalization of this profession.

North Macedonia. Forensic accounting in North Macedonia is gaining importance in the context of strengthening institutions and the fight against corruption, especially after the country started the process of approaching the European Union. Despite progress in the legislative framework, the practice of forensic accounting is still in the developing stage and faces numerous challenges.

These institutions cooperate with each other and with international partners, especially OLAF and GRECO.

When we talk about the situation in practice, the most common cases where forensic accounting is used in North Macedonia are:

- abuse of public procurement,
- financial fraud in the banking sector,
- illegal enrichment of public officials,
- tax evasion and falsification of company balance sheets.

Although there are institutional mechanisms, practice shows that political pressures and limited resources often hinder the full application of forensic findings.

One of the most famous cases that attracted public attention is the „Racket Affair” from 2019, in which public officials and persons from the judiciary were accused of extortion and financial manipulation.

This affair showed that forensic accounting can be a powerful tool in the fight against high corruption, but also that independent mechanisms are needed to prevent abuse of political influence.

When we talk about the education and development of the profession, the universities in Skopje and Bitola are introducing courses in the field of forensic accounting, but the profession is still not fully developed. A small number of experts hold international certificates (CFE, CPA forensics).

Professional associations of accountants and auditors emphasize the need for:

- wider introduction of specialized education,
- training of employees in state institutions,
- cooperation with international organizations.

Further development of forensic accounting in North Macedonia requires:

1. Increasing the independence of state bodies, especially the prosecution and audit.
2. Digitization of tax and budget records, in order to detect irregularities more easily.
3. Improving cooperation with EU institutions, especially OLAF and GRECO.
4. Investment in staff training and development of academic programs.
5. Application of international standards in financial investigations.

North Macedonia is at a turning point: the success of forensic accounting will depend on a combination of political will, strengthening of institutional independence and investment in knowledge and technology.

3. Comparison with EU practices

Unlike the countries of the Western Balkans, forensic accounting enjoys institutional and professional support in the European Union. There are accredited certifications and developed master's programs in this field. Forensic accountants have legally recognized expert status, and their findings are used in judicial proceedings. The key difference is the degree of integration of forensic accounting into judicial and tax processes, as well as the high level of cooperation between professional associations and state institutions. These

standards represent a model according to which the countries of the Western Balkans can shape their reform processes.

Forensic accounting in the countries of the European Union has developed in accordance with high standards of transparency, responsibility and independence of institutions. EU countries use forensic accounting as a key tool in the fight against financial crime, corruption and money laundering, with clearly defined roles, procedures and professional training.

In EU member states, forensic accounting is integrated into the work of:

- auditing institutions,
- specialized prosecutor's offices for economic crime,
- financial intelligence units and
- independent regulators of the financial sector.

Germany has a sophisticated network of state audit offices and specialized forensic teams that monitor complex financial transactions, particularly in the banking and industrial sectors. These teams often cooperate with private audit firms. In Sweden, the high transparency of public finances and the digitization of data enable quick detection of irregularities. Forensic accountants regularly use big data analytics and cash flow tracking software. The practice of international forensic accounting has also been developed in the Netherlands, especially in the finance and transport sectors, with a special emphasis on the prevention of money laundering and corruption in ports and logistics. In the EU, forensic accountants are often certified through international or national programs:

- Certified Fraud Examiner (CFE),
- Forensic Accounting Certificate – ACCA,
- Chartered Accountant with Forensic Specialization (UK, Netherlands).

Standardization allows investigations to be recognized in courts and in international procedures. Compared to the Western Balkans, where certification and formal recognition of the profession is still lacking, EU countries have a clearly defined career and professional code.

When we talk about the application of forensic accounting in practice, in the EU forensic accounting is mainly used in:

- investigation of corruption and conflict of interest,
- audits of EU funds and grants,
- prevention of money laundering and financial crime in the banking sector.

In 2015, the famous „Mafia Capitale” affair shocked the Italian public. The investigation exposed a large network of criminals, entrepreneurs and politicians, which included 46 people, and spread throughout the Roman city government. As part of organized crime investigations, forensic accountants analyze complex transactions and fictitious companies to uncover financial malfeasance. Likewise, in France, a forensic audit of public procurement in the infrastructure and health sectors enabled the identification of multimillion-dollar fraud and corruption chains.

If we make a comparison with the Western Balkan countries, the differences are shown in the following table:

Table 1: Comparative analysis – Western Balkans and the EU

Region/ Country	Institutional Frameworks	Level of Education and Availability of Qualified Staff	Opportunities for Advancement through International Cooperation and EU Integration
Serbia	Legal frameworks aligned with EU directives, but challenges remain in implementation and supervision; regulatory bodies are active but not fully effective.	Universities offer forensic accounting; limited continuous education.	The EU integration process creates opportunities for harmonization of standards and participation in international organizations.
Bosnia and Herzegovina	Fragmented institutional framework due to entity-level regulations; complexity reduces efficiency.	Educational institutions exist, but quality is inconsistent; lack of practical training; youth emigration affects availability of professionals.	EU integration and regional cooperation could support regulatory alignment and capacity building.
Montenegro	Legal framework largely aligned with the EU; lack of institutional capacity for consistent enforcement.	Solid foundation in the education system, but limited number of specialized professionals; need for additional training.	EU candidate status accelerates alignment and strengthens opportunities for international projects and training.

Albania	Progress in legislative reforms, but implementation and supervision remain challenging.	Universities are developing programs, but quality and practice lag behind; migration reduces availability of professionals.	The integration process strongly drives reforms, creating opportunities through international cooperation.
North Macedonia	Stable regulatory framework, but weaker implementation in practice; institutions face resource limitations.	Relatively strong educational base, but a better system of continuous education and professional certification is needed.	EU integration is a key driver of reforms; regional cooperation can accelerate professional development.
EU (reference framework)	Strong and stable regulatory and supervisory systems; standardization through EU directives and international standards.	High level of education and continuous professional training; wide availability of qualified professionals.	Intensive international cooperation and integration; continuous improvement through innovation and standardization.

Source: Author's research

As we can see in the previous table, the following differences are evident:

1. Institutional independence - in the EU there is greater protection from political influence, while in the Western Balkans political pressures often hinder independent investigations.
2. Professional certification – EU countries have developed programs and internationally recognized certificates; The Western Balkans is still developing these capacities.
3. Technological application - digitization and analytics of big data in the EU facilitate the detection of irregularities; The Balkans still make extensive use of manual and partial methods.
4. Regulatory framework – EU legislation is harmonized with directives and standards that obligate the application of forensic methods; The Balkans have fragmented and often inconsistent legislation.

The solution for the countries of the Western Balkans and the key directions for the improvement of forensic accounting could be the adoption of EU experiences

as a model regarding the implementation of certifications, digitization of data, strengthening of independent institutions and international cooperation. The key is to establish a regulatory framework, formalize education and enable the operational cooperation of forensic accountants with the judiciary.

4. Prospects for the development of forensic accounting in the Western Balkans

As we can see, forensic accounting in the Western Balkans is a developing profession, which faces numerous challenges, but at the same time has a huge potential to become a key instrument in the fight against financial crime, corruption and inefficiency in public finances. The perspectives of the development of this discipline can be seen through several key dimensions: institutional, educational, technological and regional cooperation.

Institutional development. For all the countries of the region, including Bosnia and Herzegovina, Serbia, Montenegro, Albania and North Macedonia, it is crucial:

- Strengthening the independence of institutions - state audit institutions, prosecutor's offices and police agencies must be freed from political influence in order for forensic investigations to be effective and credible.
- Specialized forensic teams - formation of professional teams within audit institutions and prosecutor's offices with clearly defined responsibilities and work protocols.
- Unified legislative framework - harmonization of laws on accounting, auditing and the fight against money laundering at the state and regional level. In other words, legal recognition of the profession is necessary - the introduction of the forensic accountant as a professional expert in the legislative framework.

Education and professional development. The development of professional staff is crucial and it is possible through:

- Academic programs – introduction of specialized courses and master study programs in forensic accounting at universities in the region.
- International certifications – support for obtaining CFE (Certified Fraud Examiner) and other international certificates.
- Continuous education - training for employees in the public sector, auditing and banking, in order to follow modern trends and methods.

Technological development. The application of modern technologies is of key importance in terms of:

- Digitization of financial data - establishment of electronic systems for tracking transactions and public procurement.
- Big Data analytics – using software tools to identify anomalies and suspicious transactions.
- Integration of artificial intelligence – automation of routine controls and analyses, freeing up experts for more complex forensic investigations.

Regional and international cooperation. Forensic accounting also requires cross-border cooperation, especially due to organized crime and money laundering, which is why it is crucial:

- Exchange of information between the countries of the Western Balkans, through common databases and project initiatives.
- Cooperation with EU institutions (OLAF, Europol, GRECO) for training and exchange of practices.
- Standardization of methodologies - harmonization of regional practices with international standards of forensic accounting.

Finally, when we talk about the perspective of forensic accounting in the Western Balkans, the conclusion is that it has a huge potential to become a pillar of institutional transparency and the fight against financial crime. However, its development is conditional and requires a combination of political will, educational initiative, technological innovation and regional cooperation.

Conclusion

Forensic accounting in the Western Balkans is at its early stage of development and is faced with numerous challenges: lack of professional staff, legal framework and institutional cooperation. However, the processes of European integration, international support and the growing need to fight corruption and financial crime open significant perspectives for the improvement of this area. Through systemic reforms, the introduction of educational programs and the strengthening of professional standards, forensic accounting can become a key instrument in strengthening transparency and the rule of law in the region, that is, a key tool in the fight against financial crime, corruption and irregularities in public finance operations. Its importance lies not only in the detection of crime, but also in the preventive role of protecting the public interest and building citizens' trust in institutions.

Analysis of the situation in Bosnia and Herzegovina, Serbia, Montenegro, Albania and North Macedonia shows that, although there are legal frameworks and institutions operating in this field, the practice of forensic accounting is still not fully developed and faces numerous challenges: political influence, lack of professional staff, limited resources and fragmented legislation.

A comparison with the practices of the European Union clearly shows the key differences: in the EU, forensic accounting is institutionally independent, highly professionalized and supported by digitization and sophisticated big data analysis methods. Regional experts still rarely have internationally recognized certificates, and technology and software support are limited compared to EU standards.

Perspectives for the development of forensic accounting in the Western Balkans are based on four key directions:

- Institutional development - strengthening of independent and specialized teams within audit institutions and prosecution offices.
- Educational development and certification – introduction of academic programs, continuing education and internationally recognized certificates.
- Technological development - digitization of data, application of software tools and analytics of big data, use of artificial intelligence.
- Regional and international cooperation - standardization of methods, exchange of information and cooperation with EU institutions.

The application of these measures would enable the strengthening of transparency, more efficient detection of irregularities and better preparedness of institutions for European integration and international cooperation. In the long term, the Western Balkans can develop a strong system of forensic accounting, which will not only serve in repression, but also in the prevention of financial malfeasance and the creation of a favorable business environment.

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GLOBAL ECONOMIC AND BANKING CRISIS: CORPORATE GOVERNANCE REFORMS BEFORE AND AFTER

Abstract

The global banking crisis at the start of the 21st century, preceded by the Enron case, initiated significant regulatory changes. The analysis of subsequent financial collapses reveals that these bankruptcies were not only caused by adverse economic conditions and moral hazard, but also by inadequate corporate governance, financial statement manipulation, and misrepresentation of capital and collateral values. Bank insolvency, in particular, does not occur by chance or solely due to liquidity shortfalls; rather, it reflects systemic failures in oversight and internal controls. In the first decade of the 21st century, the crises prompted comprehensive regulatory reforms to clarify accountability, strengthen supervisory mechanisms, and improve corporate governance. Shortly thereafter, the Republic of Serbia paid a high price for the collapse of some of its largest banks as well. This paper examines the intersection of the global and Serbian banking crises, focusing on the intentional and unintentional initiation of insolvency proceedings and the regulatory responses before and after the economic downturn. A central question remains unresolved: Does the concept of directors' command liability effectively serve as a tool for corporate governance reform, or is it simply a formal mechanism for assigning liability without addressing actual culpability or considering the broader systemic context?

Key words: financial fraud, banking crisis, insolvency, directors' liability, corporate governance

JEL Classification: K42, K20, K22

Introduction

Corporate governance emerged as a central issue in the major systemic crises of the early 21st century, affecting both financial and non-financial sectors and contributing to significant economic disruption. The Enron case and the subsequent global banking crisis exemplify how data manipulation, inflated collateral values, and weak governance structures can lead to insolvency and substantial financial losses. Unlike previous, primarily national crises, these events had global repercussions. In response, both international and national legal frameworks, including those in the United States and the European Union,

implemented substantial reforms to corporate governance and supervisory practices. These reforms particularly emphasized enhancing directors' liability in both banking and non-banking sectors, aiming to strengthen internal controls and reduce the risk of unlawful insolvency proceedings.

Shortly after the collapse of major banks in the United States, Serbia faced its most severe banking crisis. Even a state bailout would be insufficient to stabilize the already undercapitalized banking sector, ultimately resulting in the insolvency of several major banks. The controversial failures of Agrobanka and Privredna banka continue to be subjects of debate to this day. As of the time of writing this paper, more than a decade after the onset of the crisis, insolvency proceedings of the banks, as well as criminal proceedings related to abuse of office, have yet to be concluded.

The ongoing amendments and improvements to corporate governance frameworks have been significantly influenced by major crises of the 21st century. These events have strengthened managerial accountability and led to enhancements in supervisory systems. A clear example of this evolution can be seen in banking regulation. The systemic shocks from the global financial crisis have driven continuous improvements in both supervisory systems and managerial liability. Some theorists, starting with E. F. Fama in the article "What Is Different About Banks?" concur that the banking sector is distinctive, along with its governance issues, due to the systemic importance of banks and the expertise of those involved in their management (Hopt, 2013).

1. Back to Enron: tracing the road to the global banking crisis

the prelude to one of the most significant global economic crises was the collapse of Enron Corporation, a major American energy company. The company was founded in 1986 through the merger of two pipeline companies, Houston Natural Gas and Inter North, Inc. After the merger, the newly formed company continued its operations under the name "Enron," initially concentrating on the transportation of natural gas. During the 1970s, the United States implemented deregulation of the energy sector, which completely restructured the natural gas market. State regulation and price controls were replaced by the principles of consumer free choice (Rapaport & Dharan, 2004, p. 4). Deregulation aimed to establish a competitive energy market, expected to lower gas prices and increase consumer surplus. However, the results were quite different. Market oversaturation led to a fall in gas prices, prompting producers to withdraw gas from sale due to a lack of profitability. As a result, the gas industry faced a severe crisis. Banks refused to extend credit to producers, as they could not accurately forecast future gas prices (McLean & Elkind, 2013).

In the emerging environment, Enron's leadership identified an opportunity to expand the company's operations. Having previously earned income solely from gas transportation, Enron transformed itself into a "Gas Bank". The Gas Bank project was designed to meet the needs of both gas producers and end-users. On the one hand, producers urgently needed financing, while on the other, end consumers aimed to hedge against potential gas price hikes. Enron positioned itself as a middleman between these interests, thereby creating a new source of income. Specifically, Enron initially entered into long-term gas supply contracts with producers, where they agreed to deliver specified quantities of gas at a fixed price in the future. In exchange, Enron prepaid the total value of the gas, effectively extending credit to the producers. Enron then resold its contractual *rights to purchase gas at a fixed price* to end consumers for a premium, profiting from the price difference. In this manner, Enron became a financial intermediary, trading not in gas itself but in contractual rights under long-term supply agreements. Soon after, Enron began trading these rights on capital markets by issuing options and futures.

The problematic aspect of this practice was how Enron recorded its revenues. The basic rule of revenue recognition is to record revenues when they are actually earned. Enron diverged from this rule, instead adopting the *mark-to-market* method, which recognized projected future revenues in advance of their realization. As a result, Enron's financial statements showed profits that did not actually exist but were based on estimated future income. At that time, such an accounting approach was illegal. Interestingly, the later introduced FASB 13350 standards permitted energy traders to include expected future gains from energy contracts as revenue (Weber, 2002).

At the end of 1999, Enron Corporation embarked on another significant business venture by launching the Enron Online platform (hereinafter: EOL). EOL was among the first online trading platforms designed to facilitate energy trading. The platform offered real-time access to energy prices, making the trading process faster, more efficient, and less costly. Its advantages were clear. However, EOL became the most powerful tool for the manipulations and fraud carried out by Enron. The business model heavily depended on Enron assuming the role of principal counterparty in numerous transactions, acting simultaneously as both buyer and seller ("The Creation of Enron Online," n. d.). This practice effectively doubled transactions, creating the illusion of increased demand, which in turn pushed energy prices higher. Through the EOL platform, market liquidity was artificially inflated to generate profit within financial markets. The Federal Energy Regulatory Commission estimated that Enron's profits from EOL exceeded USD 500 million in 2000 and 2001. According to the Commission, EOL was the pri-

mary driver of “wash trading,” which created a false sense of liquidity, resulting in artificial volatility and distorted pricing (Federal Energy Regulatory Commission [FERC], 2003).

The concealment of substantial debt, the reporting of non-existent profits, and various other accounting irregularities led to Enron’s collapse. Given the company’s business model, the fall of this “giant on fragile foundations” was inevitable. Later legal proceedings uncovered that Enron’s executives aimed to create a favorable environment for financial manipulation by influencing public energy policy through social and business networks. Specifically, the leadership lobbied political channels and directly impacted energy market deregulation, creating a fertile ground for future irregularities. For example, Enron funded a department at Harvard Business School, from which the values of “deregulation” and “privatization” were promoted (Clark & Demirag, 2006, p. 79).

The downfall of Enron Corporation was unavoidable. The company filed for insolvency under the U.S. Bankruptcy Code (Title 11 of the United States Code). The responsibility for its collapse was widespread, involving multiple failures at all management and oversight levels: from the executive leadership and chief accountants to the audit committee, external auditors, and legal advisers. Failures in the securities market were also significant, as analysts continued to recommend buying, and credit rating agencies rated Enron’s debt as investment-grade until just before the company’s bankruptcy. As a result, several individuals were indicted or pleaded guilty to fraud (Ribstein, 2002).

Building on the Enron case, another major crisis threatened the banking sector in 2008. The global banking crisis initially impacted the US economy. It then spread to the worldwide banking system, leading to the collapse of key players such as Lehman Brothers, Bear Stearns, Merrill Lynch in the USA, and the Royal Bank of Scotland in the UK, among many others. This crisis prompted reforms in the financial market environment. The initial shock was experienced in the United States as a result of the collapse of the housing market, the proliferation of subprime loans, and the imprudent trading of financial derivatives that produced toxic assets with minimal or no intrinsic value. Housing prices in the United States reached their peak in mid-2006, after which a surge in defaults on subprime loans initiated the first wave of bankruptcies among financial institutions. This turmoil led to the destabilization of the secondary mortgage market and significantly disrupted interbank lending. By the conclusion of 2007, several major banks on both sides of the Atlantic had either collapsed or been compelled to rely on government intervention to maintain solvency.

A prominent example of this was the collapse of Bear Stearns, which at the time was the fifth-largest investment bank in the United States. Despite a government-facilitated intervention by the Federal Reserve through JPMorgan Chase, Bear Stearns was ultimately unable to avert its collapse (refer to Chapter 4: The Great Credit Crisis and the Re-Regulation of the Financial System). The most severe impact occurred with the collapse of Lehman Brothers in September 2008, which constituted the largest bankruptcy in U.S. history and quickly became a symbol of the global financial crisis. The collapse disrupted markets worldwide, weakened banking portfolios, and intensified mistrust among banks, further restricting interbank lending. The US Department of the Treasury refused to intervene to rescue Lehman Brothers, citing moral hazard, as a bailout might encourage other banks to act irresponsibly, relying on state support (Mrak, 2013). At that point, the scale of the crisis and its consequences were incalculable. Consequently, urgent measures were implemented to enhance accountability in the financial sector, primarily through corporate governance rules for banks, which some authors have referred to as “prudential corporate governance” (Hopt, 2013).

Following initial uncertainties about the causes of the economic collapse, numerous analyses have been published that address the financial crisis and its origins. The decline in trust within the banking sector was a pivotal element contributing to the underlying factors of both crises being analyzed. Particular attention has been given to the role of governance failures in banks during the financial crisis, a topic on which academic and professional opinions remain divided. The initial view was that governance failures in banks played a limited role in the financial crisis. Simultaneously, greater emphasis was placed on other factors, such as weak monetary policy in the country of origin, the U.S. Federal Reserve’s policies and practices, housing loan financing for the broader population, the securitization of loans into complex financial instruments, regulatory and audit failures, and investor greed. Internal governance failures in banks were seen as one part of the chain leading to systemic collapse. However, on their own, neither was sufficient to trigger nor capable of preventing it. The European Banking Authority (EBA) also concluded that governance failures in banks were not the direct cause of the financial crisis, but rather “key contributing factors”. Later, the EBA emphasized that “weak governance structures, in particular inadequate oversight and challenge by the management body’s supervisory function”, were among the “fundamental causes of the financial crisis”. It further stated that “although corporate governance did not directly cause the crisis, the lack of effective control mechanisms contributed to excessive risk-taking by financial institutions” (Hopt, 2013).

2. The Sarbanes–Oxley Act and corporate governance reform: American and European experience

Following the collapse of the U.S. capital market, a series of corporate scandals in major firms significantly undermined investor confidence. The regulatory response, through amendments to the legal framework, was the enactment of the Sarbanes–Oxley Act (SOX) in 2002, aimed at enhancing transparency, accountability, and corporate ethics (Sarbanes–Oxley Act, 2002). Among other measures, executive liability was increased, stricter financial reporting standards were introduced, and oversight of independent auditors was strengthened. SOX became the foundation for preventing corporate abuse and irregularities that could lead to insolvency, serving as a model for subsequent reforms in European legislation.

SOX established a new paradigm of corporate governance, with particular emphasis on the role of auditors. The Law promoted audit independence, restricted consulting services provided by audit firms, and introduced mandatory audit committees within companies. A more rigorous reporting system was also established, thereby enhancing shareholder protection and reducing the risk of financial weaknesses being concealed. One of the key innovations introduced by SOX was the personal and criminal liability of executive and financial officers (Sarbanes–Oxley Act, 2002). This matter is detailed in Section 302 of SOX, which imposes numerous obligations on executive and financial officers, including the requirement to sign every annual and quarterly report, thereby certifying that the information contained therein accurately reflects the company’s operations and financial condition. By signing, executives also guarantee that, to the best of their knowledge, the report contains no false statements (Sarbanes–Oxley Act, 2002, art. 302). Before these amendments, responsibility primarily rested with accountants and auditors, while executives often defended themselves by claiming unfamiliarity with the report content and errors in financial statements. The enactment of SOX eliminated this possibility. The Law prescribes exceptionally severe penalties for the destruction, alteration, or falsification of financial statements (Bondarenko & the Editors of Encyclopaedia Britannica, 2025, para. 8). Additionally, executive and financial officers are required to report all irregularities to audit committees and auditors, while “misleading” auditors was criminalized while a five-year rotation of audit partners was introduced (Coates, 2007). Such imposed liability represents objective (command) responsibility, which in practice may result in consequences for executives due to intentional or accidental errors committed by third parties within the system. At the same time, it emphasizes the importance of carefully selecting and managing personnel, particularly in account-

ting and auditing. When analyzing these provisions, it becomes evident that, on the one hand, increased accountability reduces the likelihood of repeating past events that caused significant system-wide damage without meaningful consequences. On the other hand, skepticism remains regarding the complete objectification of executive liability, as this approach may be subject to misuse to the detriment of executives. In contrast, individuals with actual, subjective responsibility may remain outside the chain of accountability.

SOX significantly addressed issues in corporate governance, which are governed by Codes in Europe. This indicates that the U.S. legal system does not depend on soft law in corporate governance. Consequently, the United States employs the principle of “comply or else,” rather than the European “comply or explain” approach (Radović, 2015, p. 29). However, in practice, criminal investigations into companies such as Enron, Tyco, and WorldCom were carried out under laws existing before the SOX. Personal liability for management, faced by directors of U.S. firms through class actions, largely remained unchanged after the adoption of SOX. In the financial sector, banks were required to establish sophisticated internal controls, risk management procedures, and independent supervisory structures. This enhanced institutional discipline and forced financial institutions to shift from minimal regulatory compliance to a proactive approach towards transparency and risk management (Romano, 2005).

While SOX represented the U.S. response to the corporate crisis, similar regulations were later developed in Europe to enhance the stability and integrity of the financial system. The most notable examples are the Basel II and subsequently Basel III standards, adopted by the Basel Committee on Banking Supervision. These standards focus on capital adequacy, risk management, and bank liquidity (BCBS, 2004; BCBS, 2010). SOX was based on the premise that corporate governance problems result from managerial abuse and weak internal controls, whereas the Basel standards emphasize systemic risks in banking and the need for resilient bank balance sheets, such as the incentives created under Basel II for the development of off-balance-sheet entities. However, both approaches share a common foundation: the effort to restore investor confidence and maintain market stability. Interestingly, many U.S. banks, simultaneously faced with SOX requirements and Basel standards, had to adjust their strategies to satisfy both regulatory regimes.

The regulatory framework subsequently developed through various European directives and guidelines has strongly influenced the composition of bank boards. In this context, emphasis was placed on the separation of the Chairman of the Board of Directors and Chief Executive Officer (CEO) roles, the establishment of specialized committees, and increased independence of board

members. This reinforces the view that the executive board is the central actor in corporate governance, bearing ultimate responsibility for the bank's operations. Since the financial crisis, particular attention has been paid to the expertise and integrity of executives. The EBA, in its guidelines, does not favor a specific board model but sets high standards of suitability for the management body as a whole. These criteria also apply to holders of key functions in a bank, and routine practice has come to include direct interviews by supervisory authorities not only with management but also with other employees who significantly influence the bank's operations. Empirical research findings confirm that board members' expertise is one of the highest-ranking criteria. A study conducted in Germany on 29 banks found that state-owned banks incurred significantly higher losses during the crisis. One of the primary reasons was the lower qualifications of board members compared to those of predominantly private banks, which had more experienced executives with greater managerial and financial expertise. Statistically, the significant correlation between losses and lack of expertise suggests that board members' competence has a direct impact on bank stability (Hopt, 2013).

3. The banking crisis in the Republic of Serbia – Bankruptcy as orchestrated collapse?

The controversy surrounding the collapse of major banks in the Republic of Serbia, which followed the global credit crisis, was driven primarily by domestic factors. Key issues included mismanagement in credit allocations and the establishment of inadequate collateral, often based on inaccurate representations of collateral's value. These problems significantly contributed to the financial instability of the banks. Some banks allowed collateral to be constituted on assets that could not be subject to enforcement (e.g. a mortgage on a gas pipeline system that could not be individually executed). In other cases, mortgages were even established on state-owned property.

One example of a controversial banking crisis is the 'collapse' of Agrobanka. Following the global crisis and the introduction of temporary measures, Agrobanka had earlier been recapitalized, primarily through foreign capital. Subsequently, as determined by an extraordinary control conducted by the National Bank of Serbia (NBS), the escalation of risky operations led to bankruptcy. In 2012, the NBS revoked Agrobanka's operating license, which had previously been placed under receivership. For example, among the bank's debtors were cooperatives that had received approximately EUR 50 million in loans for cold storage construction projects. The guarantee for these loans was merely a contract with a foreign company for the purchase of a specified quantity

of products, of which only a small portion was realized, and exports were almost nonexistent, preventing borrowers from servicing their obligations and causing significant financial losses for the bank. These examples indicate a lack of adequate risk assessment and control over credit allocations, as well as a misalignment of credit policies with actual market potential, further weakening the bank's stability. In early 2012, Agrobanka lost its operating license after a temporary administration was appointed in late 2011. In May 2012, the bank's client deposits and obligations were transferred to a bridge bank named „Nova Agrobanka.” Shortly after this transfer, bankruptcy proceedings were officially initiated and are still ongoing.

The initiation of bankruptcy proceedings against Agrobanka was preceded by the enactment of the anti-crisis Law on Amendments to the Law on Bankruptcy and Liquidation of Banks and Insurance Companies (effective December 2010), which introduced the institution of administrative management in cases of bankruptcy, entrusted to the Deposit Insurance Agency. This transferred the legal powers of the bank's governing bodies - the management and executive boards, as well as the general assembly, established by law, to the Agency. The law also provided for a special-purpose bank (*bridge bank*), which may be established at the request of the Deposit Insurance Agency to transfer all or part of the assets and liabilities of a bank whose operating license has been revoked by the National Bank of Serbia (Kozar et al., 2013). This institution represents a legal transplant adopted from European and American legislation, which has been known for some time. To date, Nova Agrobanka has been the only special-purpose bank established to transfer assets and protect client interests. However, this “project” lasted only six months, after which a new bankruptcy proceeding was initiated.

One of the primary factors contributing to the shock experienced by Serbia's banking system was the mismanagement and excessive issuance of high-risk loans by a significantly undercapitalized bank. This prompts an important question: How was it that both government representatives and private shareholders on the bank's general assembly and executive board neglected to take action against years of poor management, leaving regulatory intervention as the sole means to address these practices? This case exposed serious weaknesses in corporate governance and a lack of accountability among supervisory bodies, which ignored evident problems and risky allocations. Only after the introduction of receivership at the end of 2011 were the full extent of irregularities and losses uncovered, resulting in severe consequences not only for the banking sector but also for public trust in institutions responsible for ensuring transparency and accountability in their operations.

In this specific case, the convergence of management failures and external participants, loan beneficiaries, and appraisers led to a series of criminal proceedings for abuse of office under Article 234 of the Criminal Code. The indictment was based on allegations that, between 2006 and 2011, the accused, contrary to the Law on Banks and internal regulations and procedures at Agrobanka, approved loans (of significant value), banking guarantees, and wrote off overdue obligations of the bank's clients, which ultimately burdened the bank itself. These particularly involved granting loans to groups of related parties, exposing the bank to risks above legally permitted limits (see Article 33 of the Law on Banks). Members of the bank's executive board were primarily responsible for financial reporting and the inaccurate presentation of capital adequacy, as well as for concealing the bank's undercapitalization. Appraisers were also held accountable for inaccurate collateral valuations, with some valuations being inflated tenfold to justify loan approvals formally. In some instances, accepted collateral included assets that were neither owned by the borrower nor the loan beneficiaries but represented state or social property. Additionally, the weaker legal framework governing appraisers at that time allowed valuations to be conducted without sufficient oversight (the Law on Real Estate Value Appraisers was only enacted in 2016; prior to that, from 2010, the Law on Court Experts had been applied).

Despite the ongoing official investigations, critical analysis points to potential accountability for the lack of transparency regarding the bank's underperformance. It raises the question of whether the credit committee may have exaggerated the bank's financial standing beyond its true exposure, as management has suggested. Alternatively, it could also be argued that the subjective responsibility of management in this matter is unavoidable. This issue remains open to interpretation.

4. Corporate governance reforms in Serbia

The preceding section detailed the practices contributing to Agrobanka's collapse. While management is often identified by public opinion as primarily responsible, the global economic and banking crisis undoubtedly resulted from multiple interrelated factors. Deficient management, insufficient internal and external controls, and external interventions were just some of the factors that significantly contributed to the breakdown of Serbia's banking system. Incomplete legal regulation also facilitated risky practices. The crisis underscored the longstanding recognition within legal circles of the need for reform in Serbian company law.

Despite the circumstances described above, the banking crisis did not directly prompt amendments to the Law on Business Companies. The initiative to reform Serbian company law emerged in 2008 as part of efforts to align with European standards and OECD principles. That year, the Serbian Chamber of Commerce introduced the first Code of Corporate Governance (“the Code”), which addressed key corporate governance issues. The Code addressed these matters only in a basic way and was non-binding. The substantive provisions of the 2008 Code were subsequently incorporated into law through the 2011 amendment to the Law on Business Companies. The failures of Agrobanka and other banks further underscored the need to strengthen corporate governance in Serbia.

The 2011 amendment to the Law on Business Companies introduced significant innovations in Serbian company law, such as the two-tier management system, fiduciary duties of directors, and disclosure obligations. The law also specified the institution of independent directors and the obligation of public companies to undergo external auditing. In the following sections, the authors will examine some of the institutions introduced in 2011, which largely contributed to strengthening corporate governance and reducing opportunities for abuse. Since the Law on Business Companies has been amended multiple times since 2011, the authors will subsequently consider the regulations currently in force.

The rules introduced in 2011 can be categorized into two groups. On one hand, the law imposes certain obligations on companies and management to ensure preventive action, while the second set of rules refers to sanctions in cases of unlawful conduct.

Firstly, the 2011 law introduced, for the first time in Serbia, the so-called two-tier management system. Until then, Serbian company law only recognized a single-tier management system. This innovation enabled company founders to choose between the two management systems when establishing a company (Law on Business Companies, 2025, art. 417). The two-tier management system originates from the German legal system and involves two management bodies: the management board and the supervisory board. The key difference from the single-tier system lies in the scope of responsibilities. The supervisory board has a broad range of powers, primarily supervisory, while the management board handles the company’s operations¹. Some authors argue that both single-tier and two-tier management systems are equally effective, making it difficult to declare one superior to the other (Jungmann, 2006, p. 474).

1 See Article 441 of the Companies Act

Specifically in the banking sector, the chairperson of the executive board, which must have at least two members, represents the bank and requires the signature of another member when concluding legal transactions and undertaking legal actions within this body's remit. Due to the significance of the banking sector, the conditions set by law for this position are considerably stricter than those for any role in the non-financial sector (Law on Banks, 2021, arts. 75–76). In addition to the executive board, banks are required to maintain a Board of Directors. The principal responsibility of this board is to oversee the activities of the Executive Board. It is crucial to understand that the role and significance of the Board of Directors within the banking sector diverge markedly from those found in the non-financial sector.

The mandatory presence of an independent member on the management or supervisory board of a public company is another achievement of the 2011 Law on Business Companies. An independent director is a non-executive director with no business, family, or other ties to the company, executive directors, controlling members (shareholders), or affiliated companies, including their management and controlling members. Therefore, this director is expected to make objective and impartial decisions (Code of Corporate Governance, 2012). The need for independent directors is particularly emphasized in companies that have opted for the single-tier management system (Radović, 2008a, pp. 77, 84). In banks, the management board consists of at least five members, including the chairperson. At least one-third of the management board must be independent of the bank (Law on Banks, 2021, article 71). In addition to the statutory requirements, the National Bank of Serbia (NBS) may prescribe further independence requirements, thereby increasing its authority in controlling and supervising management.

The 2011 Law on Business Companies also thoroughly regulated the area of supervision, which had previously been poorly defined. Regarding internal supervision, special rules were introduced for public companies. In such companies, at least one person responsible for internal oversight must meet the requirements prescribed for an internal auditor, as determined by accounting regulations. The company must employ this individual and may not have them as a director or a member of the supervisory board (Law on Business Companies, 2025, art. 451). The Law also mandates external auditing of annual financial statements for public companies. While this obligation previously existed, it was only covered under the Law on Accounting and Auditing. Under the 2011 Law, the external auditor must be independent and act objectively. The selection of the external auditor is the responsibility of the Audit Committee, preventing management from influencing the objectivity of supervision by choosing a “favorable” auditor. Banks are additionally required to notify the

National Bank of Serbia of the appointment of an external auditor, who must be selected from the list of auditors approved by the NBS. Following these legislative reforms, a multi-level control system was established, which clearly facilitates the detection of fraudulent activities. At the same time, multi-level supervision has a preventive effect.

Under Article 369 of the Law on Business Companies, public companies are required to publish their annual and consolidated reports on their websites (Law on Business Companies, 2025, art. 369). This legal requirement is supported by the Code of Corporate Governance, which recognizes the full, truthful, and timely disclosure of all information relevant to company operations as good governance practice (Code of Corporate Governance, 2012, principle 14). Accordingly, public companies are required to disclose a comprehensive range of financial and non-financial information, including a statement on the implementation of the Corporate Governance Code, in their annual reports (European Bank for Reconstruction and Development, 2015). Compliance with reporting obligations is overseen by the Securities Commission, thereby ensuring transparency and acting as a safeguard against financial fraud.

It is also important to note that in 2011, the concept of *directors' fiduciary duty* was introduced, obliging company directors to act with due care (*duty of care*) when making business decisions and to adopt decisions that are in the best interests of the company. Directors are also required to avoid conflicts of interest. If conflicts arise, they must be reported, and the interests of the company must take precedence over personal interests (*duty of loyalty*). In addition to the duties of care and loyalty, directors have to protect the company's trade secrets and comply with competition restrictions (Law on Business Companies, 2025, arts. 61–76). In the context of preventing unlawful conduct and financial fraud, the duties of care and loyalty are particularly important. If a director breaches any fiduciary duty, they may be held liable for damages resulting from the breach of that duty. Another sanction includes the disgorgement of profits, meaning the return of any benefits gained through a breach of fiduciary duty or loyalty. Although this Anglo-Saxon institution, "*disgorgement of profits*", is legally established, some authors argue that it deviates from the logic of the compensation principle prevailing in Serbian tort law (Radović, 2019, p. 37).

The Law on Business Companies establishes a general liability framework for directors. They are held accountable for any damage caused to the company due to actions that violate the law, decisions made by the assembly, or the company's statutory regulations (Law on Business Companies, 2025, art. 415). A director who fails to act in accordance with the law, shareholder decisions, or the statute does not meet the expected standard of conduct and is therefore

responsible for the damages that result (Veličković, 2012, p. 124). However, in the banking sector, subject to independent regulation, the National Bank of Serbia may also impose a monetary penalty on a member of the management or executive board of a bank for acting against provisions of the Law on Banks, NBS regulations, or other applicable laws. The height and manner of the fine are determined by law (Law on Banks, 2021, art. 117). These measures are implemented in cases of identified irregularities and are generally (though not necessarily) combined with other measures targeting the bank itself.

Conclusion

The cases presented in this paper demonstrate that unlawful practices in both financial and non-financial sectors can generate severe consequences for local and global economies. In this regard, preventive supervision and timely intervention prove far more effective than post hoc remediation, which often fails to address systemic weaknesses. Regulatory reforms, a more precise delineation of management responsibilities, and enhanced supervisory mechanisms have collectively established a more robust foundation for preventing similar incidents in the future.

The rapid collapse of Agrobanka and other systemic banks in Serbia caused an unprecedented disruption to the national economy. While the global financial crisis provided a broader context, the Serbian banking crisis was mainly attributed to administrative shortcomings and ambiguities in the legal framework. In response, legislation governing internal organization, management, and supervision was strengthened. There were incremental reforms to director liability through successive amendments to the Law on Business Companies, the Law on Banks, and the Corporate Governance Code.

The concept of command liability for directors and executive officers is not necessarily the most equitable solution, as it allows for potential abuse and irresponsible behavior by individuals acting with intent. Additionally, strict liability has its limitations; in some cases, the subjective responsibility of third parties should protect managers from liability. This observation is not meant as a proposal or critique, but rather as an acknowledgment of the complexities that can arise in practice. Therefore, applying strict liability should be approached with caution in both criminal and civil contexts. It is essential to conduct a thorough assessment of all relevant facts and establish the material truth, allowing for the possibility of excluding directors' liability if the culpability and intent of a third party can be demonstrated.

Corporate governance and questions of accountability remain a dynamic field that will undoubtedly continue to evolve, particularly in the era of technolo-

gical advancement and pervasive digitalization. The importance of stability in the banking sector is particularly pronounced, as a healthy economy relies on it. Consequently, the integrity and professionalism of management, expressed through responsible governance, have been legally codified. Considering the current state of the national banking sector, the histories of Agrobanka, Privredna banka, and other institutions are unlikely to be repeated. Through statutory requirements for managerial competence, strict regulations, and adherence to high professional and ethical standards by management, the risks of insolvency and mismanagement have been significantly mitigated. Responsible corporate governance now constitutes a cornerstone of Serbia's banking system, playing a crucial role in restoring confidence in the sector.

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