

9<sup>th</sup> International Scientific Conference  
on Economics and Management

# EMAN 2025



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# SELECTED PAPERS





9<sup>TH</sup> INTERNATIONAL SCIENTIFIC CONFERENCE  
EMAN 2025

***EMAN 2025 – Economics & Management:  
How to Cope with Disrupted Times***

**SELECTED PAPERS**

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## Preface

The *Selected Papers* volume of the 9<sup>th</sup> **International Scientific Conference EMAN 2025 – Economics & Management: How to Cope with Disrupted Times** brought together a focused collection of research addressing key challenges faced by economies, organizations, and societies in periods of uncertainty and rapid transformation. The conference was held in **hybrid format on March 27, 2025, in Paris, France, at the Institut in Paris, University of London**, continuing EMAN's tradition of fostering international academic dialogue on contemporary economic and management issues.

This volume highlighted how organizations and policymakers responded to disruption through digital transformation, sustainability strategies, and adaptive management practices. A significant group of papers explored the impact of artificial intelligence readiness on competitiveness within EU member states, the role of cloud computing and digitalization in SME sustainability, and the influence of technological innovation on supply chains and inventory management. These contributions emphasized that digital capabilities were increasingly central to resilience and long-term growth.

Sustainability and responsible business practices formed another key pillar of the selected papers. Research addressed green entrepreneurial orientation in SMEs, the distinction between genuine SDG reporting and greenwashing, and the broader integration of sustainability into corporate strategies. These studies underscored the importance of transparency, accountability, and strategic alignment with global sustainability goals in times of disruption.

The volume also examined financial systems, markets, and economic behavior, including earnings management, investment and financing decisions in SMEs, life insurance market development, and financial literacy trends. These contributions provided insights into how financial structures adapted to economic shocks and evolving regulatory environments.

A strong emphasis was placed on human resources and organizational behavior, with papers exploring job satisfaction, employee stress, psychological safety, and the relationship between employee satisfaction and customer retention. Research on leadership models and organizational justice highlighted the human dimension of management, particularly in service-oriented and dynamic industries.

Additionally, the selected papers addressed consumer behavior and digital environments, focusing on the influence of social media, emotional experience in online interactions, and purchasing behavior among Generation Z. These studies reflected the growing importance of digital platforms in shaping market dynamics and consumer decision-making.

Taken together, the contributions in this volume reflected the core objective of EMAN 2025: to provide evidence-based insights into how economies and organizations could navigate disrupted times. By combining perspectives from economics, management, finance, and digital transformation, the selected papers offered valuable guidance for scholars, practitioners, and policymakers seeking to build resilient, sustainable, and adaptive systems in an increasingly complex global environment.





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# AI Readiness Impact on the EU Member States Competitiveness: Insights from Cluster Analysis

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**Abstract:** Artificial intelligence continues to revolutionize industries and become a crucial competitiveness driver in the European Union market. Still, major challenges arise as countries try to reach their full potential and use it to maximum advantage. This research introduces AI Readiness Index and Global Competitiveness Index as a part of the methodological framework designed to assess and compare the AI condition among EU members and its impact on market trends. It evaluates several dimensions critical to AI readiness in conjunction with GCI, including digital infrastructure, policy frameworks, human capital, research and development output, and economic factors such as digital adoption and innovation ecosystems. The purpose of this study is to quantify the AI readiness of EU countries and identify regional clusters with their strengths and weaknesses. Findings indicate that AI adoption is highly heterogeneous across the EU, with substantial gaps between the leading countries and those facing difficulties in catching up.

## 1. INTRODUCTION

Over the past few years the Artificial Intelligence (AI) has affected almost every segment of modern society, redefining technological limits and its role in everyday life and business. Furthermore, the AI has emerged as a cornerstone of national and industrial competitiveness. As countries struggle with challenges of digital transformation, AI technologies are not only integrating into various sectors but are also shaping the route of economic growth and innovation. The acceleration of AI development signals a pivotal shift in how nations are positioning themselves in the global market, with governments and corporations investing heavily to exploit these capabilities and gain a competitive advantage. AI's usage at the governmental, industrial, and individual levels has emphasized its multifaceted role in not just driving economic growth but also enhancing the quality of life across communities.

AI readiness implies a multidimensional framework wherein technological, organizational and human factors mutually interact to determine the effectiveness of AI adoption. Continuous evaluation and improvement in these areas are essential as nations and organizations strive to capitalize on enormous opportunities of AI technologies. Given its potential to automate day to day tasks, enhance decision-making processes, and foster groundbreaking innovations, AI is recognized as a critical driver for improving overall productivity and efficiency. Its capacity to revolutionize operations across multiple sectors, including manufacturing, finance, healthcare and education, is enormous, emphasizing its significance for the economy. In order to be competitive in the global race to develop AI technologies and systems, fostering AI expertise is essential (Lee & Cho, 2024). This indicates that adoption of AI technologies is not enough by itself, but also requires a population with adequate skills. Furthermore, the connection between AI and competitiveness extends beyond just technological adoption. Integration of AI in business practices and governmental policies is crucial, creating new competitive and collaborative dynamics among countries and firms (Xiong

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et al., 2020). AI adoption becomes a key determinant of business success, empowering companies to face challenges more efficiently and benefit from opportunities that arise in today's interconnected world. Supported by adequate regulation and national strategies, the implementation of AI technologies leads not only to the enhanced competitiveness of businesses but also has broader implications on international relations, where the ability to innovate and adapt can significantly impact a nation's position on the global stage.

AI readiness refers to the capacity of individuals, organizations or nations to effectively adopt and implement Artificial Intelligence (AI) technologies. This concept encompasses various dimensions, including technological infrastructure, human capital, organizational culture and regulatory frameworks. AI readiness is essential because it determines how well an entity can leverage AI capabilities to enhance efficiency, drive innovation, and maintain competitiveness in an increasingly digital landscape. It is closely related to the digital transformation in broader terms, particularly concerning small and medium-sized enterprises (SMEs). Effective evaluation of AI readiness involves an integration of strategy and technology, where alignment with organizational goals and capabilities significantly influences the successful adoption and utilization of AI (Motjolo-pane & Chanza, 2023). These findings emphasize that readiness is not only about technological adoption but also reflects strategic approaches that facilitate AI integration within existing operational frameworks. Furthermore, factors such as cultural attitudes, skill levels and organizational infrastructure are crucial for embracing AI technologies (Jöhnk et al., 2021). Leadership support, employee training and strategic vision as indicators of organisational capabilities are vital in attaining an optimal level of AI readiness. AI readiness is not just a preliminary condition, but a fundamental and essential component throughout the entire AI adoption journey, which makes these two concepts interdependent, mutually fostering and requiring each other, resulting in a closely connected and synergistic relationship (Jöhnk et al., 2021). Therefore, as the context and objectives for adoption shift, it is crucial to consistently reassess AI readiness.

Although the AI technology offers many benefits and governments around the world are making significant efforts to provide an appropriate regulatory framework and environment that would stimulate further adoption and provide gains for the whole society, numerous threats arise. On the one hand, they tend to foster innovation and provide domestic companies with an advantage over the competition, while on the other are obliged to protect the population and prevent potentially harmful impacts of new technologies on society. Ethical implications, regulatory gaps and socio-technical limitations could be listed as three general categories of AI technology challenges that most countries are faced with (Brecker et al., 2023). Issues of privacy, responsible implementation of AI solutions and ethical usage of the data have raised serious concerns over the past years. The evidence suggests that even some of the world's most advanced countries are not immune to these problems. Despite demonstrating high AI readiness and using advanced AI systems, many countries show a lack of AI accountability, poor transparency and severe privacy protection issues (Nzobonimpa & Savard, 2023). This indicates that further development and adoption of AI technology must be followed by suitable regulations, government policies, and measures. Collaboration between the government and other stakeholders could significantly prevent negative effects on society and identify possible issues at an early stage. By encouraging public-private partnerships, the development and implementation of AI solutions can be expedited, ensuring they are not conflicting public interests (Trabelsi, 2024).

## 2. ARTIFICIAL INTELLIGENCE SIGNIFICANCE FOR INCREASING EUROPEAN UNION COMPETITIVENESS

The significance and adoption of AI across European Union (EU) countries is increasingly critical given the technology's impact on various sectors, ranging from economic productivity to governance and democracy. The complexity of AI adoption requires a constant evaluation of strategic policies and frameworks being developed at both the European and member state levels. AI has cemented its role as a pivotal technology within the EU, driving legislative and regulatory changes aimed at fostering an integrated digital single market. The EU has developed a comprehensive approach to digital governance, reflecting broader ambitions beyond mere regulatory constraints, establishing a multi-dimensional framework that encompasses social, political and economic dimensions of AI deployment (Krarup & Horst, 2023). However, despite the efforts on the EU level, the unification of AI strategies is still unattained, as dissimilarities between national policies of member states prevail. Although with common strategic goals and understanding of AI, differences in form and volume, in goals and guidelines specification, in institutional management of the AI development and in perspective of international cooperation remain present (Woszczyna & Mania, 2023). In order to successfully use the potential of AI technology and face the challenges it brings, EU has defined the AI strategy as a coordinated approach to AI development and adoption (EC, 2018) and has recently launched Action Plan which includes key areas to focus on, as well as actions and guidelines which would accelerate the AI policies, boost AI capacity and enhance competitiveness of European continent (EC, 2025).

As AI adoption progresses, concerns about legitimacy and the implications of automated decision-making processes have become greater. Research suggests that public perception of AI-driven political decisions is complex, with many EU citizens favoring traditional human decision-making by EU politicians over automated systems, which should only be used as assistance (Starke & Lünich, 2020). To keep the legitimacy of their role and decisions, governments “must by all means ensure that (i) AI developers and managers apply principles of equality, freedom, and human rights, that (ii) citizen participation is not harmed by AI, and that (iii) the use of this technology also empowers civil society and greater inclusiveness in policy making and governmental services” (Duberry, 2022, p. 231). The EU shows commitment to address these concerns, advocating for responsible use of AI that aligns with democratic values, and establishing necessary guidelines for trustworthy AI, which should be implemented in a way that respects laws and ethical principles, while not jeopardizing societal and environmental well-being.

The integration of AI into different sectors requires a substantial commitment to education and skill development. Education systems must be redesigned to foster AI readiness among students and professionals, so they are prepared for rapid technological changes. Such proactive approaches do not only contribute to individuals' competences and success, but also bolster national competitiveness as a skilled workforce accelerates innovation development and economic progress. The educational dimension plays a central role in improving AI competencies across the EU. The EU's AI strategy emphasizes the need for educational frameworks that promote technological skill development. Furthermore, education presents an essential pillar for AI adoption across member states, crucial to addressing future challenges in technology integration. Considering it as the main driver of AI strategy, various policy documents have evolved to include certain educational programs, ensuring individuals and organizations are equipped with the necessary AI knowledge and skills to advance and be competitive in a transformed digital landscape (Xiong et al., 2023).

AI has profound implications for economic development in advanced economies, including many EU nations. Higher AI readiness enables organizations to use advanced technologies effectively

and cultivates a culture of innovation, driving sustainable economic growth in an increasingly digitalized global economy. Effectively aligning AI with existing economic structures could yield significant benefits. Consequently, enhancing AI readiness should remain a priority for policymakers, organizations and educational institutions to ensure that EU can successfully compete on the world stage. According to the estimations, if widespread adoption is achieved, the generative AI could contribute 8% to the EU's GDP in ten years (Thelle et al., 2024). However, the impact of AI on economic growth can vary considerably across different sectors and regions due to differences in access to AI technologies, digital infrastructure, and AI skills (Trabelsi, 2024). Significant discrepancies in innovation infrastructure, investment in digital technologies, and educational background of the workforce among member states limit the competitiveness of the EU. Therefore, AI readiness in the EU necessitates a multidimensional approach that encompasses economic, social and regulatory aspects. As EU countries work to position themselves within the global AI landscape, a clear understanding of the factors influencing readiness will be essential for effective policy formulation and implementation, aiming to exploit the potential of AI technologies while addressing challenges.

### 3. METHODOLOGY

The integration of AIRI and GCI via Two-Step Cluster Analysis creates a powerful analytical framework to explore how countries are positioned in terms of both technological readiness and economic competitiveness. As global digital transformation accelerates, such methodologies offer actionable insights into the alignment, or misalignment, between economic potential and digital governance capacity. Future research could refine this approach using time-series clustering, dynamic panel models, or hybrid AI-MCDA frameworks. Two-Step Cluster Analysis is an unsupervised machine learning technique that enables the automatic grouping of observations into clusters based on similarities across input variables. It is particularly suited for large datasets and can handle mixed data types (i.e., numerical and categorical). The Artificial Intelligence Readiness Index (AIRI), developed by institutions such as Oxford Insights and the International Development Research Centre (IDRC), evaluates a country's preparedness to implement AI in public services and governance. It serves as a policy diagnostic tool to assess institutional, infrastructural, and human capital foundations needed for responsible AI adoption. Developed by the World Economic Forum, the Global Competitiveness Index (GCI) measures a country's ability to achieve sustained economic productivity and long-term growth. It is widely used in macroeconomic and policy research. Cluster outputs can guide differentiated policy recommendations for AI integration, workforce upskilling, and institutional reforms. Combining AIRI and GCI allows for the identification of countries that are economically competitive but institutionally unprepared for AI, and vice versa.

Table 1 presents the evolution of BIC values, BIC change, and distance ratios as the number of clusters increases from 1 to 5. It helps determine the optimal number of clusters by identifying the point at which adding an additional cluster no longer yields a significant improvement in model fit. Lower BIC values indicate better model fit, so the number of clusters increases from 1 to 5, BIC steadily increases, which on its own might imply worse fit. However, in SPSS Two-Step Clustering, higher BIC values combined with larger BIC changes may point to improved segmentation and separation between clusters. BIC Change measures the gain (increase) in model fit between cluster solutions. This indicates that each additional cluster significantly improves the model's ability to distinguish between groups, though at a diminishing marginal gain. Ratio of BIC Changes used to compare the relative change in BIC compared to the base case (2 clusters). From 2 to 5 clusters, the ratio increases from 1.000 → 1.341 → 1.536 → 1.633. This progressive growth suggests consistent benefit from adding more clusters. Ratio of Distance Measure indicates how distinct each cluster

is compared to previous solutions. Values above 1.0 are desirable, as they show better separation. From 2 to 5 clusters, the ratio drops from 1.584 → 1.504 → 1.333 → 1.218. This gradual decline signals that cluster separation is becoming less pronounced as more clusters are added.

**Table 1.** Schwarz's Bayesian Criterion (BIC)

Number of Clusters	Schwarz's Bayesian Criterion (BIC)	BIC Change <sup>a</sup>	Ratio of BIC Changes <sup>b</sup>	Ratio of Distance Measures <sup>c</sup>
1	313.27			
2	364.66	51.39	1.00	1.58
3	433.56	68.90	1.34	1.50
4	512.51	78.94	1.53	1.33
5	596.44	83.93	1.63	1.21
a. The changes are from the previous number of clusters in the table.				
b. The ratios of changes are relative to the change for the two cluster solution.				
c. The ratios of distance measures are based on the current number of clusters against the previous number of clusters.				

**Source:** Authors' own calculation

Each cluster's centroid represents the average value (mean) and cluster conditions of AIRI and GCI for that group, helping to characterize its relative positioning in terms of digital readiness and competitiveness:

- Cluster 5: Represents innovation leaders — best practice models.
- Clusters 3 & 4: Indicate countries with strong economic platforms but lagging digitalization — strategic targets for AI-driven CE investment.
- Cluster 2: Requires foundational capacity-building in both competitiveness and AI infrastructure.
- Cluster 1: Emerging leaders, slightly behind Cluster 5 but already digitally mature.

**Table 2.** Descriptive statistics through clusters

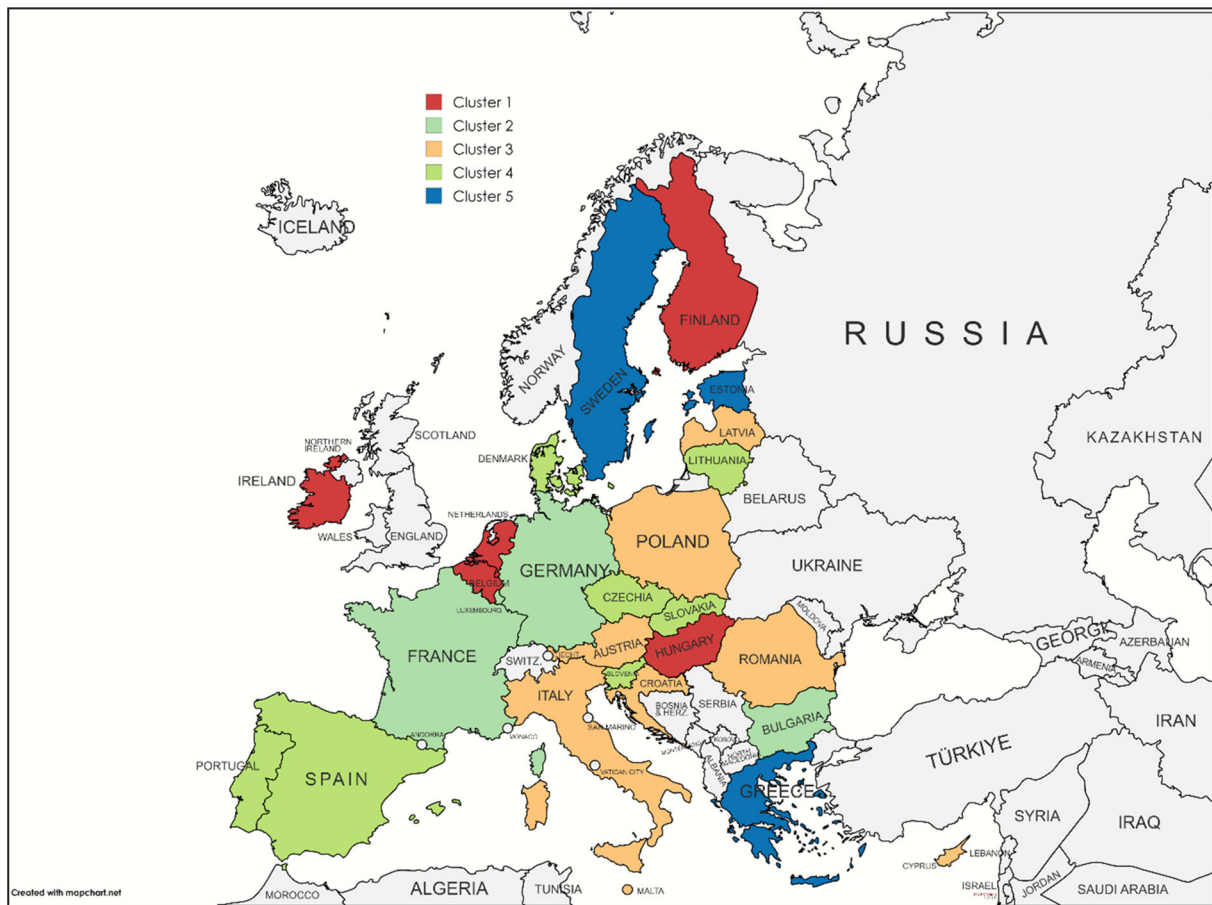
		AIRI_Avg		GCI_Avg	
		Mean	Std. Deviation	Mean	Std. Deviation
<b>Cluster</b>	1	79.37	3.30	71.33	2.08
	2	63.53	1.212	65.84	1.58
	3	63.01	5.55	71.51	0.79
	4	62.53	5.09	74.63	1.58
	5	80.44	0.51	78.57	1.28

**Source:** Authors' own calculation

Strategic insights from the table above could be visually presented through the countries' membership in the formed clusters (Figure 1).

Figure 2 displays a visual output from the Two-Step Cluster Analysis in IBM SPSS, summarizing the characteristics of clusters derived based on two key continuous predictors: GCI\_Avg (Global Competitiveness Index Average) and AIRI\_Avg (Artificial Intelligence Readiness Index Average), with Country likely used as a categorical variable for classification. The analysis identified 5 distinct clusters, labeled here as Cluster 1 through Cluster 5, with varying proportions of the total sample:

- Cluster 3 is the largest, containing 8 countries (29.6%).
- Cluster 4 includes 7 countries (25.9%).
- Cluster 1 contains 5 countries (18.5%).
- Cluster 2 has 4 countries (14.8%).
- Cluster 5 is the smallest, with 3 countries (11.1%).



**Figure 1:** Cluster membership of the EU countries

**Source:** Authors' own calculation

At the top right, the predictor importance bars indicate the relative contribution of each input variable. This reinforces that the clustering is primarily driven by quantitative competitiveness and AI readiness indicators, not by nominal country identifiers:

- GCI\_Avg and AIRI\_Avg both have high importance scores (close to 1.0), meaning they are the most influential in forming the clusters.
- Country serves as a grouping visualization aid rather than a predictive input.

For each cluster, the chart displays density plots of the distributions of GCI and AIRI:

- Cluster 3: Centered in the middle ranges of both AIRI and GCI, with some concentration around moderate values.
- Cluster 4: May represent countries with slightly lower AIRI but more uniform GCI.
- Cluster 1: Likely includes higher GCI and moderate AIRI values.
- Cluster 2: Shows higher variance and perhaps represents outlier behaviour.
- Cluster 5: Has lower AIRI and GCI scores overall, indicating lower-performing or emerging economies.

Visual summary of Cluster Comparison from a Two-Step Cluster Analysis performed in SPSS depicts the boxplots which clearly separate five clusters (color-coded: 1=light blue, 2=red, 3=dark blue, 4=green, 5=yellow), each with distinct distributions in GCI and AIRI averages (Figure 3):

- Cluster 1 (light blue): Contains a broad middle range for both GCI and AIRI, suggesting average-performing countries.

- Cluster 2 (red): Features low GCI and slightly below-average AIRI, indicating countries with structural economic disadvantages and lower AI readiness.
- Cluster 3 (dark blue): Includes countries with moderate GCI but very low AIRI, possibly highlighting a digital lag despite economic stability.
- Cluster 4 (green): Represents strong performance in both GCI and AIRI, likely reflecting high innovation capacity and balanced competitiveness.
- Cluster 5 (yellow): Contains outliers with high GCI and AIRI, positioning them as leading countries in terms of AI infrastructure and economic strength.

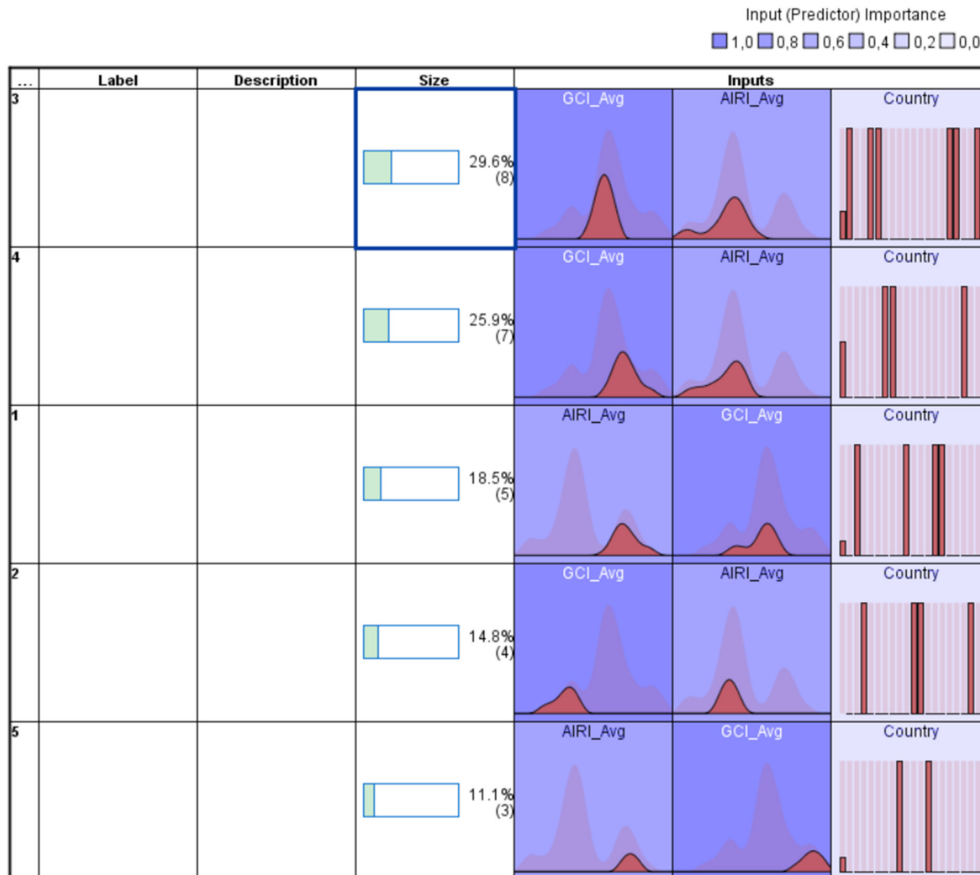


Figure 2. Cluster size and dispersion

Source: Authors' own calculation

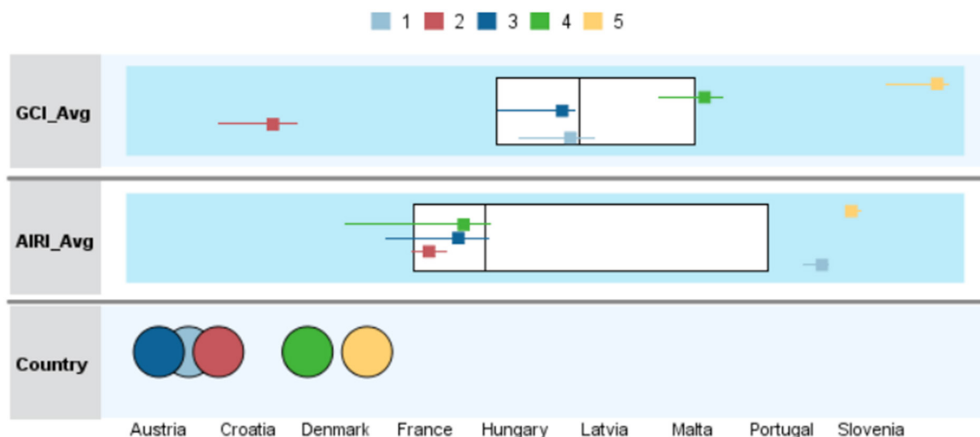


Figure 3: Cluster comparison

Source: Authors' own calculation

## 4. CONCLUSION

The integration of AI into the economy is no longer a matter of choice but a necessity for maintaining national and industrial competitiveness. The potential for AI to drive innovation, enhance productivity and create competitive advantage underscores its significance. As countries navigate this rapidly evolving technological environment, the emphasis on cultivating AI skills and fostering supportive ecosystems will be critical to realizing the transformative benefits of these technologies. The future competitive landscape will undoubtedly be defined by how effectively nations leverage AI to adapt, innovate and progress in an age characterized by profound technological change. Cluster 1 demonstrates very high digital readiness and above-average competitiveness, though not the highest. It likely includes developed countries with strong policy frameworks in AI and near-global average economic structures. Cluster 1 is suitable for advanced circular economy strategies integrated with digital innovation. Countries in Cluster 2 are below average in both digital and economic dimensions. The low standard deviations indicate homogeneity, these are likely emerging economies with relatively limited variation in readiness or competitiveness. This group may require foundational investment in AI and economic liberalization to initiate circular innovation. There is a clear gap between economic performance and digital infrastructure that must be addressed for circular transformation in Cluster 3. Cluster 4 is the second-best cluster in terms of GCI, but still lacks in AI readiness, with values below the average AIRI. These countries may have competitive markets, but struggle with digital adoption, policy measures should focus on accelerating digital transformation. Top-performing Cluster 5 across both indicators with very low variation, indicating highly developed, stable digital and economic systems. Ideal examples of countries ready to implement high-tech circular economy strategies, smart infrastructure and green AI applications. The adoption of AI within EU countries is marked by complex policy frameworks focusing on ethical use, public perception and varied sector-specific implications. As the EU navigates this technological framework, the need for comprehensive strategies that encompass educational reform, ethical guidelines and transparent governance will be pivotal in realizing the full potential of AI while maintaining public trust. Mutual collaboration between member states is essential for the successful integration of AI technologies, and the need for a unified approach persists since the discrepancies in AI readiness and adoption levels remain pronounced.

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# Financial Drivers of Earnings Management in the Serbian Business Environment

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**Abstract:** *Earnings management is a critical financial reporting issue, as it affects the quality of financial information available to stakeholders. This paper aims to analyze the key determinants of earnings management of business entities headquartered in Serbia, focusing on firm-specific characteristics derived from financial statements. Earnings management would be assessed by discretionary accruals, following the Modified Jones Model, which is widely recognized as a robust method for detecting manipulative accounting practices. The analysis will be conducted using panel regression, applied to 12,960 entity-year observations. The sample includes business entities actively operating from 2018 to 2021, from six sectors of the Serbian economy. The findings of this research imply that profitability and asset structure have a positive and statistically significant effect on earnings management. In contrast, company size and liquidity show a negative and statistically significant impact on earnings management.*

## 1. INTRODUCTION

Financial transparency is crucial for the operation of an effective capital market, as it enables investors, creditors, and other stakeholders to make informed decisions based on available information about the reporting entity's operations (Abu Hamour et al., 2024). Business entities provide disclosure through publicly available financial reports, which serve as a critical mechanism for communicating corporate performance (Healy & Palepu, 2001). Mandatory disclosure is subject to audit and regulatory oversight, confirming the precision and transparency of financial data. The challenges posed by low-quality financial reporting are especially evident in modern business environments, where transparency and reliability of information are crucial for sustainable growth. In transitional economies such as Serbia, the relevance of understanding the drivers of earnings management is particularly important, as it is a prerequisite for the development of capital markets and given the evolving regulatory framework and business practices. The efficiency of capital markets depends on the quality, timeliness, and comprehensiveness of corporate disclosures. Poor-quality financial reporting can increase information asymmetry, reduce investor and creditor confidence, lead to suboptimal investment decisions, and contribute to market instability. Moreover, such financial reports may elevate the risk of manipulation, fraud, and potential legal and regulatory consequences, ultimately increasing the cost of capital and diminishing a company's competitiveness. Managerial accounting behavior is frequently a highly volatile component of the corporate setting, as it reacts to every minor change or variation in business-influencing factors (Goel, 2018). In a market-oriented

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environment, management consistently modifies its accounting choices and processes to adapt to changing situations, including market dynamics, legislative alterations, or economic cycles. This flexibility, aimed at optimizing reporting and sustaining competitiveness, also increases the likelihood of possible manipulations or unexpected changes in the presentation of financial data.

In line with the previously discussed considerations, his study examines the effect of profitability, firm size, annual sales change rate, current ratio, tangibility, and firm age on earnings management practices. This insight is essential for policymakers, regulators, and corporate stakeholders seeking to improve financial reporting quality, mitigate risks associated with earnings manipulation, and foster a more transparent and efficient capital market.

The report is organized in the following order: after the introduction, a comprehensive literature background synthesizes prior scholarly research on the factors and implications of earnings management. The third section defines the methodology, including the analytical framework and data sources employed in the study. The subsequent section presents the practical findings, followed by a discussion that contextualizes the outcomes within the existing academic discourse. Finally, the conclusion provides a synthesis of key insights, emphasizing the financial drivers influencing earnings management within the Serbian business environment and their broader implications for corporate transparency and market efficiency.

## 2. LITERATURE BACKGROUND

The literature offers a variety of approaches aimed at identifying and classifying the determinants of financial reporting quality. These approaches often depend on the researcher's perspective, the methodology employed, and the specific context in which financial reporting issues are examined. Financial statements, as key components of corporate reporting, contain a wealth of information on the financial performance and position of business entities. Such information serves as a significant predictor of potential earnings management practices (Richardson et al., 2003). Therefore, the explanation of model variables for predicting earnings management is of critical importance for the development of effective models aimed at detecting potential discretionary actions affecting financial statement positions.

One of the most examined factors influencing earnings management is profitability. Prior research, including the study by Ilić et al. (2024), investigated whether profitable companies have the need to modify their reported earnings or losses using accrual-based accounting adjustments in financial statements. This analysis is conducted using panel regression analysis on annual data from companies operating in the AP of Vojvodina, Serbia, within the agricultural and manufacturing sectors. The results indicated that profitability directly influences earnings management for several reasons. These include the ability to conceal unfavorable performance in one segment of the business by offsetting it with positive results from another, the continuous maintenance of a favorable market reputation and high stock prices, and the fact that earnings management in profitable companies may be less apparent. Since profit is often perceived as a natural outcome of successful operations, it becomes more challenging to detect irregularities. These findings are consistent with previous research conducted by Firnanti et al. (2019) and Beuselinck et al. (2010).

In addition to profitability, firm size is another significant determinant of earnings management. Large entities often have access to a broader range of operations and resources, including more sophisticated accounting and financial tools (Kim et al., 2003), which could provide them with more efficient mechanisms and systems for managing earnings (Jensen & Meckling, 1976). The findings of Khanh and Thu (2019) support the assumption of a positive relationship between firm

size and earnings management through real activities and accrual-based adjustments. Their study, conducted on a sample of 241 publicly listed companies between 2010 and 2016, employed four econometric models to empirically validate this relationship.

Beyond size, the growth rate of a company could also drive earnings management behavior. Business entities experiencing significant growth rates may opt for earnings management techniques to present a more favorable image of their anticipated future expansion. By doing so, they could secure various advantages, such as easier and more cost-effective access to capital sources. On the other hand, actual and sustained growth in total revenue or sales revenue may reduce the need for implementing the aforementioned techniques, as positive results already meet stakeholder expectations. [Lemma et al. \(2013\)](#) examined the earnings management behavior of non-financial companies across 44 countries, including 22 developed and 22 developing economies. Their study encompassed 29,430 firms, analyzing their financial performance over 17 years. The findings of the econometric analysis of six models show that the effect of growth, represented as the annual percentage increase in sales revenue, has a significant and robust negative impact on discretionary accrual management activities in financial reporting. This finding holds across various model specifications and reporting environments, confirming that companies with greater growth potential may skip earnings management through accounting techniques.

Considering the level of liquidity, the primary motivation for business entities to engage in earnings management stems from the need to conceal difficulties in meeting short-term obligations in their regular operations. Under such circumstances, reporting entities make accounting choices aimed at adjusting specific financial statement positions related to earnings management. As the level of liquidity increases, the likelihood of a company involving in earnings management decreases ([Hasanuddin et al., 2021](#)).

Furthermore, companies with a higher share of short-term assets often exhibit greater liquidity and flexibility in utilizing discretionary accruals to adjust financial statements, as they can more easily manipulate items such as inventories and receivables. On the other hand, a higher reliance on fixed assets may provide more opportunities for managing depreciation and long-term provisions, which are common areas where discretionary accruals can be applied. [AlNajjar and Riahi-Belkaoui \(2001\)](#) measured, among other factors, the impact of asset structure on earnings management. The results indicated a negative and statistically significant relationship, suggesting that firms with a higher proportion of fixed assets are less inclined to participate in earnings management strategies. [Khanh and Thu \(2019\)](#), in their previously mentioned study, confirmed this finding.

Similarly, firm age is an important determinant, as older companies tend to avoid aggressive earnings management due to greater exposure to regulatory scrutiny. Older firms have a longer operational history and a stronger reputation to uphold. Consequently, they are presumed to exercise greater caution in participating in aggressive earnings management practices. [Das et al. \(2018\)](#), in their research study, examined the persistence and direction of factors influencing earnings management through discretionary accruals and real activity manipulation. Their findings indicated a negative and statistically significant relationship between firm age and earnings management, highlighting that larger and more established companies are keen to employ discretionary accrual techniques. This is primarily because of their increased exposure to regulatory scrutiny and higher political costs, which act as deterrents to earnings manipulation.

Building on these findings, the following analysis will examine the strength and direction of these determinants in influencing discretionary accruals, providing empirical insights into their impact on earnings management practices.

### 3. DATA AND METHODOLOGY

Financial data for the study is gathered from the balance sheet and income statement collected through the TP Catalyst database (Moody's Analytics Inc., 2024). The sample includes business entities actively operating from 2018 to 2021, forming 12,960 entity-year observations, from six sectors of the Serbian economy, classified according to the European Community's NACE Rev. 2 (2008) statistical classification: Agriculture, Forestry, and Fishing (Sector A), Manufacturing (Sector C), Construction (Sector F), Wholesale and Retail Trade and Repair of Motor Vehicles (Sector G), Transportation and Storage (Sector H), and Professional, Scientific, Innovation, and Technical Activities (Sector M). These sectors were chosen because they represent the most significant industries in Serbia, particularly in terms of employment and their overall contribution to the economy. Table 1 outlines the sample distribution according to industry classification.

**Table 1.** Industry structure of the sample

Sector	Industry	Number of companies	%
A	Agriculture, forestry and fishing	213	6.57%
C	Manufacturing	562	17.35%
F	Construction	320	9.88%
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	832	25.68%
H	Transportation and storage	625	19.29%
M	Professional, scientific and technical activities	688	21.23%
<b>Total</b>		<b>3,240</b>	<b>100%</b>

**Source:** Authors' calculation based on NACE Rev. 2 (2008)

The dependent variable will be expressed using discretionary cutoffs. There are several techniques for measuring financial performance management. The most frequently utilized model is the Modified Jones model. Firstly, it proves to be necessary to compute the number of total accruals (TA) and non-discretionary accruals using the following formulas (Cohen & Malkogianni, 2021; Tica et al., 2024; Valaskova et al., 2021):

$$TA_{it} = \frac{(\Delta CA_{it} - \Delta CL_{it} - \Delta CASH_{it} + \Delta STD_{it} - DEP_{it})}{A_{it-1}} \quad (1)$$

Where:  $TA_{it}$  denotes total accruals for the business entity in year  $t$ ,  $\Delta CA_{it}$  denotes the change in current assets for the business entity in year  $t$ ,  $\Delta CL_{it}$  denotes the change in short-term liabilities for the business entity in year  $t$ ,  $\Delta CASH_{it}$  denotes the change in cash and cash equivalents for the business entity in year  $t$ ,  $\Delta STD_{it}$  denotes the change in the amount of debt within short-term liabilities for the business entity in year  $t$ ,  $DEP_{it}$  denotes the amount of depreciation costs for the business entity in year  $t$ ,  $A_{it-1}$  denotes the total assets for the business entity in the year  $t-1$ .

$$\frac{NDA_{it}}{A_{it-1}} = \alpha_0 \left( \frac{1}{A_{it-1}} \right) + \alpha_1 \left( \frac{\Delta REV_t - \Delta REC_t}{A_{it-1}} \right) + \alpha_2 \left( \frac{PPE_t}{A_{it-1}} \right) + \varepsilon_{it} \quad (2)$$

Where:  $NDA_{it}$  denotes non-discretionary accruals for company  $i$  in year  $t$ ,  $TA_{it}$  denotes total accruals for the company  $i$  in year  $t$ ,  $A_{it-1}$  denotes total assets for the company  $i$  in year  $t-1$ ,  $\Delta REV_{it}$  denotes the change in income for the company  $i$  in the measurement year  $t$  compared to the previous one,  $\Delta REC_t$  denotes the change in receivables from customers in the measurement year  $t$  compared to the previous one,  $PPE_{it}$  denotes the value of the company's  $i$  tangible fixed assets in the year  $t$ ,  $\varepsilon_{it}$  denotes accidental mistake of the company  $i$  in the year  $t$ .

With the values of every parameter available, discretionary accruals could be computed according to the formula given below.

$$DA_{it} = TA_{it} - NDA_{it} \quad (3)$$

The following table presents all the model variables and calculation formulas that will be evaluated in the model.

**Table 2.** Panel data model variables

Variable name	Abbr.	Formulation	Presumed direction of influence
Earning Management	DA	Modified Jones Model (see Equation 1, 2 and 3)	/
Profitability	ROA	Net income / Total Assets	+
Company size	SZ	Natural logarithm of Total Assets	+
Sales growth	SG	Annual Sales Revenue Growth Rate	-
Liquidity	LIQ	Current Assets / Current Liabilities	-
Tangibility	TA	Fixed Assets / Total Assets	-
Firm age	FA	Absolute number of years since foundation	-

**Source:** Authors' overview based on research  
Das et al. (2018), Khanh and Thu (2019) and Ilić et al. (2024)

The assessment of factors influencing earning management practices will be done through the estimation of a regression model employing panel data analysis. Before employing empirical analysis, the fundamental assumptions of panel data methodology, such as multicollinearity, heteroskedasticity, and autocorrelation, will be systematically tested to ensure the robustness and reliability of the model estimates.

#### 4. RESULTS AND DISCUSSION

Table 3 presents a summary of the descriptive statistical analysis for the variables included in the panel data model. The median is preferred over the mean due to the presence of outliers in several variables. The median represents the central tendency more accurately in skewed distributions, making it a robust measure of typical values. The median value of earnings management measured through discretionary accruals is -0.0378, indicating a slight tendency toward income-decreasing practice in the sample. The wide range of values, from -0.999 to 0.998, along with a standard deviation of 0.322, suggests substantial variation in earnings management practices among firms. Based on the median value of the profitability variable (3.080), it could be concluded that most of the analyzed companies are profitable. However, a profitability level of 3% is relatively low, indicating that while companies are generating positive returns, their profit margins remain modest. The presence of extremely negative profitability values suggests that some firms face substantial financial challenges that may influence managerial decisions related to earnings management and financial reporting practices. Company size, measured in logarithmic form, has a relatively stable distribution, suggesting a balanced representation of small and large firms. The sales growth variable exhibits a median value of 0.040, while the mean is 0.186, with a minimum of -1.000 and a maximum of 302.930. The substantial difference between the mean and median, along with the extremely high maximum value, indicates a highly skewed distribution, driven by a few firms experiencing exceptionally high sales growth. Liquidity, with a mean of 4.037 and a wide range (0.000 to 99.890), suggests that some firms face liquidity constraints while others maintain substantial cash reserves. Tangibility, with a median of 0.303, indicates that on average,

30.3% of firms' total assets are composed of fixed assets. Lastly, firm age averages 20 years, with the youngest firm at 7 years and the oldest one at 75 years, indicating a mix of both younger and well-established firms in the sample.

**Table 3.** Sample general statistics findings

Variable	Mean	Median	Min	Max	Std. Dev.
Earning Management	-0.112	-0.0378	-0.999	0.998	0.322
Profitability	4.597	3.080	-98.730	96.980	11.410
Company size	17.923	17.780	11.238	25.679	1.551
Sales growth	0.186	0.040	-1.000	302.930	3.461
Liquidity	4.037	1.820	0.000	99.890	7.992
Tangibility	0.345	0.303	0.000	1.000	0.253
Firm age	20.009	19.000	7.000	75.000	7.422

Source: Authors' calculation

To ensure the appropriateness of the selected estimation model, several fundamental premise tests were conducted, as shown in Table 4. Hausman Test results ( $p = 0.0000$ ) confirm that the fixed effects model is the appropriate specification, rejecting the null hypothesis that the random effects model is preferable. This suggests that firm-specific effects significantly influence earnings management and must be accounted for in the estimation. Regarding Wooldridge Test ( $p = 0.0638$ ), the null hypothesis of no autocorrelation is not denied, indicating that first-order autocorrelation is not a concern in the dataset. The existence of heteroskedasticity is validated by Breusch–Pagan/Cook–Weisberg Test ( $p = 0.0000$ ), requiring the use of robust standard errors in the panel data estimation to obtain unbiased coefficient estimates.

**Table 4.** Panel data fundamental premise tests

Test type	p	Assumption
Hausman test	0.0000	The fixed effects specification is suitable
Wooldridge test	0.0638	No autocorrelation
Breusch–Pagan/Cook–Weisberg test	0.0000	Heteroskedasticity

Source: Authors' calculation

Table 5 presents the Variance Inflation Factor (VIF) and Tolerance (TOL) values for the independent variables, assessing the presence of multicollinearity. Since all VIF values are below 1.10, with tolerance values close to 1, multicollinearity is not a concern in the model. This confirms that the independent variables do not exhibit high correlation levels, ensuring the validity of the regression coefficients.

**Table 5.** Multicollinearity examination findings

Variable	VIF	TOL
Profitability	1.03	0.969842
Company size	1.05	0.952147
Sales growth	1.00	0.998829
Liquidity	1.03	0.973631
Tangibility	1.07	0.932188
Firm age	1.03	0.968574

Source: Authors' calculation

The estimation outcomes of the panel data model with corrected standard errors are presented in Table 6. Several key findings emerge from the analysis. An adverse and statistically significant relationship at the 1% significance level (Coef. = -0.020074,  $p < 0.01$ ) suggests that larger firms

engage less in earnings management. This aligns with theoretical expectations that larger firms are subjected to increased monitoring from regulators, auditors, and investors, which limits their ability to manipulate earnings. Liquidity exhibits a negative and significant effect at the 1% level (Coef. = -0.001489,  $p < 0.01$ ), indicating that firms with higher liquidity are not likely to engage in manipulation activities. This result aligns with prior research, as firms with sufficient liquidity levels have fewer incentives to manipulate earnings to meet short-term financial obligations. A positive and significant relationship (Coef. = 0.138064,  $p < 0.01$ ) is observed between tangibility and earnings management, suggesting enterprises having a greater proportion of fixed assets have greater opportunities to engage in discretionary accruals. This finding supports the notion that tangible assets offer more flexibility in adjusting depreciation and asset revaluation to influence reported earnings. Profitability, firm age, and annual sales change rate do not exert a significant influence on earnings management, suggesting that their impact may be more context-dependent and influenced by industry-specific factors or institutional environments.

**Table 6.** Panel data model estimation: corrected standard errors

Variable	Coef.	Std. Err.
Profitability	0.000244	.0002016
Company size	-0.020074**	.0017071
Sales growth	-0.000699	.0007381
Liquidity	-0.001489**	.0003096
Tangibility	0.138064**	.0095251
Firm age	0.000521	.0003465
Cons.	0.210433**	.0298445

**Note:** \*\* stat. significance  $< 0.01$ ; \* stat. significance  $< 0.05$

**Source:** Authors' calculation

## 5. CONCLUSION

This analysis provides an assessment of the financial determinants influencing earnings management in Serbian business entities. By analyzing a dataset covering six economic sectors from 2018 to 2021, the research identifies significant relationships between firm financial characteristics and earnings management practices, measured through discretionary accruals. The empirical findings reveal that firm size and liquidity negatively influence earnings management, suggesting that larger and more financially stable firms are not interested in manipulative financial reporting. Larger firms are subjected to more intensive regulatory control, stricter corporate governance, and higher investor oversight, reducing managerial discretion in financial reporting. Additionally, firms with strong liquidity face less pressure to manipulate earnings, as they have sufficient resources to cover operational needs and debt obligations without resorting to aggressive accounting practices. Conversely, tangibility has a positive and significant impact on earnings management, indicating that firms with a higher proportion of fixed assets have more opportunities for discretionary accruals. Tangible assets provide greater flexibility for accounting adjustments, such as asset revaluations, depreciation methods, and impairment losses, which can be used to influence reported earnings. Moreover, since fixed assets often serve as collateral for financing, firms may be involved in earnings management to meet financial covenants or assure better borrowing terms. Interestingly, profitability, firm age, and sales growth do not show statistically significant effects on earnings management.

Notwithstanding the useful information obtained, the research possesses specific limitations. Initially, the study focuses solely on Serbian firms, which may limit the adaptability of the findings to other economic environments. Differences in regulatory frameworks, market structures, and corporate

governance practices across countries could yield different results. Secondly, the study applies to the Modified Jones Model. While this is a widely recognized approach, it may not capture all dimensions of earnings management, particularly those related to real earnings management techniques. Future studies could incorporate additional models, such as real activities-based measures, to provide a more comprehensive analysis. Thirdly, the dataset is constrained to a four-year period, which may not fully account for long-term trends in earnings management behavior. Extending the study over a longer timeframe could improve the robustness of the results. Additionally, another important limitation is that the study does not account for major exogenous disruptions, like the COVID-19 pandemic and the Russia-Ukraine conflict. These global events significantly impacted business operations, supply chains, and economic stability, leading to substantial fluctuations in profitability across nearly all sectors. The economic consequences of these crises varied across industries, affecting companies both directly and indirectly. Future research should incorporate the effects of such macroeconomic disruptions to better understand their influence on earnings management practices.

Given these limitations, several recommendations for future research could be proposed. Future studies should consider cross-country comparisons to assess whether the determinants of earnings management vary under different institutional and economic settings. Additionally, exploring the role of systems for corporate governance, such as the independence of the board of directors, ownership structure, and audit quality, could provide further insights into the factors that mitigate earnings manipulation. Another important direction for research is the impact of macroeconomic conditions, such as financial crises, inflation rates, and regulatory reforms, on the prevalence of earnings management practices. Furthermore, sector-specific analyses should be conducted to examine the unique factors influencing earnings management within each industry. A comparative approach across industries would help identify sectoral differences and provide more targeted recommendations for improving financial transparency and reporting integrity.

In conclusion, this research enhances the expanding corpus of literature related to earnings management by shedding light on the financial drivers that influence discretionary accrual practices in Serbian firms. The findings underscore the importance of firm size, liquidity, and asset structure in shaping earnings management decisions. The conclusions of this study have important implications for several key stakeholders. For regulators and policymakers, understanding the drivers of earnings management could help in designing more effective financial reporting standards and regulations aimed at limiting manipulative practices. For investors and creditors, insights into which firm characteristics are associated with earnings management could improve the assessment of financial risk. Moreover, for corporate managers, the findings reflect on how internal financial policies and reporting choices may be perceived in terms of transparency and trustworthiness. Additionally, this research provides the broader literature on earnings management in transitional economies and offers practical recommendations for improving financial reporting quality in Serbia.

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# Determinants of Investment and Financing of Small and Medium-Sized Companies in the Republic of Croatia: Selected Activities

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## Keywords:

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**Abstract:** *The study's objective is to examine the impact of indicators of vulnerability or resilience of small and medium-sized companies (represented by variables of size, growth, investment in fixed assets and financial constraints, liquidity, and profitability), as well as external influence (GDP indicator), on investment and financing strategies in selected sectors in (non-) crisis periods. The research covers small and medium-sized companies in the manufacturing industry, wholesale and retail trade, repair of motor vehicles and motorcycles, and tourism sector activities in the Republic of Croatia from 2008 to 2023. The period from 2008-2014 is defined as the financial crisis period, 2015-2019 as the post-crisis period of the financial crisis, or the COVID-19 pre-crisis period, 2020-2021 as the COVID-19 crisis period, and the period from 2022-2023 as the COVID-19 post-crisis period. Quantitative data includes company data grouped into panel data. Inferential statistics, the panel regression analysis method, is used.*

## 1. INTRODUCTION

Macroeconomic conditions, that is, conducting business in either crisis or non-crisis periods, influence a company's vulnerability or resilience (Korent et al., 2025). The basic financial statements can provide insights into a company's potential resilience to crises (Bistrova et al., 2021). A company's vulnerability or resilience is reflected in its core business variables, among which Bistrova et al. (2021) and Korent et al. (2025) highlight liquidity, profit margins, capital structure, and growth (Bistrova et al., 2021) as particularly important. In addition, investment decisions represent one of the key decisions in business operations (Frezatti et al., 2013), along with decisions regarding their financing. According to Frezatti et al. (2013), during favorable macroeconomic conditions, companies tend to seek new business opportunities, which often include investing in fixed assets. Conversely, in times of macroeconomic instability - reflected, for example, in declining profitability and cash flow volatility - investment in fixed assets is typically considered more carefully, taking into account the aforementioned perspective. Existing studies identify the influence of these vulnerability and resilience variables on investments and capital structure, considering them determinants in both crisis and non-crisis periods. Therefore, the aim of this research is to examine the impact of indicators of company vulnerability and resilience as independent variables on investments in fixed assets and capital structure as dependent variables, during crisis and non-crisis periods, in selected sectors of the Republic of Croatia.

The research examines the aforementioned impact on small and medium-sized companies operating in the manufacturing industry, wholesale and retail trade, repair of motor vehicles and motorcycles, as well as in sectors related to tourism. The selection of these industries for the study is based on their significance, primarily in terms of their contribution to the gross domestic product of the

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Republic of Croatia (Državni zavod za statistiku, 2025). Given that the study explores the influence of vulnerability and resilience indicators on investments and financial structure during crisis and non-crisis periods, the research encompasses the financial crisis period from 2008 to 2014, the post-financial crisis period from 2015 to 2019, the COVID-19 crisis period in 2020 and 2021, and the post-COVID-19 crisis period in 2022 and 2023. Therefore, the research covers a total of 16 years (from 2008 to 2023). Due to the length of the observed time span, and to the authors' knowledge, there are no existing studies that comprehensively examine the determinants of investment and financial structure while taking into account both of the aforementioned crises.

Following the introduction, the second chapter provides an overview of existing research on the determinants of investment and financial constraints. The third chapter outlines the research methodology, including the sample, variables, and methods used. The fourth chapter presents the research findings along with a discussion of the results. The fifth chapter offers recommendations for future research, while the main research conclusions are presented in the final chapter.

## **2. DETERMINANTS OF INVESTMENTS AND FINANCING CONSTRAINTS: EXISTING EVIDENCE**

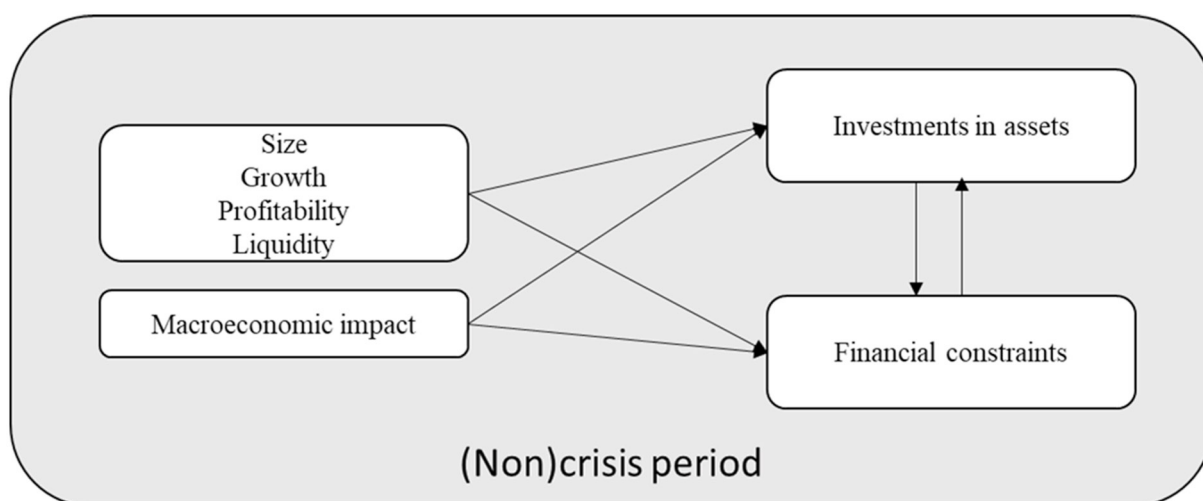
A review of the existing literature reveals that certain microeconomic determinants of corporate investment and capital structure, i.e., financial constraints, often overlap, highlighting the importance of their management. For instance, the most frequently cited determinants of capital structure in the literature include company size, asset investment, liquidity, and profitability (Harrison & Widjaja, 2014), while key determinants of asset investment, according to Farooq, Tabash, et al. (2021), include company size, company growth (measured by sales growth), and profitability. Additionally, Açikgöz and Sezgin Alp (2022) identify liquidity as an important determinant as well. Alongside these variables, the same authors consider indebtedness - referred to as the liquidity ratio (the ratio of total debt to total assets) - to be a crucial determinant of investment, as it reflects overall leverage, i.e., the capital structure. This implies the existence of reverse causality between fixed asset investment and financial constraints. Namely, investment is a determinant of capital structure, while the indicator of capital structure also determines investment.

In addition, the research interest often focuses on comparing corporate vulnerability and resilience variables, that is, the determinants of investment and capital structure, before and after a specific economic crisis - most commonly the global financial crisis (Harrison & Widjaja, 2014) or the COVID-19 pandemic (Farooq, Tabash, et al., 2021). However, due to the extended time frame, to the authors' knowledge, there are no studies that simultaneously examine changes in these determinants across both of the aforementioned crises, while also considering both investment and capital structure as focal points.

Based on the above, the research model can be illustrated as shown in Figure 1. The model demonstrates how the determinants - company size, growth, profitability, liquidity, and macroeconomic influence - affect investments and financial constraints. Furthermore, financial constraints are shown to influence investments, while investments also affect financial constraints. This mutual influence is examined in both crisis and non-crisis periods.

Investments in fixed assets generally include tangible assets (e.g., buildings, land, equipment, etc.) and intangible assets (e.g., patents, rights, licenses, etc.) (Açikgöz & Sezgin Alp, 2022). In this study, investments represent a dependent variable on the one hand, whereby the influence of independent determinants on them is examined. On the other hand, investments in fixed assets

also determine a company's capital structure, thereby serving as an independent variable when analyzing their impact on corporate indebtedness. [Harrison and Widjaja \(2014\)](#) and [Moradi and Paulet \(2019\)](#) confirm a positive, statistically significant impact of fixed asset investments on a company's capital structure - i.e., higher investments lead to higher levels of debt, and vice versa, *ceteris paribus*. [Mokhova and Zinecker \(2013\)](#) explore this relationship across various European countries, finding that results differ depending on the country. For example, in Croatia, Montenegro, and Serbia, they demonstrate a negative, statistically significant impact of investment on capital structure, which aligns with the findings of [Alipour et al. \(2015\)](#), while, in countries such as Iceland, Latvia, and Slovakia, a positive, statistically significant relationship is observed - consistent with, [Harrison and Widjaja \(2014\)](#) and [Moradi and Paulet \(2019\)](#). The same study shows that in certain countries, such as Turkey, Bulgaria, and Hungary, no statistically significant relationship between investments and capital structure was found.



**Figure 1.** Research model

**Source:** Author's work

Capital structure decisions, as a result of financing strategy, relate to the way assets are financed through a combination of debt and equity ([Harc, 2015](#)). Fixed assets are often financed by debt, and therefore, part of a company's debt capacity depends on its asset structure ([Alipour et al., 2015](#)). In existing research, capital structure<sup>3</sup> has also been analyzed as a dependent variable influenced by the previously mentioned determinants. However, it also determines investment in fixed assets and can thus be examined as an independent variable influencing investment. [Farooq, Tabash, et al. \(2021\)](#) emphasize that companies with greater access to bank loans tend to be more confident in their investment activities. Nevertheless, the results regarding the impact of financial constraints on investment are inconsistent. The debt ratio, as a representative measure of capital structure ([Alipour et al., 2015](#)), was not found to be a statistically significant determinant of investment in the study conducted by [Farooq, Tabash, et al. \(2021\)](#). [Açikgöz and Sezgin Alp \(2022\)](#) also found that capital structure had no statistically significant effect on investment in micro and small companies, while in medium and large companies, the impact was negative. A statistically significant inverse relationship between indebtedness and investment is also confirmed by [Moon and Sharma \(2014\)](#).

The literature review provided below extracts the most frequently discussed potential determinants of corporate investment and financial constraints, which include company size, company growth, liquidity, and profitability. As noted by [Bistrova et al. \(2021\)](#), company growth, liquidity,

<sup>3</sup> Debt and financial constraints are used as synonyms of capital structure in the paper.

and margin (a measure of profitability) are considered indicators of a company's vulnerability or resilience. In addition, previous period indebtedness may influence current period indebtedness; therefore, the lagged value of leverage is also considered a determinant of capital structure. This variable has been shown to have a statistically significant positive impact (Karadeniz et al., 2009). Similarly, past investments may influence current investment levels. Farooq, Ahmed, et al. (2021) demonstrate that the lagged value of investment has a statistically significant positive effect on current-period investment.

The examination of the impact of company size on capital structure is not a novelty in scientific research. According to Degryse et al. (2012), larger companies have better access to financial resources compared to smaller ones. Harrison and Widjaja (2014) conclude in their literature review that most studies show a positive and significant correlation between company size and corporate debt. The findings of Moradi and Paulet (2019) are consistent with this. However, there is empirical evidence suggesting that company size has a statistically significant negative impact on capital structure (Alipour et al., 2015), as well as studies that do not detect any empirical significance of this impact (Mokhova & Zinecker, 2013). Açıkgöz and Sezgin Alp (2022) highlight that there is an important difference between small and large companies in terms of financing investments in fixed assets. Therefore, company size is often also considered a determinant of investment behavior. Farooq, Tabash, et al. (2021) demonstrate that company size positively and significantly influences investment decisions.

In examining the impact of growth on corporate debt, Moradi and Paulet (2019) note that there are contradictory theoretical predictions, and accordingly, the results of previous studies show that the impact of growth on corporate debt can either be significantly inverse or significantly direct. The findings of Moradi and Paulet (2019) demonstrate that company growth, measured by the relative change in total assets, has a statistically significant positive impact on corporate debt (debt ratio). In contrast, Alipour et al. (2015) show that company growth has a statistically significant negative effect on the debt ratio, while Husaeni (2018), who uses sales growth as an indicator of growth, does not find any statistically significant impact of sales growth on capital structure (the debt-equity ratio). Growth as a determinant of investment has also not been overlooked in the literature. Farooq, Tabash, et al. (2021) measure company growth by sales growth, and their research results indicate that this determinant has a positive, statistically significant impact on corporate investment. As for capital structure, Husaeni (2018), also measures company growth by sales growth but does not identify it as empirically significant.

The impact of liquidity on capital structure has not been overlooked in the literature<sup>4</sup>, as the optimal level of corporate debt is, among other factors, constrained by asset liquidity and the average use of debt within a given industry (Williamson, 1988). Harrison and Widjaja (2014) find an inverse, statistically significant relationship between liquidity and capital structure. According to Lipson and Mortal (2009), this implies that highly liquid companies are less leveraged, as the internal cost of capital for liquid companies is lower than the cost of debt and equity. Alipour et al. (2015) find mixed results - depending on the methodology used, they either identify or fail to identify a statistically significant impact of liquidity on capital structure. At the same time, liquidity is considered one of the key determinants of investment (Farooq, Tabash, et al., 2021). Investments in fixed assets are important from a risk management perspective, as they are typically characterized by low liquidity and require substantial financial resources, which in turn impacts a company's liquidity position (Açıkgöz & Sezgin Alp, 2022). The findings of Açıkgöz and Sezgin Alp (2022)

<sup>4</sup> For a systematized presentation of the connection between liquidity and capital structure, see Lipson and Mortal (2009).

show that liquidity has a negative, statistically significant effect on fixed asset investment. Conversely, Moon and Sharma (2014) find a statistically significant positive effect on investment. Therefore, the findings on the influence of liquidity on investment decisions are not conclusive.

Profitability, as a determinant of capital structure, has been shown to have a statistically significant negative effect in the studies by Harrison and Widjaja (2014) and Karadeniz et al. (2009). Alongside liquidity, profitability is considered a critical factor in determining investments in fixed assets, as noted by Moon and Sharma (2014). However, empirical findings are not consistent. Farooq, Tabash, et al. (2021) find that return on assets has a statistically significant but negative impact on corporate investment, suggesting that more profitable companies invest less in fixed assets, implying a conservative approach to such investments due to their long-term nature. In contrast, Moon and Sharma (2014) find a positive and statistically significant effect on fixed asset investment, suggesting that higher profitability enables companies to access more abundant resources for investment.

Economic shocks affect business operations, particularly corporate investment decisions and capital structure. Therefore, in addition to microeconomic determinants, the real gross domestic product (GDP) growth rate is included as a variable of interest to examine the macroeconomic influence on investment and financial structure. Shahzad et al. (2021) confirm a statistically significant negative macroeconomic effect on corporate indebtedness. As noted by Frezatti et al. (2013), periods of economic growth encourage companies to seek new business opportunities, often leading to increased investment. Conversely, environmental instability can create uncertainty regarding investment returns, thereby having the opposite effect. Kosma (2015) emphasizes that the level of economic activity is one of the key determinants of investment, with higher output growth - measured through GDP - being crucial for stimulating investment. In their study, Farooq, Ahmed, et al. (2021) include GDP growth as a potential determinant of corporate investment and find a statistically significant positive impact.

### 3. METHODOLOGICAL FRAMEWORK

The methodological framework of the research includes quantitative research on secondary data. Below is a description of the used sample, variables and research methods.

#### 3.1. Sample

The sample of this quantitative secondary research consists of company-year observations, i.e., data on companies registered in the Republic of Croatia and classified according to the National Classification of Activities 2007 into sections C and G, as well as the relevant classes, groups, and divisions of sections H, I, and N. These companies are recorded in the database of the Financial Agency (FINA) for the period from 2008 to 2023 (Financijska agencija, 2024). Specifically, the study includes the following industries: section C – Manufacturing; section G – Wholesale and retail trade, repair of motor vehicles and motorcycles; and industries within the tourism sector (in accordance with Eurostat methodology, including transport activities, accommodation services, food and beverage service activities, motor vehicle rental and leasing, and travel agency activities, i.e., classes 4910, 4932, 4939, 5010, 5030, 5110 in section H; classes 5510, 5520, 5530, 5610, 5630 in section I; and class 7721, group 771, and division 79 in section N) (Rašić, 2020). Within these industries, the research focuses on micro, small, and medium-sized companies (SMEs), defined in accordance with the European Commission's recommendations (Europska unija, 2020). The dataset includes variables required to calculate company-level indicators, organized as panel data.

The time horizon of the analysis covers sixteen years from 2008 to 2023. The period from 2008 to 2014 is defined as the financial crisis period, the years 2015 to 2019 represent the post-crisis period of the financial crisis, or the pre-crisis period of the COVID-19 crisis, the years 2020 to 2021 are defined as the COVID-19 crisis period, and the period from 2022 to 2023 is defined as the post-crisis period of the COVID-19 crisis. The selection of this specific time frame is primarily driven by the defined research problem and objectives.

### 3.2. Variables

Based on the aforementioned data, indicators of the relevant variables were calculated using the MS Excel software package. The selection of variables and their respective indicators was determined by theoretical grounding, their significance in related research and methodologies, as well as the availability of data necessary for their calculation. In general, the variables and their indicators used in the research include: company size, company growth, investment in fixed assets, financial constraints, liquidity (security), and profitability of the company, as well as the macroeconomic impact. **Table 1** provides a detailed overview of the variables and indicators used in the study, including their prior empirical justification.

**Table 1.** Determination of research variables

Variable	Indicator name (abbreviation)	Variable indicator		Previous empirical foundation
		Numerator	Denominator	
<b>Dependent variables (depending on the model and independent variables)</b>				
<b>Investments in fixed assets</b>	Share of fixed assets in total assets (FATA)	Fixed assets	Total assets	Açikgöz & Sezgin Alp (2022); Alipour et al. (2015); Mokhova & Zinecker (2013)
<b>Capital structure</b>	Leverage ratio (TLTA)	Total liabilities	Total assets	Farooq, Tabash, et al. (2021); Alipour et al. (2015); Mokhova & Zinecker (2013)
<b>Independent variables</b>				
<b>Size</b>	Company size (LNTA)	Natural logarithm of total assets		Farooq, Tabash, et al. (2021); Alipour et al., (2015); Mokhova & Zinecker (2013)
<b>Growth</b>	Percentage sales growth (%TR)	(Total sales <sub>t</sub> – Total sales <sub>t-1</sub> )	Total sales <sub>t-1</sub>	Farooq, Tabash, et al. (2021); Alipour et al. (2015); Husaeni (2018)
<b>Liquidity</b>	Liquidity ratio (CACL)	Current assets	Current liabilities	Harrison & Widjaja (2014); Alipour et al. (2015)
<b>Profitability</b>	Net Return on Assets (NROA)	Net profit	Total assets	Karadeniz et al. (2009)
<b>Macroeconomic impact</b>	Real GDP growth rate (%RGDP)			Farooq, Ahmed, et al. (2021); Shahzad et al. (2021)

Source: Author's work

### 3.3. Methods

In addition to standard procedures of traditional financial analysis, the research employed a range of statistical methods, including both descriptive and inferential statistics. In addition to descriptive statistics<sup>5</sup>, panel regression analysis was used as an inferential statistical method. The latter was applied to test panel regression models of potential determinants of corporate investment and financing strategies across the previously defined crisis and non-crisis periods.

<sup>5</sup> Descriptive statistics results are available upon request.

Among the panel regression analysis methods, the study employs dynamic panel models, which involve examining the lagged dependent variable as an independent variable. This assumption is reasonable, given that investment and financing decisions from the previous period may potentially influence decisions in the current period. Therefore, to estimate the determinants of capital structure, a dynamic panel regression model using the Arellano-Bover/Blundell-Bond estimator is applied (Karadeniz et al., 2009). This estimator allows for the use of unbalanced panel data, which is common in economic research, especially when accounting for company-specific demographic characteristics. Two main models are used in this research. These models are presented below, where the first model (1)  $\beta_0$  represents the intercept,  $\beta_n$   $n \in \{1, \dots, 7\}$  denotes the regression coefficients of the independent variables,  $i$  denotes the company in the year  $t$ , and  $\varepsilon_{it}$  is the error term.

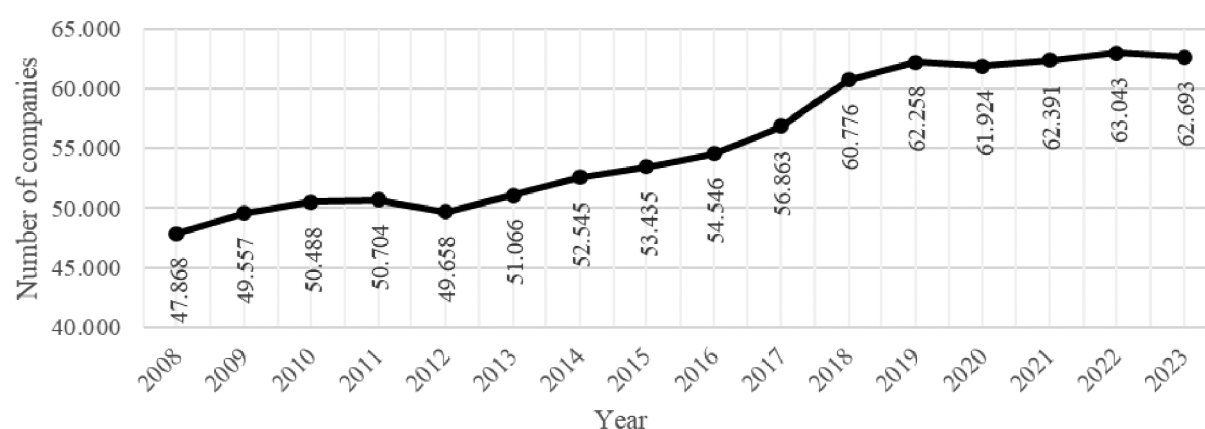
$$FATA_{it} = \beta_0 + \beta_1 * FATA_{it-1} + \beta_2 * LNTA_{it} + \beta_3 * \%TR_{it} + \beta_4 * TLTA_{it} + \beta_5 * CACL_{it} + \beta_6 * NROA_{it} + \beta_7 * \%RGDP_t + \varepsilon_{it} \quad (1)$$

$$TLTA_{it} = \beta_0 + \beta_1 * TLTA_{it-1} + \beta_2 * LNTA_{it} + \beta_3 * TR_{it} + \beta_4 * FATA_{it} + \beta_5 * CADL_{it} + \beta_6 * NROA_{it} + \beta_7 * \%GDP_t + \varepsilon_{it} \quad (2)$$

The elaborated models are tested on the entire sample of companies from the defined industries and across the full time period, as well as separately for each of the defined crisis and non-crisis periods. This approach enables insights into the determinants of investments and financial constraints during both crisis and non-crisis periods. The analyses are conducted using Stata software packages.

## 4. RESULTS AND DISCUSSION

**Graph 1** illustrates the trend in the number of companies included in the study. In 2008, the number of small and medium-sized companies amounted to 47,868, and by 2023, this number had increased by 30.97%. The research sample consists of 889,815 company-year observations. Although the overall number of companies generally increased over the observed period, slower growth and/or a slight decline in the number of companies is evident during the financial crisis and the COVID-19 pandemic periods.



**Graph 1.** Trends in the number of companies in the research sample

Source: Author's work

### 4.1. Determinants of Investments in Fixed Assets

The results of the investigation into the determinants of investments in small and medium-sized companies from 2008 to 2023 are presented in **Table 2**. In general, with the exception of company

growth (%TR), all variables have a statistically significant impact on investments in fixed assets (FATA) at the 1% significance level, except for the leverage indicator (TLTA), which is statistically significant at the 5% level. Company size (LNTA) has a direct statistically significant impact on investments, which is in line with the findings of [Farooq, Tabash, et al. \(2021\)](#), who suggest that larger companies invest more in acquiring capital assets. While these authors find a statistically significant positive impact of company growth on investments, the results of the present study do not confirm this. In contrast to [Açikgöz and Sezgin Alp \(2022\)](#), who found that leverage does not have a statistically significant impact on investments in micro and small companies but does for medium and large companies, this study partially challenges and partially confirms this finding. The results show an inverse statistically significant impact of capital structure (TLTA) on investments in small and medium-sized companies, which is consistent with the findings of [Moon and Sharma \(2014\)](#). In line with the results of the latter study ([Moon & Sharma, 2014](#)), the results of this research also show that liquidity (CACL) has a positive, statistically significant impact on investments, meaning that more liquid companies invest more in fixed assets, and that higher asset profitability (NROA) provides companies with more resources for investment in fixed assets. The growth of real GDP (%RGDP) has a statistically significant but negative impact on investments, which contradicts the findings in the study by [Farooq, Ahmed, et al. \(2021\)](#). Since this study uses a dynamic panel method, the results show that investments in fixed assets from the previous period (FATA L1) have a positive, statistically significant impact on the company's investments in the current period.

**Table 2.** Determinants of investments in fixed assets in the period from 2008 to 2023

<i>System dynamic panel-data estimation</i> <i>Number of obs = 701,468</i>							
Group variable: id		Number of groups = 106,104					
Time variable: GODINA		Obs per group:					
		min = 1					
		avg = 6.611136					
		max = 15					
Number of instruments = 126		Wald chi2(7) = 163513.39					
		Prob > chi2 = 0.0000					
One-step results							
	FATA	Coefficient	Std. err.	z	P>z	[95% conf. interval]	
	FATA						
	L1.	0.7738746	0.0020205	383.01	0.000	0.7699145	0.7778348
	LNTA	1.43374	0.0305916	46.87	0.000	1.373781	1.493698
	%TR	-3.14e-10	5.95e-10	-0.53	0.598	-1.48e-09	8.51e-10
	TLTA	-2.33e-09	9.25e-10	-2.52	0.012	-4.14e-09	-5.17e-10
	CACL	2.21e-06	6.34e-07	3.49	0.000	9.71e-07	3.46e-06
	NROA	5.13e-09	6.78e-10	7.57	0.000	3.80e-09	6.46e-09
	%RGDP	-0.0743197	0.0041349	-17.97	0.000	-0.082424	-0.0662155
	_cons	-9.539818	0.3396232	-28.09	0.000	-10.20547	-8.874169
Instruments for differenced equation							
GMM-type: L(2/). FATA							
Standard: D. LNTA D. %TR D. TLTA D. CACL D.NROA D.%RGDP							
Instruments for level equation							
GMM-type: LD.FATA							
Standard: _cons							

**Source:** Author's work based on printout of results from the STATA program

While **Table 2** presents the results of the determinants for the entire period from 2008 to 2023, **Table 3** presents the results of the determinants of investments in fixed assets depending on the defined (non) crisis periods. The estimated results show that the variables of growth and liquidity are not statistically significant during the financial crisis period (2008-2014) nor during the COVID-19 pandemic crisis (2020-2021). This suggests that during crisis periods, investment decisions are not determined by liquidity and revenue growth, which can be interpreted as lower variability and, consequently, reduced significance of these factors in explaining the volatility of investments in fixed assets. However, during non-crisis periods, these variables become statistically significant in explaining changes in investments in fixed assets. It is intriguing to consider that revenue growth (%TR) in crisis periods, although insignificant, has a positive impact on investments, while in non-crisis periods, it has a statistically significant but negative impact on investments in fixed assets. In other words, companies with higher revenue growth during non-crisis periods invest less in fixed assets, and vice versa. This result shows opposite estimates compared to the study by [Farooq, Tabash, et al. \(2021\)](#), who confirmed a statistically significant positive impact of company growth on its investments. Capital structure, as well as growth, is significant during non-crisis periods, where it is evident that post-global financial crisis, more leveraged companies invested less in fixed assets, whereas after the COVID-19 pandemic, the opposite occurred. Investments in fixed assets in the previous period, company size, and profitability, as well as macroeconomic influence, are significant positive determinants of investments in fixed assets in the current period at the 1% or 5% significance level, regardless of the (non)crisis period. Therefore, the larger the company, the more profitable it is, the higher its investment in fixed assets in the previous year, and the more positive the macroeconomic impact, the higher its investments in fixed assets in the current year, and vice versa. These findings are consistent with research by [Farooq, Ahmed, et al. \(2021\)](#) regarding the impact of previous period investments on current period investments and the macroeconomic impact, [Farooq, Tabash, et al. \(2021\)](#) regarding company size, and [Moon and Sharma \(2014\)](#) regarding company profitability. In general, more determinants influence investment decisions during non-crisis periods than during crisis periods. This, as previously mentioned, is most often the result of their lower variability and consequently weaker impact in crisis compared to non-crisis periods. This is particularly evident from the results of descriptive statistics, where liquidity shows a noticeably lower variability during the COVID-19 crisis period, and growth shows lower variability during the financial crisis period.

**Table 3.** Determinants of investments in fixed assets in (non)crisis periods

FATA	2008 - 2014 Coefficient (P>z)	2015 - 2019 Coefficient (P>z)	2020 - 2021 Coefficient (P>z)	2022 - 2023 Coefficient (P>z)
FATA LI.	0.8023627 (0.000)***	0.7286725 (0.000)***	0.7504093 (0.000)***	0.6721302 (0.000)***
LNTA	0.4801351 (0.000)***	2.199693 (0.000)***	1.430399 (0.000)***	1.699509 (0.000)***
%TR	3.27e-09 (0.249)	-1.91e-09 (0.046)**	9.67e-10 (0.225)	-1.24e-08 (0.002)***
TLTA	-7.53e-09 (0.000)***	8.96e-09 (0.000)***	6.55e-09 (0.014)**	-5.16e-09 (0.006)***
CACL	-0.0000146 (0.360)	-0.0001076 (0.000)***	-0.0000578 (0.132)	1.89e-06 (0.003)***
NROA	7.17e-09 (0.005)***	1.80e-08 (0.000)***	-5.07e-08 (0.000)***	4.07e-09 (0.000)***
%RGDP	0.0859541 (0.000)***	-0.2158449 (0.000)***	-0.0690242 (0.000)***	0.1142282 (0.000)***
_cons	0.5245272 (0.394)	-15.92378 (0.000)***	-8.884312 (0.000)***	-11.01997 (0.000)***

**Note:** \*\*\* Significant at 1 %; \*\* significant at 5 %; \* significant at 10 % level

**Source:** Author's work based on printout of results from the STATA program

## 4.2. Capital Structure Determinants

**Table 4** presents the results of the determinants of capital structure for the entire period from 2008 to 2023. Except for liquidity (CACL), all other variables have a statistically significant impact on the debt of companies, at the 1% and 5% significance levels. Although [Harrison and Widjaja \(2014\)](#) conclude from the literature review that most studies show a positive significant correlation between debt and company size, the results of this study belong to the minority of studies that find that company size (LNTA) has a statistically significant negative impact on capital structure, which is consistent with the results of [Mokhova and Zinecker \(2013\)](#) for Croatia. This suggests that larger companies use less debt, as they are assumed to be able to finance themselves from internal resources. While [Alipour et al. \(2015\)](#) identify an inverse impact of company growth on its capital structure, this study reveals a statistically proportional impact. This finding can primarily be explained by the theory of the pecking order theory and secondarily by high transaction costs related to issuing equity, which is why companies with higher growth prefer debt to finance their investment needs over internally secured funds. In this way, fast-growing companies will have a higher level of debt than slow-growing companies. ([Orsag, 2015](#)) The results showing that investments in fixed assets have a statistically significant negative impact, and that liquidity is not a determinant of capital structure, are in line with the results of [Alipour et al. \(2015\)](#). The negative impact of investments in fixed assets on company debt can be attributed to the increase in risk due to the increase in operational leverage ([Hutchinson & Hunter, 1995](#)). The estimated results indicate a negative impact of profitability on capital structure, which is consistent with [Karadeniz et al. \(2009\)](#), and congruent with the theory of the pecking order theory, implying that highly profitable companies surpass low-profit companies in terms of using retained earnings in internal financing, and consequently are less indebted. Consistent with the findings of [Shahzad et al. \(2021\)](#) the macroeconomic impact also demonstrates a statistically significant negative impact on company debt, implying that companies have lower debt in economically favorable periods, i.e., periods of higher real GDP growth, and vice versa. Finally, it is expected that higher debt in the previous period leads to higher debt in the current period, and vice versa.

**Table 5** shows the results of the analysis of capital structure determinants depending on (non-) crisis periods. Regardless of the period, liquidity is not a statistically significant determinant of capital structure, while previous-period company indebtedness has a statistically significant positive effect, and company size and profitability have statistically significant negative effects on capital structure - regardless of whether the period is one of crisis or not. These findings align with the results shown in **Table 4**, which covers determinants over the entire observed period. In contrast, the statistically significant impact of other determinants - such as growth, investments in fixed assets, and the real GDP growth rate - depends on the period. During the financial crisis period, all variables except liquidity show a statistically significant impact on indebtedness. In the post-crisis period of the financial crisis, i.e., the pre-COVID-19 crisis period, aside from liquidity, investments in fixed assets and macroeconomic influence are not statistically significant. In this period, indebtedness in the previous period, size, growth, and profitability influenced the capital structure of companies in the selected sectors. In the COVID-19 crisis period and its post-crisis phase, along with liquidity, company growth is also not a statistically significant determinant of capital structure. All of the above leads to the conclusion that, during crisis periods, more variables determine or influence financial structure decisions than in non-crisis periods. This finding can be attributed to the greater volatility of company capital structures in uncertain, crisis periods compared to more stable, non-crisis periods.

**Table 4.** Determinants of capital structure in the period from 2008 to 2023

System dynamic panel-data estimation		Number of obs = 701,468				
Group variable: id	Number of groups = 106,104					
Time variable: GODINA	Obs per group:					
	min = 1					
	avg = 6.611136					
	max = 15					
Number of instruments = 126	Wald chi2(7) = 37200.87					
	Prob > chi2 = 0.0000					
One-step results						
TLTA	Coefficient	Std. err.	z	P>z	[95% conf.	interval]
TLTA						
LI.	0.336731	0.002755	122.23	0.000	0.3313314	0.3421306
LNTA	-5011833	44580.86	-112.42	0.000	-5099210	-4924456
%TR	0.0024293	0.00089	2.73	0.006	0.000685	0.0041737
FATA	-12059.43	2761.829	-4.37	0.000	-17472.52	-6646.344
CACL	0.0042023	0.9501422	0.00	0.996	-1.858042	1.866447
NROA	-0.0852307	0.0010108	-84.32	0.000	-0.0872118	-0.0832496
%RGDP	-12396.59	6175.213	-2.01	0.045	-24499.79	-293.3977
_cons	5.71e+07	496946.2	114.85	0.000	5.61e+07	5.80e+07
Instruments for differenced equation						
GMM-type: L(2/). TLTA						
Standard: D. LNTA D. %TR D. FATA D. CACL D.NROA D.%RGDP						
Instruments for level equation						
GMM-type: LD. TLTA						
Standard: _cons						

**Source:** Author's work based on printout of results from the STATA program

**Table 5.** Determinants of capital structure in (non)crisis periods

	2008 - 2014	2015 - 2019	2020 - 2021	2022 - 2023
TLTA	Coefficient	Coefficient	Coefficient	Coefficient
	(P>z)	(P>z)	(P>z)	(P>z)
TLTA LI.	0.7898511 (0.000)***	0.1879163 (0.001)***	0.9732366 (0.000)***	0.0863478 (0.000)***
LNTA	-2244981 (0.000)***	-3893674 (0.000)***	-3802787 (0.000)***	-7222559 (0.000)***
%TR	-0.0669058 (0.000)***	0.0028269 (0.008)***	0.0016365 (0.129)	0.0085295 (0.261)
FATA	-16472.98 (0.000)***	3202.455 (0.341)	12470.64 (0.042)**	-15522.6 (0.061)*
CACL	-0.8084458 (0.970)	-2.304217 (0.935)	-0.9753996 (0.985)	-0.0035258 (0.998)
NROA	-0.8324514 (0.000)***	-0.6510664 (0.000)***	-1.357408 (0.000)***	0.0392434 (0.000)***
%RGDP	-89549.89 (0.000)***	4614.604 (0.861)	26987.59 (0.000)***	-129984.6 (0.000)***
_cons	2.60e+07 (0.000)***	4.36e+07 (0.000)***	4.22e+07 (0.000)***	8.39e+07 (0.000)***

**Note:** \*\*\* Significant at 1 %; \*\* significant at 5 %; \* significant at 10 % level

**Source:** Author's work based on printout of results from the STATA program

## 5. FUTURE RESEARCH DIRECTIONS

The present study conducts a comparative analysis of the determinants of corporate investment and capital structure, differentiating between crisis and non-crisis periods. In order to gain a deeper understanding of how crisis conditions influence investment activity and capital structure formation, it is recommended that future empirical models include a dummy variable indicating the presence or absence of a crisis. Given that the research sample consists of micro, small, and medium-sized companies from various sectors, future research should focus on examining the specific determinants of investment and capital structure based on company size and industry affiliation. Additionally, to achieve a more comprehensive insight, it is advisable to extend the sample to include large companies.

## 6. CONCLUSION

The stated objective of the research has been achieved, with key determinants of investment and financial constraints identified as indicators of vulnerability or resilience among companies in selected sectors of the Republic of Croatia, in the context of both crisis and non-crisis periods. Empirical findings reveal statistically significant differences in the determinants of investment in fixed assets and in capital structure, depending on the presence of crisis conditions. Furthermore, the results confirm the existence of reverse causality between investments in fixed assets and capital structure, implying an interdependence between investment decisions and the level of corporate indebtedness, where indebtedness stems from the asset structure while simultaneously conditioning investment opportunities. The inclusion of additional explanatory variables further confirms their relevance in the context of investment and financial structure management, thereby emphasizing the need for a strategic approach to financial decision-making, particularly in times of heightened uncertainty.

The main contribution of this research lies in its comprehensiveness, as it encompasses a sixteen-year period that includes two global crises (the 2008 financial crisis and the COVID-19 pandemic), as well as in its analytical approach focused on identifying the bidirectional causality between investment and capital structure. Additionally, the research contributes to the literature by extracting the key determinants that shape corporate investment behavior and indebtedness, thereby highlighting the importance of their active and integrative management in order to preserve financial stability and ensure long-term business sustainability. Given the evolving economic conditions and increasingly prominent global risks, the findings of this study provide a valuable contribution to understanding the dynamics of investment decisions and financial structure, offering a foundation for more informed and resilient strategic decision-making in the future.

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# Green Entrepreneurial Orientation in Small and Medium-Sized Enterprises: Evidence from Serbia

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**Abstract:** *This study aims to examine how green entrepreneurial orientation influences green innovations and how these innovations impact sustainable business performance in SME sector in the Republic of Serbia. As environmental challenges grow, businesses recognize the need for green innovations. These innovations reduce environmental harm, improve resource efficiency, and support long-term sustainability. Sustainability integration in business strategies and operations could lead to an improvement in public image. Research shows that SMEs in the Republic of Serbia are aware of green innovations but adopt them only after competitors. Instead of acting proactively, they implement eco-friendly practices under market or regulatory pressure. This reactive approach slows innovation and limits long-term economic and social benefits.*

## 1. INTRODUCTION

Growing ecological issues represent a serious threat to people, economic development and the environment in general. Governments and companies are increasingly focusing on sustainable manufacturing and the integration of sustainable business processes into core activities in response to escalating environmental challenges (Das & Rangarajan, 2020). Companies have begun implementing green strategies in response to growing internal and external pressures to comply with ecological regulations (Asadi et al., 2020). These green strategies require the adoption of green technologies, the design of environmentally friendly products, the application of green practices in the supply chain and the improvement of customer welfare through the provision of health and safety benefits (Muangmee et al., 2021).

In order to align with Sustainable Development Goals 2030, the introduction of green innovations into business operations is necessary to enhance corporate sustainable performance (Batool et al., 2025). Based on the foundations of Resourced-Based Theory, green innovations can result from Green Entrepreneurial Orientation (GEO) (Guo et al., 2020) and are crucial for enhancing sustainable business performance (Muangmee et al., 2021).

According to meta-analysis results (Oduro, 2024), there is a positive and significant impact of eco-innovations on SMEs' sustainable performance. However, current literature offers limited insights into the relationship between GEO and green innovations in SMEs, and their effects on sustainable performances (Muangmee et al., 2021; Oduro, 2024). This identified gap motivated the present study, which aims to examine the impact of GEO on green innovations in SMEs in the Republic of Serbia, as well as the impact of green innovations on sustainable performance, specifically economic, environmental and social performances in SMEs, particularly in the region of Western Serbia.

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SMEs are widely regarded as the foundation of economic growth. In the EU, around 99.8% of all active companies were SMEs and they generated almost 52% of the total value added in 2024 (Espinosa, 2024). SMEs were responsible for almost 63% of employment in EU countries in 2022 (Eurostat, 2024). Since SMEs represent the majority of companies in the global economy, their impact on local communities and the environment is substantial. SMEs increasingly adopt green innovations to gain a competitive advantage (Rodrigues & Franco, 2023). Incentives and subsidies for green activities significantly stimulate the development of green innovations and practices in SMEs (Rodrigues & Franco, 2023).

According to data from 2023, SMEs make up 99.4% of the total number of companies in the Republic of Serbia, accounting for 55.8% of workforce employment and contributing 51% to the creation of gross value-added (Statistical Office of the Republic of Serbia, 2024). In Western Serbia, SMEs comprise 99.3% of all companies, employ 62.8% of the workforce, and contribute 61.4% to the creation of gross value-added (Statistical Office of the Republic of Serbia, 2024). These data suggest the importance of SMEs and highlight the need for a GEO and the implementation of green innovations.

The paper is organized as follows. First part is dedicated to the literature review, beginning with an explanation of GEO and its difference from entrepreneurial orientation (EO). It continues with an overview of the characteristics of green innovations. This section concludes with a summary of previous research findings and the development of hypotheses. The next part presents the methodology and methods used for data analysis. Results and a brief discussion are provided afterward. Finally, conclusions are drawn, including implications, research limitations, and suggestions for future research directions.

## 2. LITERATURE REVIEW

### 2.1. Entrepreneurial Orientation vs. Green Entrepreneurial Orientation

Entrepreneurial orientation (EO) is a critical factor of competitive advantage, stimulates business growth and development, and improves the overall business performance (Kiyabo & Isaga, 2020). Companies with a strong EO identify and exploit market opportunities more quickly, adjust to changes more effectively, and achieve better outcomes compared to their competitors. EO is a crucial element that determines a company's ability to survive, grow, and dominate the market. Companies that develop this orientation build a foundation for long-term competitiveness and profitability (Sorama & Joensuu-Salo, 2023). Numerous authors have studied EO and agree that its foundation is built on three main dimensions: innovativeness, proactiveness, and risk-taking (Goulap, 2020; Ibarra–Cisneros & Hernandez–Perlines, 2020; Zhuang et al., 2020). Later research has added new dimensions, so today the comprehensive model also includes competitive aggressiveness, autonomy, and a wide range of entrepreneurial behaviors (Al-Mamary, 2025; Kiyabo & Isaga, 2020; Sorama & Joensuu-Salo, 2023).

Innovativeness reflects a company's dedication to new ideas, experimentation, and creative processes that result in the creation of new goods, services, or technologies. Such firms more readily develop new organizational approaches and adapt business practices to become more environmentally friendly (Guo et al., 2020; Muangmee et al., 2021; Zhuang et al., 2020). Proactivity means searching for opportunities, taking a visionary approach, and introducing new products or services ahead of the competition, while anticipating future needs and shaping the environment (Al-Mamary 2025; Muangmee et al., 2021). Proactive companies learn about environmental innovations by actively communicating with partners and exchanging knowledge, which opens

up new opportunities (Zhuang et al., 2020). Risk-taking represents a company's willingness to invest resources in organizational initiatives with uncertain results (Al-Mamary, 2025). Autonomy allows entrepreneurs to freely explore new and eco-friendly business ideas without too many limits, which is important for creating green products and services. Competitive aggressiveness drives entrepreneurs to stand out by creating eco-friendly innovations, helping them strengthen their market position and support sustainability (Al-Mamary, 2025).

Green entrepreneurial orientation (GEO) is a specialized and evolutionary form of EO. It integratively incorporates sustainability principles into basic entrepreneurial processes and reflects adaptation to contemporary environmental challenges and circular economy demands (Guo et al., 2020; Muangmee et al., 2021). Research indicates that GEO plays a key role in achieving the environmental, economic, and social performance of organizations (Muangmee et al., 2021; Zhuang et al., 2020). It focuses on sustainable development and environmental responsibility (Muangmee et al., 2021). GEO does not reject traditional EO principles but rather expands and enriches them. It retains all three basic dimensions of EO (Aftab et al., 2024) and adds environmental and social components. Innovation is extended to green initiatives, proactiveness includes anticipating environmental regulations, and risk-taking involves investing in untested sustainable models (Figiel & Badar, 2025; Guo et al., 2020; Tze San et al., 2022). GEO acts as a strategic bridge between entrepreneurial capabilities and sustainable business practices (Figiel & Badar, 2025; Tze San et al., 2022; Zhuang et al., 2020). According to Rong et al. (2025), GEO is a specific approach that businesses use to promote green innovation and strengthen both their economic and social sustainability. Companies with a strong GEO strive for environmentally responsible management. They introduce innovations in products, services, processes, strategies, or business models, which are recognized as green innovation (Guo et al., 2020; Muangmee et al., 2021).

## 2.2. Green Innovations and Their Impact on Business Performance

According to Al-Mamary (2025), green innovation is the process of introducing and managing business practices that focus on saving energy, recycling, and designing environmentally friendly products. It includes the creation “of environmentally sustainable products and practices by using eco-friendly materials, following ecological product design principles, minimizing material usage, reducing emissions and decreasing the consumption of resources” (Aftab et al., 2024, p. 534). Their goal is to solve environmental problems and support sustainability. This approach is driven by concerns about climate change and by government regulations. These factors push companies to include green innovation in their operations to stay competitive (Al-Mamary, 2025; Baeshen et al., 2021; Rong et al., 2025). Green innovations are not limited to technological solutions – they require a holistic approach that includes products, processes, business models, and social change (Maziriri & Maramura, 2022). As a result, many companies are beginning to view green innovation not just as an environmental obligation, but as a source of long-term competitive advantage. Green innovations generally take two main approaches: one views green innovations as a form of organizational capability, while the other focuses on concrete environmental practices involving internal systems, human resources, and external pressures (Al-Mamary, 2025).

The importance of green innovations is multifaceted: they help create a competitive advantage, meet environmental standards, improve the quality of the environment and public health, and open up new jobs in green sectors (Asadi et al., 2020; Rodrigues & Franco, 2023). Green innovations enable companies to develop products with a positive impact on the environment. The terms green innovation and eco-innovation refer to the contribution of businesses to sustainable development while simultaneously strengthening their competitive advantage.

Green innovations may emerge as a result of GEO (Guo et al., 2020). Both GEO and green innovations are rooted in the principles of the triple bottom line concept (Muangmee et al., 2021), which emphasizes the simultaneous achievement of economic prosperity, environmental quality and social equity (Elkington, 1997). To be truly sustainable, companies must achieve and measure economic, environmental and social performance. The primary objective of GEO is to promote sustainable business practices and to introduce green products and services (Muangmee et al., 2021). GEO and green innovations can also be seen as distinctive competences and capabilities that support the sustainable performance of SMEs (Oduro, 2024).

### 2.3. Hypotheses Development

Contemporary environmental crises have contributed to raising awareness about the importance of sustainable business and have stimulated the development of green innovations as a response to growing environmental challenges, making this topic highly relevant. SMEs have recently begun to implement green innovations, partly due to stakeholder pressures. Achieving financial performance while simultaneously promoting social welfare and enhancing environmental quality has become highly important, drawing full attention from SMEs to the triple bottom line model (Baeshen et al., 2021). Sustainable (green) innovations have become critical for improving economic, social and environmental dimensions of sustainable performance.

Research in SMEs about the relationship between GEO and green innovations was conducted in several different contexts. Research conducted in Italian SMEs (Aftab et al., 2024) showed that GEO positively influences green innovations, but also suggested the mediation role of green innovation in the GEO and firm performance relationship. Research in SMEs in Thailand (Muangmee et al., 2021) focused on the relationship between GEO and green innovation and their impact on business performance. These findings showed that GEO represents a relevant factor affecting green strategies and leads to green innovations. It proved a positive and significant impact of green innovation on economic, environmental, and social performances, also. These findings suggest that companies' success depends on economic success, social performance and environmental factors, too (Muangmee et al., 2021). Research conducted in Greece in SMEs (Skordoulis et al., 2022) demonstrated a positive impact of GEO on green innovation. The authors suggest that even though green innovation is a crucial factor for creating green entrepreneurship, adopting green entrepreneurship practices does not necessarily lead to green innovation. These innovations depend on entrepreneurs' perceptions and environmental beliefs, and factors of the external environment also (Skordoulis et al., 2022). Research conducted in Saudi Arabia in SMEs (Al-Mamary, 2025) explored the predictors of green entrepreneurial intentions (and GEO as one of them) and their influence on green innovation. The findings of this study suggest that GEO has a positive influence on entrepreneurial intentions, which has a strong positive influence on green innovations. Entrepreneurs have government support for green projects, the market accepts and wants green products, and the benefits of green innovation are becoming widely recognized. This way, an environment for green innovation promotion is created, so entrepreneurs are interested in making their businesses sustainable.

Some recent studies have explored the relationship between green innovation and performance, also. Research in China (Batoool et al., 2025) showed that green innovation significantly impacted environmental performance, suggesting that companies that implement green innovation are better at achieving environmental performance. Rodrigues and Franco (2023) conducted research in SMEs in Portugal and showed that green innovations have crucial importance for achieving environmental performance and sustainable performance in general. They concluded that adopting

green innovations can help SMEs make a difference in the market, attract new customers, and create a competitive advantage. It was highlighted that SMEs need institutional support in order to take advantage of green innovations. Rustiarini et al. (2022) conducted research in SMEs in Bali, Indonesia, and showed a significant positive influence of green innovation on sustainable performance. They suggest that SMEs, through green innovation application, conduct a proactive action for meeting regulators' pressures, reducing environmental influences and improving economic performance. Research conducted among SMEs in Saudi Arabia (Baeshen et al., 2021) showed that green innovation has a significant and positive impact on economic, environmental, and social performance. These findings indicate that the implementation of green innovation is essential for SMEs, as its adoption enables them to achieve economic, environmental and social performance simultaneously. Research in the hotel industry in Malaysia (Asadi et al., 2020) showed that green innovations positively affected economic and environmental performance, suggesting their relevance and potential for sustainable performance promotion.

Based on previous research findings and theoretical background, the following hypotheses were formulated:

**Hypothesis One:** Green entrepreneurial orientation (GEO) has significant and positive influence on green innovation.

**Hypothesis Two:** Green innovation has significant and positive influence on sustainable performance (i.e. economic, environmental and social performance).

### 3. METHODOLOGY

The data were collected using an adapted questionnaire consisting of five parts. The first part included general questions about the respondents and the companies. The second part featured items measuring green innovations (GI), based on previous research (Muangmee et al., 2021) and comprised 4 items. The third part focused on GEO, measured by 5 items, also adapted from Muangmee et al. (2021). The fourth part focused on sustainable performance measurement and consisted of 13 items (Muangmee et al., 2021), with 5 items measuring environmental performance (ENP) and 4 items each measuring economic (EP) and social performance (SP). The fifth part referred to entrepreneurial orientation (EO), which was measured through 9 items, based on previous research (Brettel et al., 2015). All items were rated on a seven-point Likert-type scale ranging from 'absolutely disagree' to 'absolutely agree'. Data analysis was conducted using SPSS. Descriptive and regression analyses were performed to test the hypotheses. Cronbach's alpha coefficient was calculated to assess the reliability of the variables.

The sample comprised 57 respondents, with 38.6% female respondents and 61.4% male respondents. The majority of respondents were aged 25 to 35 (47.4%), while 17.5% were aged 36 to 45. In the case of education, the majority of respondents held a university degree (33% bachelor's degree and 21.1% master's degree). Most respondents had more than 11 years of work experience (36.9%), but a significant share had less than 5 years of work experience (36.8%). Regarding company size, 50.9% of respondents were employed in micro enterprises, 10.5% in small companies, and 38.6% in medium-sized companies. The distribution of employees between manufacturing and service companies was nearly balanced (47.4% vs. 52.6%). More than 90% of the companies were privately owned, and most of the companies had been operating for more than 11 years (56.1%).

#### 4. RESULTS AND DISCUSSION

Reliability analysis for all variables was conducted using Cronbach's alpha coefficient. Good reliability and internal consistency were confirmed for GEO, GI, EP and ENP. The results of the reliability analysis are presented in Table 1. The initial Cronbach's alpha coefficients for GEO, EO, GI, EP and ENP were lower than final values presented in Table 1 (0.784; 0.842; 0.707; 0.711 and 0.736, respectively). Based on these results, it was suggested that certain items be excluded to improve the Cronbach's alpha coefficients. Therefore, the decision was made to exclude: one item for GEO ("Our organization uses less or non-polluting/toxic materials"), one item for EO ("In the past five years, changes in our products or service lines have been mostly of a minor nature"), one item for GI ("Our organization uses eco-labeling"), one item for EP ("Our organization has improved capacity utilization"), two items for ENP two items ("The resource consumption our organization e.g. water, electricity, and gas has been decreased during the last 3 years"; "Our organization has achieved important environment-related certifications"). The Cronbach's alpha coefficient for social performance was found to be 0.645. Even after item deletion, it did not exceed the acceptable threshold of 0.7, which is generally considered the minimum acceptable value for this coefficient (Pallant, 2011). Consequently, the decision was made to exclude this variable from further analysis. The results of the descriptive analysis and normality tests are also presented in Table 1.

**Table 1.** Results of reliability and descriptive analysis and normality tests

Variable	Cronbach's $\alpha$	Mean	St. Dev.	Var.	Skewness	Kurtosis
<b>GEO</b>	0.792	4.206	1.405	1.973	-0.008	-0.428
<b>GI</b>	0.757	4.743	1.520	2.310	-0.473	-0.358
<b>EP</b>	0.721	4.398	1.512	2.287	0.058	-0.736
<b>ENP</b>	0.814	5.234	1.353	1.829	-0.512	-0.320
<b>SP</b>	0.645	/	/	/	/	/
<b>EO</b>	0.853	4.754	1.040	1.081	-0.520	0.008

Source: Own calculations

The descriptive analysis showed the highest mean value for the assessment of ENP ( $M_{ENP}=5.234$ ). EO ( $M_{EO}=4.754$ ) was assessed better than GEO ( $M_{GEO}=4.754$ ). The greatest homogeneity was observed for the assessment of EO ( $SD_{EO}=1.040$ ;  $V_{EO}=1.081$ ). The highest level of heterogeneity was found for GI ( $SD_{GI}=1.520$ ;  $V_{GI}=2.310$ ) and EP ( $SD_{EP}=1.512$ ;  $V_{EP}=2.287$ ). Most of the skewness and kurtosis values were negative. Negative skewness values indicate that a greater number of values are clustered on the higher side of the distribution. Negative kurtosis values suggest that the distributions are slightly flatter than a normal distribution, implying lighter tails and a broader peak. However, since the values of skewness and kurtosis do not significantly deviate from the range commonly considered acceptable for normality ( $\pm 2$  for social sciences), it can be concluded that the assumption of normality has been reasonably met.

In order to test the research hypotheses, regression analysis was conducted. The assumptions about linearity, normality, and homogeneity of variance are met. In addition, the absence of extreme values and the Durbin-Watson statistics (Model 1 - 2.068; Model 2 - 1.816; Model 3 - 1.632; Model 4 - 1.310) suggest that autocorrelation in models does not interfere with the implementation of regression analysis. The results of simple regression analysis are presented in Table 2.

The presented results indicate that all observed models are statistically significant. Model 1 suggests that GEO has a statistically significant and positive impact on GI in SMEs, so GEO significantly predicts GI. GEO explains 30.1% of the total variance in GI. Model 2 indicates that EO has

a statistically significant and positive impact on green innovation in SMEs. This means that EO significantly predicts GI. EO accounts for 28.4% of the total variance in GI. Model 3 and 4 suggest that GI has a statistically significant and positive impact on EP and ENP. These results indicate that 30.4% of the total variance in EP and 45.8% of the total variance in ENP can be explained by GI.

**Table 2.** The results of simple regression analysis

No.	Model	Model significance	Unstandardized Coefficients		t	Sig.	95.0% Confidence Interval for B	
			B	St. Error			Lower Bound	Upper Bound
1	(Constant)	r=0.549; R <sup>2</sup> =0.301; adjusted R <sup>2</sup> =0.288	2.246	0.540	4.156	0.000	1.163	3.329
	GI (independent var. GEO)	F (1; 55) = 23.698; p=0.000	0.594	0.122	4.868	0.000	0.349	0.838
2	(Constant)	r=0.533; R <sup>2</sup> =0.284; adjusted R <sup>2</sup> =0.271;	1.041	0.811	1.284	0.205	-0.584	2.667
	GI (independent var. EO)	F (1; 55) = 21.793; p=0.000	0.779	0.160	4.668	0.000	0.444	1.113
3	(Constant)	r=0.551; R <sup>2</sup> =0.304; adjusted R <sup>2</sup> =0.291;	1.796	0.557	3.224	0.002	0.680	2.913
	EP (independent var. GI)	F (1; 55) = 23.998; p=0.000	0.549	0.112	4.899	0.000	0.324	0.773
4	(Constant)	r=0.677; R <sup>2</sup> =0.458; adjusted R <sup>2</sup> =0.448;	2.378	0.440	5.409	0.000	1.497	3.260
	ENP (independent var. GI)	F (1; 55) = 46.889; p=0.000	0.602	0.088	6.814	0.000	0.425	0.779

Source: Own calculations

Our findings confirmed the first hypothesis and suggest that SMEs with a higher orientation toward green entrepreneurship are more likely to implement green innovations in their business operations. These findings are consistent with the results of previous research (Aftab et al., 2024; Al-Mamary, 2025; Muangmee et al., 2021; Skordoulis et al., 2022). A higher entrepreneurial orientation supports the implementation of more green innovations. Additionally, our findings indicate that implementing green innovations enables SMEs to achieve higher economic and environmental performance, which is in line with similar research (Asadi et al., 2020; Baeshen et al., 2021; Batool et al., 2025; Muangmee et al., 2021; Rodrigues & Franco, 2023; Rustiarini et al., 2022). However, our findings did not allow for testing the influence of green innovation on social performance, due to the low reliability of the scale. Previous research, nevertheless, has found a positive impact of green innovation on social performance (Baeshen et al., 2021; Muangmee et al., 2021).

## 5. FUTURE RESEARCH DIRECTIONS

With growing demands for sustainability, SMEs need to implement strategies and business processes to achieve this goal. The potential of GEO and green innovation implementation in reaching this objective has been demonstrated in numerous studies. As this field of research has gained significant attention in both academia and practice in recent years, future research should be expanded in order to include a larger number of respondents from other regions of the Republic of Serbia, as well as from neighboring countries. Additionally, the effects of institutional support for the implementation of green innovations and the enforcement of environmental laws could be examined, as environmental protection requirements are expected to increase in the coming years. Further research could investigate, also, how access to green finance or incentives influences

the adoption of green innovations and the development of GEO in SMEs. Longitudinal studies could provide deeper insights into the long-term effects of green entrepreneurial strategies on the sustainability performance of SMEs.

## 6. CONCLUSION

The conducted research aimed to examine whether GEO influences green innovations and how these innovations impact sustainable business performance in SMEs in the Republic of Serbia, particularly in the western region. Our findings suggest a positive relationship exists between GEO and green innovations, as well as between entrepreneurial orientation and green innovations. Although the distinction between GEO and entrepreneurial orientation was discussed in the literature review, the analysis did not reveal a significantly different influence of GEO compared to entrepreneurial orientation on green innovations. The findings also indicate a significant and positive impact of green innovations on both economic and environmental performance.

Given the extensive global efforts to establish a sustainable economy, particularly through enhancing the sustainability of developing countries, research into SMEs' achievements in sustainable performance is highly relevant and warrants further research. The study emphasized entrepreneurial orientation and green innovations, as prior research and literature have highlighted their particular relevance in achieving sustainable performance. Since the resource-based view was applied as the framework for this study, the findings contribute significantly to existing literature. Understanding SMEs' sustainable performance through this lens can assist policymakers and practitioners in making better decisions to improve SMEs' performance. As GEO and green innovations were confirmed as key predictors of sustainable performance, SME managers should be committed to improving their companies' capacities to pursue cleaner production and leverage green capital as a strategy for achieving long-term sustainable outcomes. Markets increasingly recognize environmentally conscious companies and tend to reward them with higher business outcomes.

The main limitation of this study refers to the sample size, as a larger and more diverse sample could provide deeper and more generalizable insights. However, it is important to emphasize that the presented findings are based on a preliminary study, which is planned to be expanded to other regions of the country. Furthermore, the absence of mediator or moderator variables, such as leadership styles or organizational culture, limits the ability to capture more complex mechanisms underlying the relationship between GEO, green innovations and sustainable performance. In addition, the impact on social performance was not examined due to the low reliability of the measurement scale, suggesting the need for improving this part of the questionnaire in future research.

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# Exploring the Impact of Lean Management Practices on Supply Chain Optimization in Small and Medium-Sized Enterprises: A Systematic Literature Review

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Lean;  
Lean tools;  
Optimization



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**Abstract:** While different Lean methodologies and approaches have been widely applied in large enterprises, there is a growing need to explore their effectiveness in Small and Medium Enterprises (SMEs). This study aims to present a Systematic Literature Review – SLR that examines the integration of Lean practices within SME supply chains with a focus on identifying challenges, benefits, resilience, and long-term implications. The review encompasses a systematic search across Scopus, employing strict inclusion and exclusion criteria to ensure the relevance and quality of the selected literature. PEO framework is utilized to structure the focus of the review, ensuring that the research addresses relevant groups, lean practices, and measurable outcomes. Additionally, the PRISMA methodology was employed to systematically identify, screen, and analyse the literature, providing a rigorous and transparent review process. The results indicate that Lean practices could be challenging to implement in resource-constrained SMEs, but can significantly enhance operational efficiency, resilience, and cost reduction when properly adapted to the specific needs of these enterprises.

## 1. INTRODUCTION

In this era of dynamic global competition and rapidly changing customer demands, businesses are facing significant pressures to enhance their operational efficiency. Lean management, which was initially developed within the Toyota Production System, has emerged as a powerful methodology for optimizing processes, reducing waste, and fostering a culture of continuous improvement across industries (Brunner et al., 2024). While the principles of Lean have achieved widespread adoption in larger enterprises, their integration into the supply chains of Small and Medium Enterprises – SMEs has presented unique opportunities and challenges due to different resources and differing organizational structures (ALMashaqbeh & Hernandez, 2024).

The research aims to explore how Lean Management practices can be effectively integrated into the supply chain operations of Small and Medium Enterprises to enhance efficiency and reduce waste, identifying the critical factors that influence the successful implementation of Lean principles in complex, global supply chains. Additionally, it aims to evaluate the long-term benefits of Lean process adoption and application practices in enhancing operational resilience and cost-effectiveness. The following research questions are identified to form a basis for this study.

RQ1 - What are the challenges associated with Lean innovation in SMEs, and how do these challenges impact the adoption and sustainability of Lean practices?

RQ2 - What are the underlying mechanisms by which Lean Management principles contribute to the resilience and adaptability of supply chains in volatile and uncertain environment?

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Lean methodology is a value-centric approach, fundamentally and it focuses on eliminating non-value-added activities from the operations. Lean tools such as JIT, Kanban, Total productive maintenance – TPM, etc. have been influential in shaping operational practices to enhance customer value, satisfaction, and efficiency (Dun & Wilderom, 2016). Not so long ago, Lean has expanded beyond manufacturing to involve sectors like healthcare, construction, logistics and service industries, spreading its core principles to diverse operational contexts (Medeiros et al., 2021).

If we talk about Supply Chain Management, it is a critical domain within operational management and involves coordinating the flow of goods, information, and resources from the origin to end customers. Effective management of the supply chain ensures timely product delivery, risk management, and cost minimization, all of which are vital for organizational resilience (Henríquez-Machado et al., 2021). When integrated with Lean, supply chains tend to become much more adaptable and responsive and minimize waste at each stage of the product life cycle (Urbanik et al., 2023). However, implementing lean in supply chains and particularly within SMEs is challenging due to barriers such as resource constraints, limited technological adoption, and resistance to change (Laghouag et al., 2024; Schwantz et al., 2023). SMEs are fundamental drivers of economic growth, contributing significantly to employment and GDP across both developing and developed economies. Despite their impact and presence, SMEs face distinct challenges that larger organizations are typically better prepared to manage. These limitations impact their ability to fully adopt and sustain lean practices, especially in high-cost and technology areas like automation and digitization (Kadir et al., 2024).

## 2. METHODOLOGY

This study is planned around the PEO – Population, Exposure, Outcome framework and sticks to the PRISMA – Preferred Reporting Items for Systematic Reviews and Meta – Analyses guidelines to make sure that a comprehensive and systematic approach is followed.

The PEO framework is a structured approach that is used to formulate keywords and research questions, particularly in systematic reviews and qualitative studies.

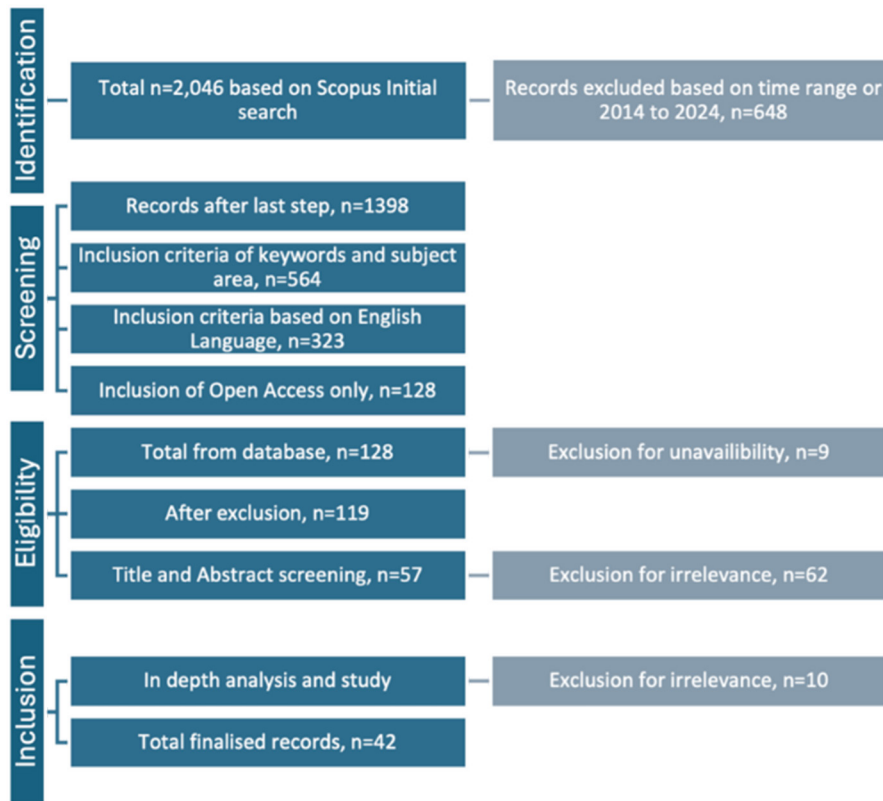
P-Population refers to the target group section that is under the study. In the case of this research, the population is “Supply Chain Management”, “Small and Medium Enterprises – SMEs” and “Operations”. E-Exposure, Describes the specific conditions, factors or interventions being investigated. Here, the exposure is “Lean Management”, “Lean Thinking”, “Continuous Improvement”, “Lean Six Sigma”. O-Outcome, denotes the expected impact, result of effect that the exposure will bring. In this study, the outcome involves “Optimization”, “Process Improvement”, “Efficiency”, “Cost Reduction”, “Survey”, and “Customer Satisfaction”. The search query or string formulated with the facilitation of PEO framework and used in the database for data extraction is (“Supply Chain Management” OR “Small and Medium Enterprises” OR “Operations”) AND (“Lean Management” OR “Lean thinking” OR “Continuous Improvement” OR “Lean Six Sigma”) AND (“Optimization” OR “Process Improvement” OR “Efficiency” OR “Cost Reduction” OR “Survey” OR “Customer Satisfaction”).

This search query was then put into the search function of SCOPUS, a well-reputed database for academic journals and articles. The framework being used here is PRISMA, which provides a standardized method for conducting and reporting systematic reviews, ensuring reproducibility and transparency in four key stages.

**Table 1.** Keyword classification based on PEO Framework

Population	Exposure	Outcome
Supply Chain Management Operations Small and Medium Enterprises	Lean Management Lean Six Sigma Lean thinking Continuous Improvement	Optimization Process improvement Efficiency Cost reduction Survey Customer Satisfaction

Source: Own processing



**Figure 1.** SLR based on PRISMA Framework

Source: Own processing

Identification - The initial search yielded a total of 2,046 articles, forming the basis of further inclusion and exclusion based on the PRISMA framework. An inclusion criterion of time-period was applied here that ranged from 2014 to 2024. This reduced the total count of articles to 1,398. Screening – This step is used to narrow down the search results by applying specific criteria and eliminating any irrelevant studies. Additional filters, based on selected keywords and subject area classification, were applied to obtain articles that specifically talk about supply chain, lean, and SMEs. This step brought the number further down to 564 articles.

Only English-language articles were included in this study. These inclusion criteria resulted in 323 articles. At last, the filter was selected that only included the articles that had open access. And this step resulted in 128 articles. Eligibility – This step is done to ensure that the articles selected for the final review are directly relevant to the research questions and objective. At first, the accessibility check was done, where all the 128 articles were downloaded and checked for accessibility. 9 articles were either not available on the external platform or were not downloadable, so they were also excluded from the list, resulting in 119 articles. This was followed by Title and

Abstract screening, where each title and abstract was carefully reviewed to evaluate its relevance. For unclear studies, a quick scan of the conclusion was also done to determine the relevance. After this whole process, 57 articles remained that were directly or indirectly relevant to the research focus. Inclusion – Each of the 57 articles was read thoroughly to ensure that they met the inclusion criteria. The main benchmarks were the relevance of Lean practices with the supply chains of SMEs and alignment with the study's research questions. The inclusion process confirmed 42 articles, with the exclusion of 15 that didn't prove to be relevant to the scope of research.

### 3. LITERATURE REVIEW

In this stretch of advancements and new developments, one of the most widely accepted systematic process improvement methods, specifically in conventional enterprises, is Lean (Pawlik et al., 2022). Lean management principles are widely recognized for their emphasis on efficiency, waste reduction, and creation of value. All of these are vital for improving the dynamics of supply chain operations in Small and Medium Enterprises – SMEs. Lean practices in SMEs are gaining popularity due to the need for organizations to optimize their resources and navigate through competitive pressures. According to Ayeni et al. (2016), Lean Management enables SMEs to eliminate waste, focus on quality improvement, cost minimization, and to be resilient in the time of market changes.

With its origin from automotive industry, Lean has gradually shown remarkable adaptability across various sectors. For instance, Al-Baldawi et al. (2024) investigated practices of Lean tailored to SMEs, with a particular focus on the critical aspects of SMEs' consideration when implementing the lean tools and the decision-making that guide these practices. A study conducted by Kessy et al. (2024) examined lean in medical supply chains, identifying drivers such as demand management and supplier collaboration problems, along with categorising the wastes into inventory, operational, and transaction costs. Process optimization remains the mind and soul of Lean Management, focusing on enhancing productivity, streamlining workflows, and minimizing waste across a broad range of operations. Several studies provide information on how organizations apply lean tools to achieve optimum improvements in efficiency and responsiveness. Memari et al. (2024) led a thorough research to investigate the impact of Lean principles directly on operational efficiency, with a focus on the elimination of the seven major wastes. Akano et al. (2023) explore the application of lean in an offshore environment where complex and high-risk workflows are prevalent. The study indicates how lean methods, specifically Value Stream Mapping and JIT, have been tailored to optimize work requests, reducing lead times and eliminating bottlenecks. In the manufacturing sector, the lean tools are more commonly used to reduce cycle times and standardize processes. Kang et al. (2016) focused on the hierarchical structure of KPIs – Key Performance Indicators in the production system. It demonstrated how lean implementation supports continuous improvement and performance benchmarking. This research showed that lean practices like Kaizen and Total Productive Maintenance are critical to maintain high productivity levels in Manufacturing, especially when implemented of downtime and production bottlenecks. The findings reveal that well-chosen lean methodologies that are supported by KPIs can provide production team actionable guidelines, which promote agile decision making and improvements in the efficiency.

Similarly, the presence of lean can also be seen in the Service sector across different regions of the world. Matthews et al. (2017) investigated organizational learning in SMEs, indicating how process improvements that are driven by Lean can help small businesses stay on track and competitive. The authors have revealed that lean tools such as Kaizen, 5S, and continuous flow are

influential in reducing wastes and enhancing flexibility for service environments. [Gutierrez et al. \(2022\)](#) examined how lean practices can enhance the agility of an organization, showcasing Lean not as a tool for efficiency but as a catalyst for building dynamic capabilities. This perspective has shown Lean as a strategic tool that enables businesses to anticipate and respond to fluctuations, making Lean an essential approach for companies that are aiming to enhance both adaptability and stability in their supply chains.

Another recent integration of lean with advanced systems and digital tools can also be observed, which has opened new doors for optimizing processes. The study by [ALMashaqbeh and Hernandez \(2024\)](#) illustrates the benefits of combining lean principles with Overall Equipment Effectiveness – OEE in a plastic production system. By using OEE as a measurement framework within a lean spectrum, organizations can be able to obtain a vivid picture of equipment performance, identifying inefficiencies and priority areas for improvement. This integrated approach helps manufacturing firms to improve output quality, which is the key aspect of lean process optimization.

A significant feature of process optimization via Lean is its application in supply chain management and logistics. A case study by [Villarreal et al. \(2016b\)](#) on lean road transportation demonstrated how lean principles can be used to improve the efficiency of routing and reduce transportation costs. By applying tools such as value stream mapping and scheduling, the authors have revealed how companies can streamline their transport operations, minimize time and fuel wastage, and improve overall performance. It explains how lean is not restricted to production floors but spreads into end-to-end supply chains.

Based on the study, we can see that several critical success factors play a significant role in the successful implementation of lean management within the SMEs. The first main critical aspect for the success could be perceived as Leadership commitment. [Brunner et al. \(2024\)](#) emphasize that a supportive culture must be created by the leaders to integrate and benefit from lean practices. Without this strong leadership, the motivation to adopt and to sustain lean initiatives tends to fade away over time. In the same study, the authors have explored the application of 5S and Kaizen in European SMEs and demonstrated the ability to reduce downtime and improve workplace organization. Research by [Alsaadi \(2024\)](#) and [Villarreal et al. \(2016a\)](#) highlights that regular training programs help improve employee engagement and enable SMEs to better integrate the lean tools, such as Just In Time (JIT), 5S, Kaizen, etc., into their operations. The usage of these lean tools is essential for optimizing processes within SMEs. [Pawlik et al. \(2022\)](#) also exhibited the effectiveness of Kanban and JIT in Mexican SMEs, where these tools contributed to lower inventory costs and waste reduction. Kanban that relies on visual cues to reflect demand allows SMEs to achieve more accurate inventory levels and improve production planning. And the JIT approach ensured that materials were delivered exactly when they were needed, which resulted in reduced holding costs and improved efficiency. Similarly, research by [Syamil et al. \(2023\)](#) focused on the role of Value Stream Mapping – VSM in manufacturing SMEs of Indonesia, shedding light on the effectiveness in identifying bottlenecks and improving the supply chain visibility. The findings from this work showed that VSM not only reduced lead times but also contributed to the enhanced customer satisfaction that resulted from streamlining the flow of materials and information.

With the integration of digital tools such as ERP systems and electronic dashboards, SMEs can achieve better data visibility and decision-making attributes ([Komkowski et al., 2024](#)). This aligns with Lean principles by streamlining processes and reducing manual errors. The researchers also caution that adopting such digital solutions, it requires significant resources in both technology and workforce training that can pose significant challenges for SMEs that often have limited financial

resources (Lepistö et al., 2022). Recent research has also highlighted the need for integration of Lean principles with digitalization in the context of Industry 4.0. Kadir et al. (2024) have explored the combination of Lean practices with digital technologies such as artificial intelligence, automation, and digital twins. It is argued that while the focus of lean is process efficiency and waste reduction, digital tools offer potential for greater innovation and improved decision-making. The authors concluded that SMEs could leverage both Lean and digital strategies to achieve higher levels of flexibility and responsiveness in their supply chains (Singh et al., 2023).

An emerging area of interest that can be observed these days is the sustainability of Lean practices in SMEs. Foris et al. (2020) conducted a study on Lean's effect on environmental sustainability within the food processing industry. Here, the waste reduction was quite crucial for both cost savings and ecological benefits. The findings indicated that Lean practices contributed to reduced energy consumption and material waste, thus supporting both environmental and economic goals. This is also linked with the study presented earlier by Alsaadi (2024), which emphasized that Lean has the potential to contribute to the triple bottom line of economic, social, and environmental performance by promoting resource utilization. Apart from the numerous documented benefits of Lean, one should not let go of the possibility of challenges while implementing Lean practices. The most observed challenge is the financial constraints that limit the ability of SMEs to invest in necessary training, resources, and digitalization. As per Memari et al. (2024), SMEs with budget limitations struggle to maintain the lean initiatives over time, as the initial cost of technological integration and training can outweigh the initial benefits. The study also mentioned that access to incentives offered by the governments or partnerships with industrial bodies could help, enabling SMEs to seek Lean implementation without compromising their limited resources.

#### 4. DISCUSSION AND FINDINGS

This paper sets out to explore the unique challenges and enablers of Lean implementation in small and medium enterprises – SMEs and examines how lean principles impact supply chain resilience, especially under volatile conditions. These findings provide insight into the thematic distribution of the System literature Review in consideration, validating specific lean tools, highlighting critical success factors, and outlining the barriers to lean adoption technically within the SME context. The reviewed literature spans over a diverse set of lean applications, primarily in SMEs, focusing on improving operational efficiency, sustainable practices, and waste reduction. Key themes identified in the literature include Lean's integration with six sigma (Tran et al., 2020), Lean's role in digitalization and Industry 4.0, and the application of Lean in various sectors like healthcare, remanufacturing, and logistics (Kadir et al., 2024). These themes showcase the growing interest of SMEs in Lean as a versatile tool that can be tailored to sector-relevant demands, along with improving resilience in unstable environments (Jong & Blokland, 2016).

From Table 2, A variety of Lean tools have prominently shown up in this SME-focused literature, such as value stream mapping – VSM, Kaizen, Kanban, and 5S. VSM has been widely validated and recommended for identifying wastes and optimizing processes, mainly in manufacturing and logistics (Villarreal et al., 2017). Kaizen, which is known for its incremental approach for improvement, is noted for continual improvements in industry, such as automotive manufacturing and healthcare, where gradual operational changes facilitate SMEs to adapt to evolving demands in the market (Ge, 2023; Kristensen et al., 2022). 5S and Kanban systems can also be found, with research highlighting their role in maintaining organized workplaces and optimized inventory flow (Rathilall & Singh, 2018). It is somehow evident that these tools align with the resource constraints of SMEs and facilitate lean's application without extensive demand for infrastructure. Tools mentioned in a very low

frequency include Heijunka and other advanced-level lean methods. This could be an area where lean practice in SMEs may further benefit from development and exploration.

As it can be seen in Table 3, based on the current literature trends, the success of lean is closely tied to several critical factors. If we further dive deep into the specific critical factors, we can see that leadership commitment and employee training emerged as primary enablers for effective lean adoption, where leadership, particularly, is instrumental in maintaining a culture of continuous improvement (Sagnak et al., 2020). Additionally, training can equip the employees with the skills necessary to apply Lean tools effectively by bridging skill gaps and fostering a culture that is improvement-oriented (Kessy et al., 2024). Stakeholder engagement and technology integration are some other pivotal success factors that emphasize the need for SMEs to establish collaborative partnerships and leverage digital tools to enhance lean’s effectiveness (Gutierrez et al., 2022; Komkowski et al., 2024).

**Table 2.** Frequently Used Lean Tools

Lean Tool	Key Feature	Significance Indicated	% of Validations
<b>Value Stream Mapping</b>	Visualizes and improves the entire process flow	High	30%
<b>5S</b>	Enhances workplace organization	High	25%
<b>Kaizen</b>	Promotes continuous improvement culture	High	20%
<b>Kanban</b>	Improves inventory and workflow efficiency	Medium-High	18%
<b>Total Productive Maintenance</b>	Maintains equipment efficiency	Medium-High	15%
<b>Just-In-Time</b>	Reduces inventory waste	Medium	12%
<b>Standardized Work</b>	Ensures consistency and quality	Medium	10%
<b>Root Cause Analysis</b>	Identifies and resolves root problems	Medium	8%

**Source:** Own research

**Table 3.** Critical Success Factors for Lean Adoption

Success Factor	Description	Importance Level	% of Validations
<b>Leadership</b>	Emphasized as the most crucial factor in lean success	High	32%
<b>Continuous Improvement</b>	Key element for sustainability in lean processes	High	28%
<b>Stakeholder Engagement</b>	Crucial for collaborative lean practices	Moderate - High	20%
<b>Employee Training</b>	Necessary to bridge skill gaps	Moderate - High	15%
<b>Technology Integration</b>	Facilitates smoother lean transitions	Moderate	12%

**Source:** Own research

**Table 4.** Challenges in Lean adoption and Implementation

Challenge	Description	Importance Level	% of Validations
<b>Limited Resources</b>	Insufficient financial, human, and technological resources to implement Lean effectively.	High	28%
<b>Lack of Skilled Workforce</b>	Workforce lacks the necessary training and expertise in Lean principles and tools.	High	25%
<b>High Demand Variability</b>	Unpredictable demand patterns causing inefficiencies in Lean-driven supply chains.	High	20%
<b>Limited Digitalization</b>	Challenges in integrating advanced technologies like ERP, IoT, and AI with Lean practices.	High	15%
<b>Economic Constraints</b>	Pressure to achieve immediate cost reductions limits long-term Lean adoption.	High	12%

**Source:** Own research

From Table 4, it can be seen that in terms of lean adoption, SMEs face unique barriers, originating primarily from resource limitations, infrastructural constraints, and skill shortages. Limited resources and Inadequate training have been the most frequently cited barriers, reflecting a widespread lack of lean knowledge and training support within SMEs. Infrastructural restraints also pose a significant challenge, as many SMEs lack the necessary physical and digital systems to implement most of the lean tools effectively.

Studies also indicate that SMEs often experience resistance to Lean principles due to a fear of change and misunderstanding of Lean's long-term benefits among employees (Rivera et al., 2021). Furthermore, fluctuating patterns of demand may hinder Lean's implementation in sectors that are reliant on stable and predictable processes (Kumar et al., 2019).

These findings somehow align closely with the general focus of this study that examines challenges and Impacts of Lean within the SMEs. These barriers, when combined with unstable patterns of demand and leadership gaps, tend to challenge the sustainability of Lean in SMEs. This underlies the importance of targeted support for Lean training and infrastructure investments. By reducing operational inefficiencies and promoting agile responses to environmental changes, Lean enables SMEs to better withstand supply chain disruptions (Meng, 2020). Additionally, lean's integration within digital systems such as ERP or Industry 4.0 technologies can further sustain resilience, enabling real-time data and a chance for adjustments and enhanced visibility across supply chain checkpoints (Liutkevičienė et al., 2022).

## 5. RESEARCH LIMITATIONS AND FUTURE SCOPE

This study has highlighted significant insights into the implementation of Lean within SMEs, though it is subject to certain limitations that suggest a few directions for future research. At first, while examining lean and its application within SMEs, very limited prior research was found that directly connects lean practices and SMEs. This gap might have constrained a more comprehensive understanding of how SMEs uniquely adapt, adopt, or struggle with lean methodologies, mostly in diverse sectoral and regional contexts. Furthermore, the current research's scope was limited to a 10-year period ranging from 2014 to 2024. This time constraint might have limited the capture of long-term trends in Lean evolution within SMEs. The reliance on a single database can also limit the scope of research, as literature from other reputable databases cannot become a part of this study.

In terms of the future scope, this research has opened the doors to many possibilities. An expanded version of the study that builds on these current findings can focus on SMEs. It can utilize primary data collection methods such as interviews and surveys to obtain seasoned insights into the challenges and outcomes of lean implementation. This can provide a micro-level aspect of SME readiness, region-specific challenges, and cultural factors that promote lean adoption.

## 6. CONCLUSION

This study has tried to explore how lean methods can contribute to the resilience and efficiency of Small and Medium Enterprises – SMEs exclusively within the supply chains facing unpredictable conditions. A structured approach was carefully used, grounded in the PEO and PRISMA frameworks, to filter out the relevant literature that was extracted from the database. The study has attempted to answer the 2 core research questions:

RQ1 -What are the challenges associated with Lean innovation in SMEs, and how do these challenges impact the adoption and sustainability of Lean practices? Findings have indicated that SMEs

face crucial challenges when implementing lean principles, mainly due to resource limitations and scalability concerns. Financial constraints, insufficient infrastructure, and inadequate training among the workforce were among the primary barriers observed. The study highlights that SMEs that tend to overcome these barriers require tailored approaches to lean that reflect their unique size, operational needs, and resource base.

RQ2 - What are the underlying mechanisms by which Lean Management principles contribute to the resilience and adaptability of supply chains in volatile and uncertain environments? Findings show that lean practices, including tools like Value Stream Mapping, 5S, and Kanban play a pivotal role in improving supply chain resilience for SMEs. These tools enable real-time monitoring of processes, waste reduction, and increased flexibility, thus allowing SMEs to adapt more proactively to market fluctuations. The focus of Lean on continuous improvement and Process optimization fosters a culture of responsiveness, which is crucial for managing supply chain disruptions. It also demonstrates that lean principles contribute to supply chain adaptability by promoting a collaborative environment across functions and departments, ensuring that even small-scale enterprises can manage demand variability and resource limitations effectively. The thematic analysis highlighted that where lean practices hold substantial promise for SMEs, successful adoption is majorly influenced by factors such as leadership, continuous improvement culture, and employee engagement. The findings reveal that when lean is paired with supportive leadership, a culture of continuous improvement, and strategic use of technology, it can significantly enhance operational efficiency. However, challenges in resource access and technical expertise remain for SMEs.

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# Distributors as Drivers of Digitalization in Excess Inventory Management for SMEs in the Chip Industry

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**Abstract:** Digitalization is both a key driver and an essential tool for supply chain optimization, particularly in industries with high market volatility. This paper examines the role of distributors in advancing digitalization for excess inventory management in the chip industry, addressing technological challenges and promoting sustainable solutions. The research explores two key questions: (1) What strategic solutions can distributors offer to promote digital innovation in excess inventory management? (2) How can SMEs implement data-driven solutions by collaboration with distributors? A methodically structured literature analysis highlights the pivotal role of distributors in platform development and data-driven inventory optimization. They support SMEs in adopting digital strategies, enhancing forecasting accuracy, and streamlining operations. The study underscores the potential of big data and machine learning in inventory control while addressing a critical research gap. Further investigation into advanced technology integration is necessary to ensure sustainable and efficient inventory management, strengthening SME competitiveness and resilience.

## 1. INTRODUCTION

Exogenous shocks led to significant disruptions in global supply chains (SCs) between 2019 and 2023. The resulting supply bottlenecks caused a global chip shortage (Gentner & Lambrette, 2023; Kleinhans & Hess, 2021). Moore's prediction (1965) that the number of transistors on a chip would double approximately every two years has been confirmed over decades and has significantly influenced technological developments in the chip industry. However, this growth is not linear but is repeatedly characterized by profound innovation surges and structural upheavals (Zhu et al., 2023). At the same time, the industry is marked by volatile demand structures (Burkacky et al., 2022; Gentner & Lambrette, 2023). Taken together, these factors amplify cyclical market fluctuations and intensify the bullwhip effect, which leads to the accumulation of excess inventory in the chip industry, especially during times of crisis (Ackerman, 2024; Zhao et al., 2018). Small and medium-sized enterprises (SMEs) face the challenge of efficiently liquidating and reallocating excess inventory to reduce capital lock-up and maintain liquidity (Ackerman, 2024). Moreover, managing excess inventory requires substantial human and logistical resources, further constraining the operational efficiency of SMEs (Kot et al., 2014). Within the chip supply chain, various key players influence inventory allocation and distribution. These include chip manufacturers, upstream franchise distributors, independent distributors, and chip brokers (Eaidgah, 2009). Distributors play a key role in this interaction by increasing SC efficiency and optimizing inventory management. They offer a variety of supply chain management (SCM) solutions (Arrow, n.d.; Electronic Direct, n.d.; Future Electronics, n.d.; Rutronik, n.d.). These solutions include both cross-organizational strategies and approaches tailored to the specific needs of individual companies for the effective control and

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coordination of material, information, and financial flows along the SC (Meixell & Gargeya, 2005). Thanks to their specialized industry knowledge and solution-oriented SCM approaches, they also act as key strategic players within networked supply chain structures. According to Ulmer and Rose (2025), distributors serve as a crucial interface for SMEs, enabling them to manage excess inventory more efficiently and to improve coordination within the SC. In this context, digital technologies are becoming increasingly important as they significantly drive and support SC optimization. Particularly in industries with high market volatility, digital solutions help to increase business agility, minimize risks, and enhance resilience to external influences (Bigliardi et al., 2022; Gupta et al., 2021). Building on these findings, this paper examines the role of distributors as drivers of digitalization in inventory management for excess stock among SMEs. The research questions derived for practical application are as follows:

**Research Question One:** What strategic solutions can distributors offer to promote digital innovations in excess inventory management?

**Research Question Two:** How can SMEs implement data-driven solutions by collaborating with distributors?

The answers to these questions aim to identify strategic and collaborative approaches to digitizing excess inventory management in SMEs. For the purposes of this thesis, excess inventory is defined as that portion of stock which exceeds forecasted demand and safety levels and cannot be used immediately. In this context, excess inventory management includes both preventive measures to avoid inventory surpluses and operational strategies to redirect, utilize, or dispose of inventory held in excess.

## 2. STATE OF RESEARCH

### 2.1. The Role of Distributors in Inventory Management

Distributors play a central role as the link between manufacturers and OEMs within the SC. Owing to their market knowledge and intermediary position, they contribute to the efficient management of excess inventory and the reduction of information asymmetries (Brabänder, 2020; Mohamed, 2024). They also support SMEs in adapting to volatile demand conditions and help stabilize inventory planning (Ulmer & Rose, 2025). A study of 54 actors in a French distribution network within the electronics industry identified four key roles of distributors: As integrators, they bundle products and services into comprehensive offerings. In their role as customizers, they adapt these offerings to the specific requirements of end customers. As facilitators, they coordinate cooperation between manufacturers and end customers to optimize value creation. In their role as responsible parties, they strengthen collective commitment and cooperation within the network. These roles extend beyond traditional warehousing and logistics functions and position distributors as key players in network management (Dessaigne & Pardo, 2020). In addition, according to Pathak et al. (2020), distributors are particularly challenged by digital transformation and the shift from CAPEX-based product sales to OPEX-oriented supply chain service offerings. The transition toward data-driven, flexible service models requires the development of new digital solutions, particularly in the area of inventory management. As part of their supply chain services, distributors offer inventory management solutions, among other things (Arrow, n.d.; Electronic Direct, n.d.; Future Electronics, n.d.; Rutronik, n.d.). In this context, a quantitative case study by Ramos et al. (2020) examines a distributor operating in the automotive sector, whose core business model is based on the procurement, storage, and resale of spare parts. The study underscores the importance of tailored inventory management approaches

within distribution networks, aiming to ensure a high level of service and profitability. The proposed model specifically addresses the distributor's role in maintaining stock availability, reducing inventory costs, and optimising replenishment strategies across a single-stage supply chain. Inventory control is understood as a key mechanism for increasing profit margins without expanding resource usage, with the distributor functioning as a central operational node in the distribution process.

These findings correspond with the broader understanding of inventory management, which encompasses both the operational control of purchasing, storage, dispensing, and inventory monitoring, as well as strategic planning across the entire network of cooperating actors—from the source of supply to the end customer. While operational control aims to efficiently manage inventory levels, quantities, and procurement timing to reduce costs and improve a company's liquidity (Zhang, 2024), the overarching goal of inventory management in the supply chain is to optimize customer service, product availability, and cost efficiency across the entire value creation network (Sbai et al., 2022).

Building on their role as a link and solution provider in the SC, distributors leverage digital technologies to enable data-based decision support, thereby creating key prerequisites for efficient, transparent, and responsive inventory management.

## 2.2. Data-Driven Processes and Real-Time Integration in Inventory Management

Data-driven technologies such as enterprise resource planning (ERP) systems, the Internet of Things (IoT), and cloud-based platforms promote transparency within the SC, increase stakeholder connectivity, and thereby strengthen the responsiveness and resilience of SMEs in inventory management (Khan et al., 2023). Intelligent warehouse technologies, including IoT, radio frequency identification (RFID), and cloud-based systems, further enhance the precision and speed of inventory processes (Khan et al., 2022). Robust, data-driven decision-making models also provide significant cost advantages in contexts marked by volatile prices and limited information availability (Xiong et al., 2022). Moreover, data-driven methods—particularly big data in combination with decision support systems—have proven essential for the systematic evaluation of complex challenges in SCM. Del Giudice et al. (2021) emphasize the strategic relevance of data-based decision-making in the context of circular SCs, showing that big data significantly enhances the effectiveness of sustainable supply chain practices. Chien et al. (2020) take a different approach by analyzing the use of deep reinforcement learning (DRL) in inventory management. Their simulation study demonstrates that DRL reduces inventory management costs by 28% compared to traditional forecasting methods by avoiding shortage costs and optimizing inventory control.

Further empirical evidence of data-driven applications is provided by Gong and Hui (2024), who show that intelligent inventory management solutions improve efficiency and accuracy while reducing errors through automation and real-time data processing. Their findings underscore the role of data-based systems in supporting optimized decision-making. Natarajan (2024) further illustrates that ERP and integrated business planning (IBP) systems enable measurable efficiency gains through data-driven real-time capabilities. Standardized data models in cloud-based planning environments improve forecast accuracy, reduce response times, and contribute to optimized inventory levels. Additional empirical support for the effectiveness of digital systems in inventory management is presented by Tseng et al. (2021), who examine key digital performance drivers within a structural equation model. Their results show that real-time inventory data and digital platform solutions significantly enhance transparency and efficiency in supply chain processes. The analysis confirms that data-driven mechanisms play a central role in operational performance. These findings underscore the importance of digital technologies in enabling more resilient and agile inventory management. This

potential is further confirmed by [Basheer et al. \(2024\)](#), whose simulated case study demonstrates that a blockchain-based material management system, grounded in the economic order quantity (EOQ) model, reduces order frequency while maintaining constant demand levels and simultaneously improves transparency, coordination, and decision-making quality in procurement. While [Basheer et al. \(2024\)](#) primarily highlight operational improvements resulting from technological integration, [Chuang et al. \(2021\)](#) provide field-based evidence through a case study of a data-driven forecasting framework for optimizing distributor inventory management. The model, which combines ensemble learning, theory-driven feature selection, and ERP-integrated real-time data, achieved a median forecast error reduction of 62.7% on average compared to a traditional 8-week moving average method. This improvement was observed across ten rolling forecast periods, with error reductions ranging from 50% to 69% depending on the period. The model's performance was particularly notable for heterogeneous items with long lead times and high demand variability. The study highlights the significant potential of data-driven forecasting methods for the resilient and proactive management of complex distribution processes in digital environments.

Building on this perspective, [Ramos et al. \(2020\)](#) develop a table-based reordering model for inventory optimization under volatile demand conditions in their quantitative case study with a distributor. The implementation of the  $(r, Q)$  strategy – a reorder point method in which a fixed quantity  $Q$  is ordered when inventory falls to a predetermined level  $r$  – in a stochastic simulation environment resulted in a 25% reduction in order shortages and a 22.49% increase in sales, achieved through improved order fulfillment and reduced inventory costs. Based on lean supply chain principles, the study shows that even digital tools with low complexity can contribute to data-driven decision-making in inventory control. In this context, inventory management proves to be not only an operational necessity but also a digital mechanism for improving resilience and service performance in dynamic sales environments.

Despite the demonstrated potential of digital technologies to improve transparency, responsiveness, and forecast accuracy, many SMEs continue to face structural, technological, and cultural barriers to their implementation.

### 2.3. Barriers to Digitalization and Data Integration for SMEs

A quantitative study conducted by [Bollweg et al. \(2019\)](#), involving 223 owner-managed retailers in Germany, identified technological and organizational barriers to the implementation of digital applications. Within the scope of the study, barriers are defined as factors that reduce the intention to use digital applications (intention), hinder the actual use of digital technologies (use), or delay or obstruct the transformation process, even when the technologies are theoretically available. The results indicate significant obstacles in the implementation of digital sales: only 20% of companies report an intention to use such channels, while just 8% actually use them. Similarly low figures are reported for digital marketing: while 38% of respondents report an intention to use such tools, only 21% actually do so. A comparable pattern is observed for digital services—31% of companies intend to use them, while only 25% report actual use. Furthermore, only 35% of respondents report having sufficient resources or feeling external pressure to act. Overall, these figures suggest that digitalization is neither strategically planned nor operationally implemented in most cases—often due to a lack of goal orientation, limited implementation capacity, and a low level of problem awareness.

In another study, [Soluk and Kammerlander \(2021\)](#) analyze central barriers to digital transformation in SMEs based on 127 semi-structured interviews with 15 family-owned industrial firms from Germany, Austria, and Switzerland. They describe the transformation process as a multi-stage

progression encompassing process digitalization, product and service digitalization, and ultimately business model digitalization. Each stage requires specific technological and organizational capabilities but is constrained by a range of structural, cultural, and resource-related barriers. Their qualitative case study demonstrates that the absence of a clearly defined, company-wide digital strategy constitutes a key obstacle. This deficit often leads to uncertainty, lack of prioritization, and weak coordination, ultimately causing digital initiatives to stall. Other commonly cited barriers include outdated IT infrastructures, fragmented data systems, and limited digital competencies. Many SMEs lack internal expertise in selecting, implementing, and operating relevant technologies. Furthermore, there is often considerable organizational resistance to change, particularly among long-serving employees who question the benefits of digital initiatives or fear negative impacts on established workflows. This resistance is frequently reinforced by paternalistic management structures that centralize strategic decision-making and inhibit innovation impulses from within the organization. Finally, financial and personnel constraints also act as structural barriers, making long-term planning and consistent implementation of complex digitalization and data integration projects significantly more difficult.

[Akberdina et al. \(2023\)](#) also provide empirical evidence for structural requirements in successful digital transformation processes. Based on a quantitative survey of 314 SMEs, they demonstrate that digital technologies alone are insufficient to trigger sustainable transformation. Only the coordinated interplay of technical solutions with institutional frameworks, cultural adaptations, and process-oriented reorganization enables the establishment of resilient, data-driven value creation networks aligned with circular digitalization. [Masood and Sonntag \(2020\)](#) arrive at a similar conclusion. Based on a quantitative survey of 271 British SMEs, they identify a lack of financial resources, limited technological knowledge, and the absence of formalized digital strategies as core barriers to the adoption of Industry 4.0 technologies. These technologies are understood as integral components of broader digital transformation processes. While automated robotics, ERP, and material requirements planning (MRP) systems are rated as particularly beneficial by the companies surveyed, they are also associated with a high level of technological complexity. The study also highlights major challenges related to information deficits, training needs, time constraints, and insufficient governmental support.

The empirical findings and conceptual frameworks discussed above form the analytical foundation of this research. Their relevance is further examined through a methodically structured literature analysis within a descriptive methodological framework.

### 3. METHODOLOGY

This study is based on a methodically structured literature analysis of existing research. The focus lies on the strategic role of distributors as drivers of digital innovation in inventory management and on their contribution to the collaborative implementation of data-driven solutions for SMEs in the chip industry. [Bortz and Döring \(2006\)](#) argue that a non-statistical meta-analysis constitutes a suitable methodological framework for generating a systematic and differentiated synthesis of the literature in research fields characterised by thematic breadth and dynamic development.

The literature search is database-driven and conducted using Scopus, IEEE Xplore, ScienceDirect, Google Scholar, SCISPACE, and Semantic Scholar. The procedural documentation serves to ensure the intersubjective comprehensibility of the literature used, both in the context of establishing the theoretical foundations and in the development of solution models. The selection of sources is carried out in three consecutive steps. In the first step, a standardised search strategy is applied

in which topic-specific search terms are combined exclusively using logical operators (AND, OR). Technical operators such as comparison, modification, indexing, or repetition functions are not employed. The search terms used can be assigned to three thematic clusters that reflect the coherent structural logic of the paper.

The first cluster relates to the theoretical foundations and includes central terms such as distributor, supply chain, inventory management, intermediaries, excess inventory, information asymmetry, digital transformation, strategic inventory solutions, and SME.

The second cluster forms the basis for modelling conceptual approaches and – despite partial overlap with Cluster 1 – deliberately reintroduces selected terms. This dual anchoring reflects their relevance both on a theoretical and on an application-oriented level. The repeated inclusion of these central terms contributes to ensuring intersubjective traceability within the subsequent analytical process. Cluster 2 therefore includes, among others, the following terms: collaborative models, SME, technological barriers, data-driven solution, inventory management, distributor, supply chain, strategic inventory solution, digital transformation, intermediaries, information asymmetry, platform ecosystems, knowledge transfer, open-source software, cloud infrastructure, partner networks, cooperation mechanisms, and dynamic capabilities.

The third cluster addresses problem-centred literature relevant to both the theoretical and conceptual parts of the study and includes terms such as COVID-19 pandemic, trade conflicts, geopolitical tensions, supply chain disruptions, demand shocks, inventory volatility, chip shortage, semiconductor shortage, and resilience strategies. These developments offer valuable insights into current challenges in excess inventory management within the chip industry. In the second step, the publication period was restricted to literature from 2020 onwards. Earlier sources were only included if they offered conceptually transferable insights or provided methodological foundations relevant to current challenges. This ensures the integration of long-term geopolitical and technological developments, while maintaining a coherent analytical framework based on established theoretical concepts. In the final step, all sources included in the analysis were subjected to a qualitative evaluation to ensure their relevance in terms of content and methodological robustness. The assessment was based on the criteria for qualitative content analysis formulated by [Mayring \(2015\)](#): thematic coherence, scientific rigor, credibility of the source and the contribution to the respective scientific discipline.

The selected literature sources are systematically synthesised as part of the analysis, with key findings and application-oriented methods extracted and existing limitations taken into account; an overview of the analysed studies is provided in Table 1.

**Table 1.** Overview of selected literature sources

Author(s)	Year	Title	Methodology	Key-Findings
Banerjee	2022	Supplier satisfaction as a mediating effect on delivery and service: A PLS-SEM approach in India during COVID-19 pandemic.	Quantitative survey analysed using PLS-SEM.	Purchasing, coordination, and payment policies improve supplier satisfaction and delivery quality.
Basheer et al.	2024	Blockchain-based decentralised material management system for construction projects.	DSR approach to validate a blockchain-based material management system.	Blockchain improves traceability, transparency, decision-making, and reduces costs and delays.
Bollweg et al.	2019	Drivers and barriers of the digitalization of local owner operated retail outlets.	Quantitative survey analysed using PLS-SEM.	Limited resources and low pressure hinder digitalisation; positive attitude weak driver

Casprini et al.	2017	How family firms execute open innovation strategies: The Loccioni case.	Exploratory case study of a family firm using interviews, documents, and observations.	Family firms overcome knowledge barriers in open innovation through imprinting and fraternization.
Chien et al.	2020	Deep reinforcement learning for selecting demand forecast models to empower Industry 3.5 and an empirical study for a semiconductor component distributor.	Development and validation of a DRL framework for dynamic forecast model selection.	DRL framework improves forecast accuracy and reduces errors compared to ensemble and SVM methods.
Chinnaraj & Antonidoss	2022	A new methodology for secured inventory management by average fitness-based colliding bodies optimization integrated with blockchain under cloud.	Development of a blockchain-based inventory model using AF-CBO in a cloud environment.	The blockchain-AF-CBO model enhances inventory security, traceability, and cost efficiency in a three-echelon supply chain.
Chuang et al.	2021	Cross-item learning for volatile demand forecasting: An intervention with predictive analytics.	Intervention-based study developing a machine learning framework for volatile demand forecasting.	Cross-item machine learning improves forecast accuracy and reduces inventory without compromising service..
Dev et al.	2020	Industry 4.0 and circular economy: Operational excellence for sustainable reverse supply chain performance.	Simulation of sustainable reverse logistics via Industry 4.0 and circular economy.	Industry 4.0 integration enhances economic and environmental outcomes in reverse supply chains.
Gong & Hui	2024	Research on Intelligent Inventory Management System Based on Automation and Real-Time Data Processing.	"Design of automated real-time inventory system.	Improves inventory accuracy, cuts costs, enhances decision-making.
Khan et al.	2023	Digital Platforms and Supply Chain Traceability for Robust Information and Effective Inventory Management: The Mediating Role of Transparency.	Quantitative PLS-SEM analysis based on a survey of Pakistani supply chain professionals.	Digital platforms and traceability enhance transparency, strengthening information robustness and inventory management.
Moeuf et al.	2019	Identification of critical success factors, risks and opportunities of Industry 4.0 in SMEs.	Delphi study and Régnier's abacus to identify risks and success factors for Industry 4.0 in SMEs.	Lack of expertise, short-term focus, and complexity are risks; training, data, and leadership support are success factors.
Pathak et al.	2020	Value co-destruction: Exploring the role of actors' opportunism in the B2B context.	Exploratory case study using interviews, documents, and recordings in an ICT service ecosystem.	Opportunism, disruption, and new business models drive both value co-creation and co-destruction.
Ramos et al.	2020	Inventory management model based on lean supply chain to increase the service level in a distributor of automotive sector.	Case study using a lean-based (r, Q) model for inventory optimization.	The lean-based (r, Q) model reduces costs, improves service levels, and enhances order fulfilment.
Soluk & Kammerlander	2021	Digital transformation in family-owned Mittelstand firms: A dynamic capabilities perspective.	Multiple case study of SMEs using semi-structured interviews.	Digital transformation follows a staged process requiring dynamic capabilities, hindered by organizational barriers.

Source: Own compilation

The objective is to identify strategic and collaborative solutions for the digitalisation of excess inventory management in the chip industry, specifically for SMEs. This process establishes a sound theoretical foundation within the framework of the research topic. The integration and application of relevant theoretical approaches form the basis for the development of practice-oriented solution models. The synthesis phase constitutes the central analytical step in which the conceptual approaches are compared, empirical findings are evaluated, and both benefits and challenges are interpreted. Furthermore, the effectiveness of theoretical innovations is examined with regard to efficient excess inventory management, particularly in the context of distributor-driven strategies and collaborative implementation models for SMEs. In doing so, the study contributes to addressing existing research gaps and provides answers to the guiding research questions. The

chosen methodological design ensures a robust foundation for deriving practice-relevant strategies and concludes with concrete recommendations aimed at enhancing both economic efficiency and ecological sustainability.

## 4. STRATEGIC APPROACHES FOR DIGITAL EXCESS INVENTORY MANAGEMENT

### 4.1. Data-Driven Inventory Solutions Provided by Distributors

In the wake of digital transformation, distributors are increasingly assuming data-driven control functions within networked supply networks. The transformation described in the study by [Pathak et al. \(2020\)](#) illustrates how the physical supply chain structures of distributors are increasingly being replaced by information-intensive, data-based control processes. Within digital platform ecosystems, distributors must adapt and no longer operate in supplier networks solely to manage inventories, but also to provide credit lines and execute operational tasks as part of service delivery. Against this backdrop, several studies show that distributors actively contribute to the data-driven optimization of inventory and control processes. [Chuang et al. \(2021\)](#) demonstrate in a field-based case study how a distributor in the chip industry can play a decisive role in the implementation of data-driven forecasting solutions. By providing an ensemble-based forecasting model integrated into the ERP system of an electronic manufacturing service (EMS) customer, the distributor supported both the technical implementation and the operational deployment. The model was regularly recalibrated based on dynamic demand data to reflect new item movements in the system. The study shows that distributors can actively embed data-based forecasting methods into operational processes. This enabled the customer to reduce inventory by 5% while maintaining a constant service level, corresponding to an inventory value reduction of approximately three million US dollars. Furthermore, [Chien et al. \(2020\)](#) analyze the use of deep reinforcement learning (DRL) for data-based forecast model selection in the inventory management of a chip distributor. The developed system selects the most suitable forecasting model based on real-time performance indicators, learns continuously, and adapts dynamically to changing demand situations. The quantitative empirical study is based on a simulation-supported comparison of different approaches under real operating conditions. Historical demand trends over a period of 131 weeks served as the data basis. The use of the system led to greater forecast accuracy and more precise control of the distributor's own inventories. In contrast, [Chinnaraj and Antonidoss \(2022\)](#) address, in a model-based simulation study, how distributors can be integrated into a blockchain-based inventory system to enable decentralized and data-secure inventory optimization. As part of a three-stage supply chain model, they store individual optimal solutions in a cloud-based blockchain structure. Hash functions ensure that inventory and cost data are accessible only to the respective distributor, thereby maintaining confidentiality and data sovereignty. The study by [Dev et al. \(2020\)](#) demonstrates an expanded scope of application for digital solutions by developing a simulation-based model for integrating Industry 4.0 technologies into closed-loop industrial supply chains. The modeled system integrates a distributor, a manufacturer, and suppliers of recycled and new materials. Technologies such as cyber-physical systems (CPS), RFID, IoT, and cloud-based ERP systems are used to control material flows, return decisions, and operational response times on a data-driven basis. The simulated scenarios demonstrate that digitally supported return strategies increase transparency, traceability, and efficiency along the entire value chain. The distributor is responsible for distributing the end products and is actively involved in modeling stochastic transport processes. The findings indicate that data-driven control approaches, as understood within the excess inventory management framework applied here, not only contribute to the avoidance and reduction of excess inventory but also place new demands on the technological and organizational collaboration capabilities of SMEs.

## 4.2. Collaborative Models for SMEs to Overcome Technological Barriers

In order to effectively overcome technological hurdles in SMEs, cooperative structures are required that enable knowledge transfer and allow for the sharing of digital resources. The Delphi study by [Moeuf et al. \(2019\)](#) identifies key risk factors that particularly affect SMEs when implementing Industry 4.0 technologies. These include, above all, a lack of expertise, a short-term strategic focus, technological complexity, and employee concerns regarding monitoring and job security. The authors highlight targeted employee training, the systematic use of internal company data, continuous improvement processes, and the simplification of digital technologies as critical success factors. Particular emphasis is placed on the role of management as a driving or inhibiting force in the transformation process. The study shows that cooperation with academic institutions is considered especially effective for knowledge transfer, whereas traditional consulting services without accompanying skill development are viewed critically. Against this backdrop, [Gong and Hui \(2024\)](#) demonstrate that the use of open-source software and cloud-based infrastructure involves comparatively low investment costs. These technologies enable SMEs with limited financial resources, in particular, to enter the realm of data-based digital inventory management and help them overcome typical technological entry barriers. While this approach focuses on technological entry support, [Banerjee \(2022\)](#) emphasizes the importance of organizational cooperation. His study demonstrates that coordinated control mechanisms between SMEs and their suppliers—especially in purchasing, payments, and communication—significantly improve delivery quality during times of crisis. Complementing this, the study by [Soluk and Kammerlander \(2021\)](#) shows that, in light of digitalization barriers faced by SMEs, medium-sized companies are often unable to manage digital transformation processes independently and increasingly rely on the involvement of external partners. Digital business models frequently reach their full potential only within collaborative ecosystems in which technology-oriented actors share digital capabilities, data infrastructures, and platform access. [Soluk and Kammerlander \(2021, p. 6\)](#) further refer to [Casprini et al. \(2017\)](#), who describe imprinting as the shaping of internal routines by external partners, and fraternization as trust-based, informal relationship structures that represent formative mechanisms for building and transferring knowledge in collaboration with business partners. The study by [Chuang et al. \(2021\)](#) illustrates how such collaborative approaches can be practically implemented. It follows an intervention-based, problem-oriented research approach in which a distributor was actively involved in the development and implementation of a forecasting system for operational scheduling processes together with one of its customers. Close collaboration between researchers and company managers resulted in an iterative development process that was both methodologically sound and practice-oriented. Based on this practical example, [Pathak et al. \(2020\)](#) emphasize that, within the context of digital platform ecosystems, strategic alliances between distributors and other supply chain actors are becoming increasingly important to actively support digital transformation. In addition to the distributor-initiated innovation approaches described above, the authors underscore that the shared use of digital infrastructures and inventory management systems increases responsiveness to volatile market demands while reducing the risk of misalignment.

## 5. DISCUSSION

The approaches described above illustrate that the digitization of excess inventory management in SMEs can increasingly be operationalized through control mechanisms and cooperative solution models. This reveals structural, technological, and organizational areas of tension that affect both the effectiveness and feasibility of corresponding measures. These findings must be evaluated in light of the research questions formulated at the outset and reflected upon in terms of their theoretical and practical implications. The studies analyzed underscore the central role of distributors

as strategic actors in digital transformation. As demonstrated by [Chuang et al. \(2021\)](#), distributors are actively involved in the development and integration of data-based forecasting models which, in conjunction with ERP systems, enable significant reductions in inventory levels. In addition, [Khan et al. \(2023\)](#) highlight the importance of traceable real-time data as a foundation for transparent and responsive inventory processes. Overall, the results demonstrate that digital solutions such as ERP integration, cloud-based forecasting methods, and blockchain-based information systems can make a substantial contribution to efficiency gains and inventory optimization ([Basheer et al., 2024](#); [Chuang et al., 2021](#)). This applies to both advanced forecasting frameworks and low-complexity tools: as both complex models ([Chuang et al., 2021](#)) and low-complexity spreadsheet-based approaches ([Ramos et al., 2020](#)) have shown measurable inventory benefits, particularly in volatile demand environments.

Distributors are increasingly acting as innovation partners, not only providing technological resources but also supporting the elimination of structural implementation barriers in SMEs. At the same time, it is becoming evident that technological potential can only be realized in conjunction with organizational transformation processes. [Soluk and Kammerlander \(2021\)](#) identify the absence of digital strategies, outdated IT infrastructures, and low digital maturity as critical barriers that impede implementation and cause strategic misalignments in inventory management. One solution lies in collaborative models between SMEs and distributors. [Gong and Hui \(2024\)](#) and [Chuang et al. \(2021\)](#) show that open architectures, shared data models, and trust-based cooperation support digital implementation. At the same time, [Bollweg et al. \(2019\)](#) make clear that there are significant gaps between the intention to use digital applications and their actual use in many SMEs. This discrepancy points to the need for a strategic realignment of digital initiatives. [Pathak et al. \(2020\)](#) further show that stochastic simulation models provide a basis for the targeted optimization of material flows and return processes, thereby supporting the development of flexible, service-oriented distribution systems.

[Chinnaraj and Antonidoss \(2022\)](#) demonstrate that blockchain-based inventory systems enable decentralized and data-secure inventory optimization, with distributors assuming responsibility for data sovereignty and IT security. In addition, [Chuang et al. \(2021\)](#) illustrate how participatory development processes can contribute to the practical implementation of digital forecasting systems and reduce technical complexity. Overall, the results suggest that effective excess inventory management requires the interplay of technology, organizational learning capability, and strategic cooperation. Distributors can assume a leading role as enablers and coordinators of digital value creation networks.

However, a research gap remains, particularly with regard to the specific conditions under which SMEs can effectively implement digital inventory solutions. Despite the existing technological potential, no empirical studies are currently available that systematically examine the structural prerequisites and cooperation models that support the successful application of digital innovations in excess inventory management. This leads to the following potential future research questions: (1) What structural conditions enable SMEs to successfully implement and apply digital excess inventory management solutions? (2) Which cooperation models between SMEs and distributors sustainably foster the development of digital capabilities and improve the practical feasibility of digital innovations in inventory management? (3) How do different levels of organizational learning capability in SMEs influence the effectiveness of digital solutions in excess inventory management? These questions provide starting points for future research to close existing knowledge gaps and derive practical recommendations for action.

## 6. CONCLUSION

This paper examines the role of distributors as drivers of digitalization in excess inventory management at SMEs in the chip industry. The structured literature analysis enables a systematic identification and evaluation of strategic concepts, technological solutions, and collaborative implementation models. The findings show that distributors act as intermediaries between technological development and application-oriented implementation. Participatory development processes, shared data models, and trust-based cooperation emerge as effective levers for overcoming technological and organizational barriers in SMEs.

Within digital platform ecosystems, distributors assume a strategic role that goes beyond traditional supply chain functions. Their task is to design digital interfaces and provide interoperable services tailored to the needs of SMEs. Effective excess inventory management in the digital context requires the interplay of technological infrastructure, organizational learning capability, and strategic cooperation. Distributors take on a coordinating role and act as key innovation drivers.

Based on these insights, strategic recommendations for implementation can be derived. SMEs should engage in targeted partnerships with digitally competent distributors to develop technological capabilities, lower entry barriers, and enhance the resilience of their inventory management. Distributors, in turn, should expand their role as consulting and collaboration partners by developing modular solutions adapted to the specific requirements of SMEs. Additionally, economic policy measures are needed to promote the integration of digital supply chain management models and systematically eliminate structural barriers.

In conclusion, digital transformation in inventory management is not only a technological challenge but also a cooperative one—with distributors acting as central players in an increasingly networked value creation system. However, technological solutions must not be viewed in isolation. Once people become part of digital value creation processes, they must be recognised as individuals—beyond the binary logic that typically defines digital systems. Only under these conditions can a digital approach be both sustainable and successful.

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# Impact of Cloud Computing on Sustainability of SMEs: A Systematic Literature Review

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Systematic Literature Review  
(SLR)



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permission.

**Abstract:** *The adoption of cloud computing in small and medium-sized enterprises (SMEs) is well known, but its impact on triple bottom line (TBL) has not yet been sufficiently researched.*

*This study fills this gap by analyzing the extent to which the adoption of cloud computing contributes to or detracts from the environmental, economic and social sustainability of SMEs. This question was analyzed by using a systematic literature review (SLR) of peer-reviewed literature from 2015 to 2025 in the SCOPUS and Web of Science databases and was guided by the SALSA framework and PRISMA guidelines. From the initial pool of over two hundred publications, inclusion and exclusion criteria were used to identify papers that linked cloud adoption to SME sustainability, resulting in a core group of studies that were used for detailed analysis.*

*The results of the study also include an unbalanced weighting of the TBL pillars. Economic aspects of sustainability dominate the current discussion, while the environmental and social aspects are comparatively undervalued.*

*This SLR provides a basis for understanding the TBL impact of cloud adoption in SMEs. It also emphasizes the importance of additional research questions that focus on the less considered environmental and social dimensions - without losing sight of the economic direction - to ensure a comprehensive pursuit of sustainability in each of the three dimensions.*

## 1. INTRODUCTION

Around 99% of all companies in the EU are small and medium-sized enterprises (SMEs) (European Commission, n.d.). Defined as companies with fewer than 250 employees, SMEs contribute significantly to value creation and employment (OECD, 2022). Therefore, their sustainable orientation is of great importance. Sustainability is often defined as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). It includes ecological, social and economic dimensions, which are collectively referred to as the Triple Bottom Line (TBL) (Elkington, 2004). SMEs often face significant obstacles due to their typically owner-managed structures, informal organizational processes and limited financial and human resources. However, due to their agility and proximity to customers, SMEs can also react flexibly to sustainability trends and introduce innovations more quickly than larger companies (Martins et al., 2022). Technological advancements associated with Industry 4.0 (I4.0), such as cloud computing (Guo et al., 2023), present promising opportunities to support sustainability efforts. Cloud computing provides location-independent and on-demand access via the internet to a shared inventory of customizable IT resources, including computing capacity, storage and software applications, via the Internet (Alshareef, 2023; Attaran, 2017; Mell & Grance, 2011). This is technically enabled through the virtualization of hardware resources, automated provisioning processes, and service-oriented architectures offering models such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) (Botta et al., 2016).

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In recent years, this model has matured into an established technology that gives SMEs in particular access to scalable digital services without high investments.

In the context of increasing sustainability pressures and rapid technological developments, it is important to understand how technologies such as cloud computing can be utilized to promote sustainability goals in SMEs. Although sustainability in SMEs and the adoption of I4.0-technologies have both been extensively studied, there is a lack of systematic analyses that explicitly examine the intersection of cloud computing and the three dimensions of sustainability in the context of SMEs.

This gap emphasizes the need for a systematic literature review that critically assesses the existing research and provides a comprehensive understanding of how cloud computing impacts sustainable business development in SMEs. Accordingly, this study addresses the following research question:

What are the effects of cloud computing adoption on the ecological, economic, and social sustainability of SMEs?

## 2. METHODOLOGY

The purpose of a systematic literature review is to cover a research topic comprehensively and comprehensibly. To achieve objectivity, traceability and reproducibility, methodological standards such as the PRISMA guideline were applied in the study. This ensures that all steps - from the search strategy to the documentation - are reported transparently and completely (Page et al., 2021).

For the research, the databases SCOPUS, Web of Science (WoS) and IEEE Xplore were selected. SCOPUS and WoS are multidisciplinary scientific databases with broad coverage and high data quality (Mongeon & Paul-Hus, 2016), covering technical as well as economic and social science publications, which is essential in the context of cloud computing and sustainability. IEEE Xplore was consulted as this database specializes in engineering and computer science and offers high-quality journals and conference proceedings on cloud computing, Internet of Things (IoT), IT sustainability and digital transformation. The search strategy was designed stringently. Searches were conducted in the fields title, abstract and keywords of the publications. To cover different word endings, truncations (wildcards) were used in SCOPUS and WoS (e.g. \* for word stems). Since IEEE Xplore does not allow the use of wildcards, customized search terms were used there. Due to the small number of search results, no exclusions were made regarding the publication date. Document types such as conference reviews were excluded from the outset as exclusion criteria. Furthermore, only articles in English or German were included. The following three search strings show the combined keyword search for economic, ecological and social sustainability aspects (in each case cloud computing + SME + sustainability dimension), with logical operators and wildcards exactly as applied:

General search terms: (“Cloud Computing” OR “Cloud Technology” OR “Cloud Services” OR “Cloud Adoption” OR “Cloud-Based Systems” OR “Cloud Infrastructure”) AND (“SME\*” OR “small and medium enterprise\*” OR “small business\*” OR “medium-sized enterprise”)

Economic Sustainability: (“economic sustainab\*” OR “cost efficien\*” OR “Cost Reduction” OR “Operational Efficien\*” OR “Business Performance” OR “business model innovation” OR “Financial Sustainab\*” OR “Financial Impact\*” OR “IT Cost Saving\*” OR “Economic Impact” OR “Return on Invest\*” OR “ROI” OR “Market Competitiveness”)

Environmental Sustainability: (“environmental sustainab\*” OR “Energy Efficien\*” OR “Carbon Footprint” OR “Green IT” OR “Sustainable IT” OR “Environmental Impact” OR “Eco-Efficiency” OR “Data Center Energy Consumption” OR “resource efficien\*”)

Social Sustainability: (“Social Sustainab\*” OR “Workforce Productivity” OR “Remote Work” OR “Work-Life Balance” OR “IT Skill Development” OR “Employee Satisfaction” OR “Inclusiv\*” OR “Stakeholder Engagement” OR “Corporate Social Responsibility”)

To ensure a high degree of completeness, replicability and scientific rigor in the methodological approach, the selection of keywords is based on the TBL framework (Elkington, 2004). In addition, relevant studies on cloud technologies and SME sustainability were considered to include common terminology.

### 3. RESEARCH RESULTS

In a first step, the search was carried out in the three selected databases SCOPUS, WoS and IEEE Xplore using the defined search terms. For analysis purposes, the search was carried out once with and once without the specific restriction to SMEs. The results of these searches are documented in Table 1.

**Table 1.** Overall Search Results in SCOPUS, WoS and IEEE Explore

	<b>Economic Sustainability, incl. SMEs</b>	<b>Environmental Sustainability, incl. SMEs</b>	<b>Social Sustainability, incl. SMEs</b>	<b>Total, after removing Duplicates</b>
<b>SCOPUS</b>	95	29	6	126
	Economic Sustainability, excl. SMEs	Environmental Sustainability, excl. SMEs	Social Sustainability, excl. SMEs	Total, after removing Duplicates
	3.751	7.024	146	10.806
<b>WoS</b>	Economic Sustainability, incl. SMEs	Environmental Sustainability, incl. SMEs	Social Sustainability, incl. SMEs	Total, after removing Duplicates
	47	10	4	57
	Economic Sustainability, excl. SMEs	Environmental Sustainability, excl. SMEs	Social Sustainability, excl. SMEs	Total, after removing Duplicates
	1.619	4.006	58	150
<b>IEEE Explore</b>	Economic Sustainability, incl. SMEs	Environmental Sustainability, incl. SMEs	Social Sustainability, incl. SMEs	Total, after removing Duplicates
	104	25	6	136
	Economic Sustainability, excl. SMEs	Environmental Sustainability, excl. SMEs	Social Sustainability, excl. SMEs	Total, after removing Duplicates
	2.795	5.626	210	5.780

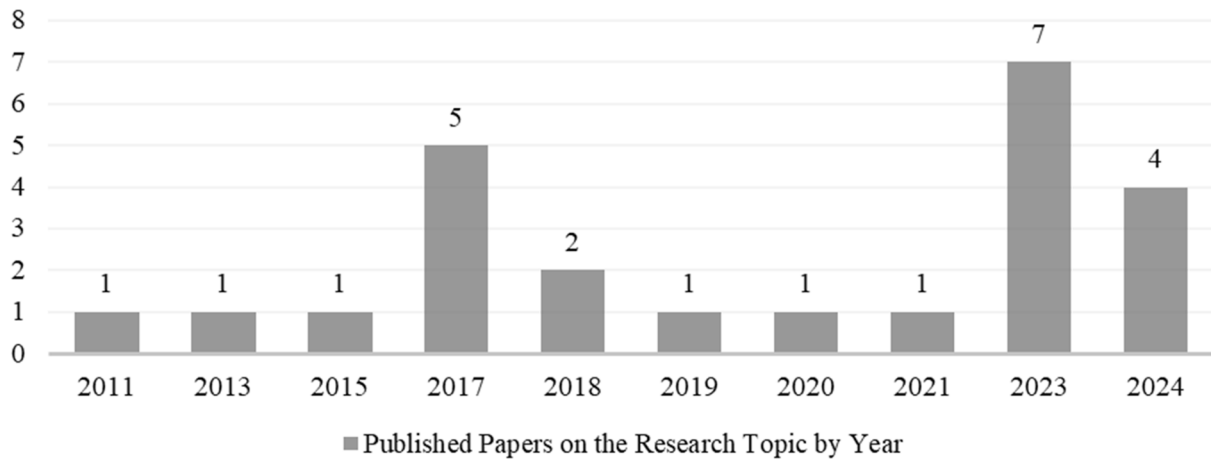
**Source:** Own research

After removing duplicates between the three databases and the sustainability dimensions, a total of 247 studies were identified for all three dimensions of sustainability before the content review. After excluding 128 unavailable documents and removing 78 unsuitable articles as part of the abstract analysis and 17 after a subsequent in-depth content analysis, 24 studies were finally included in the Systematic Literature Review (SLR).

#### 4. ANALYSIS

The relatively low number of the 24 final matching studies, as well as the significantly higher number of identified scientific articles without specific reference to SMEs, as shown in Table 1, suggests that the research question has been underrepresented in the context of SMEs to date.

The distribution of these publications over time shows increasing attention to the topic in recent years and is shown in Figure 1. Between 2011 and 2020, only eleven relevant contributions were published in total, whereas seven studies were published in 2023 and an additional four studies followed in 2024.



**Figure 1.** Published Papers on the Research Topic by Year

**Source:** Own research

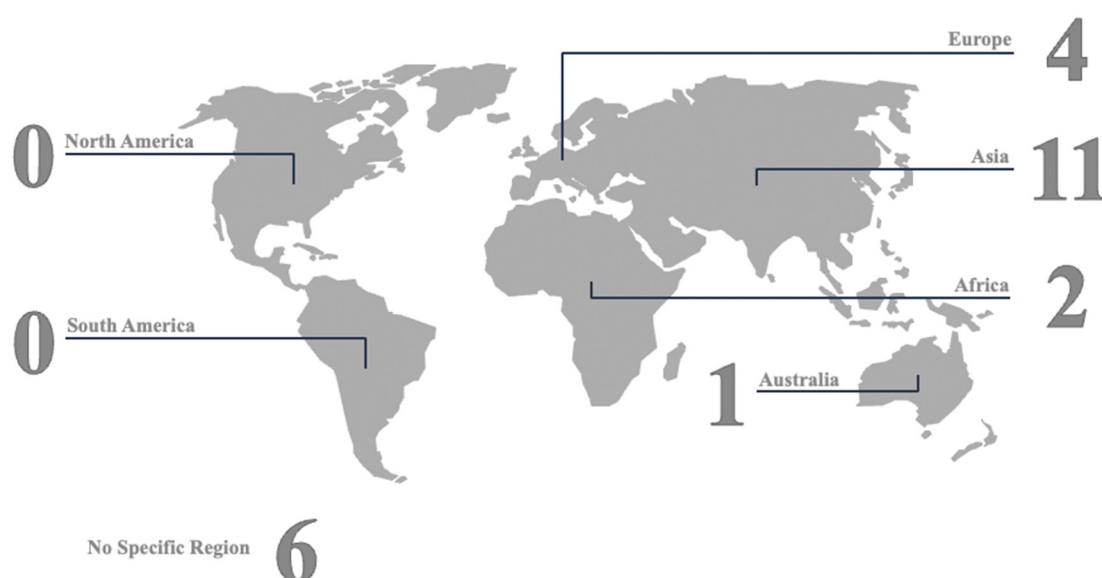
This distribution indicates a growing scientific interest, which has likely been driven by both the increasing spread of cloud technologies and the increased importance of sustainability issues in business contexts.

The publication form of the studies identified comprises 13 conference papers, ten journal articles and one book chapter.

The dominance of conference papers shows that the research landscape in this area is highly topical and dynamic, while the relatively high proportion of journal articles also reflects the increasing scientific anchoring of the topic.

Eleven studies relate to the Asian region, with China, Malaysia and Pakistan being represented several times. Africa is represented by two articles, each from Morocco and Kenya, while Europe is represented by one study from the United Kingdom, one from Latvia, one from Norway and one study on European SMEs in general. One study was identified for Australia. Studies that explicitly refer to North and South America are completely absent. Six of the studies analyzed do not follow a specific regional approach but deal with the topic on a general or global level. The regional distribution illustrates the high relevance of cloud computing for SMEs in emerging and developing countries, while research in North and South America seems to be underrepresented in this context. The distribution of the geographical context of the studies is shown in Figure 2:

The existing literature suggests that cloud computing can have a significant impact on the sustainability of SMEs, particularly regarding the economic dimension. These positive effects on economic sustainability are a central finding of the SLR and are supported by all the studies examined.



**Figure 2.** Regional Distribution of Published Papers on the Research Topic

**Source:** Own research

Several analyzed studies show that the introduction of cloud computing services is associated with a significant reduction in costs, an increase in operational efficiency and an improvement in the competitiveness of SMEs. For example, [Al-Mutawa and Mubarak \(2023\)](#) emphasize that cost reduction, user-friendliness, reliability and the promotion of collaboration in particular are decisive drivers for the sustainable development of SMEs.

[Chen \(2020\)](#) also emphasizes the role of cloud accounting for small and micro enterprises in the context of big data, with a focus on the economic dimension.

The “Function as a Service” (FaaS) model examined by [Fahad et al. \(2023\)](#) also highlights the economic advantages over traditional software development and provision models.

Innovative concepts such as “Everything as a Service” (EaaS), proposed by [JosephNg et al. \(2016\)](#), show how internal resources can be used more efficiently and IT investments optimized through virtualization and grid computing. These approaches make a significant contribution to increasing the flexibility and economic stabilization of SMEs.

Other studies, including the work of [Karagozlu et al. \(2021\)](#) and [Khan et al. \(2011\)](#), also name the economic benefits of cloud-based solutions, whether through cost savings or easier access to business intelligence systems despite limited financial resources.

While many studies primarily address cost-saving effects and productivity increases, [Khanyi et al. \(2024\)](#) also refer to aspects of scalability, risk minimization in the context of cloud-based data networks and APIs.

Regional analyses, such as those by [Khouibiri and Farhaoui \(2023\)](#) on Moroccan SMEs or [Korongo et al. \(2013\)](#) on Kenyan companies, show that cloud computing not only increases local competitiveness but can also provide macroeconomic impetus. In addition to reducing operating costs, increasing efficiency and productivity, increases in turnover, improved competitiveness, and access to new markets are highlighted as key potential benefits.

In China, [Li \(2017\)](#) confirms that the adoption of cloud strategies significantly contributes to cost reduction, improved resource management, and enhanced competitiveness.

Furthermore, the strategic importance of cloud computing for operational agility and scalability is emphasized. Studies such as those by [Odukoya \(2024\)](#) and [Uddin et al. \(2023\)](#) clearly demonstrate that companies that systematically develop their cloud capabilities not only improve their efficiency but also secure their strategic agility and long-term economic sustainability.

Additional sustainability aspects are explored in studies examining hybrid models. [Ogunshile \(2017\)](#) shows that a combination of solar energy and cloud services offers a resource-conserving and cost-efficient alternative for the continuous operation of SMEs.

[Syairudin and Nabila \(2024\)](#) also identify a direct impact on business performance. Based on their findings, the adoption of cloud computing can enhance SME performance, particularly through improved productivity and flexibility.

In further studies, economic sustainability effects emerge as indirect outcomes, as they were not explicitly investigated but merely identified within the context of the overall results.

For example, [Attaran and Woods \(2018\)](#) discuss cloud computing generally as a viable solution for SMEs and confirm that they are adopting this technology to increase their cost and operational efficiency and therefore serve as a competitive advantage, while [Ahmad and Mehmood \(2015\)](#) emphasize the role of cloud technologies as an enabling technology for sustainable enterprise and supply chain systems. [Cunha et al. \(2018\)](#), as well as [Kanimozhi Suguna and Nanda Kumar \(2019\)](#), highlight the combination of cloud computing and IoT as key drivers of sustainable processes in SMEs.

However, these predominantly positive effects on economic sustainability are also accompanied by challenges, which are identified in two studies as barriers.

Research by [Machap et al. \(2023\)](#) examines the obstacles hindering the adoption of IoT and cloud computing technologies within the Malaysian SME sector, finding that limited awareness, cost constraints, and security concerns for the SMEs restrict adoption despite the significant potential for increasing operational efficiency, reducing costs, and expanding market access.

Regional studies, such as that by [Vasiljeva et al. \(2017\)](#) in Latvia, likewise mention the economic benefits associated with the use of cloud computing, but also point to persistent security and privacy concerns as major risks and barriers to adoption.

Only three of the identified studies place a focus on the ecological and social pillars of sustainability as well.

[Al-Sharafi et al. \(2023\)](#) investigate the determinants of cloud computing integration in SMEs and empirically demonstrate that integrating cloud computing services can positively impact not only economic but also ecological and social performance aspects. Examples mentioned in the study are the reduction of energy consumption and the carbon footprint as possible environmental opportunities. Regarding the social dimension of sustainability, the increase in employee satisfaction as well as the increase in public safety was highlighted.

[Pathan et al. \(2017\)](#), alongside economic considerations as the main drivers for cloud adoption among SMEs in Pakistan, indirect ecological benefits such as reduced electricity consumption.

A broader perspective is also provided by the work of Singh et al. (2024), which uses a PEST analysis to examine the effects of cloud computing on various sustainability dimensions and identifies both economic and social benefits, such as cost savings and scalability, as well as job creation and the support of a sustainable future society.

Overall, the literature makes it clear that cloud computing is a key tool for promoting the economic sustainability of SMEs. At the same time, there are regional differences and sector-specific challenges that can influence implementation and the degree of impact.

The study by Vister and David Evans (2017), which examines the role of sustainability in purchasing decisions for cloud services in Norwegian auditing firms, is an important study. Although sustainability was not explicitly mentioned by the respondents as a decision criterion, they reported unintended positive environmental effects, particularly a reduction in paper consumption. This finding could explain and underpin the results of the SLR for the fact that general and economic sustainability benefits of cloud computing for SMEs have primarily been investigated to date, while studies on the ecological or social effects - also in connection with other technologies - have remained comparatively rare.

## 5. FUTURE RESEARCH DIRECTIONS

The studies examined as part of the SLR represent a broad spectrum of research work from different geographical regions, technological focuses, and methodological approaches. Although their respective results are context-specific, they largely complement each other and provide a consistent overall picture. Without exception, the studies confirm the economic benefits of cloud use for SMEs, particularly in the form of cost savings and increased flexibility. In contrast, ecological and social sustainability effects have only been investigated to a limited extent to date. Contradictory findings could not be identified.

Future research should specifically address these existing gaps.

Firstly, the ecological and social sustainability effects of cloud use by SMEs need to be investigated in much greater depth in future studies, as primarily economic benefits have been identified to date. In this context, the question of how cloud computing as a complementary technology can support other technologies such as artificial intelligence (AI) and edge computing in promoting sustainability practices should also be investigated in greater depth, especially regarding the creation of integrated digital ecosystems that address environmental, economic and social sustainability goals in equal measure.

Second, a geographical imbalance is evident, as much of the research to date has focused on emerging and developing countries, while systematic research in industrialized regions is largely lacking. Further studies are needed to clarify whether cultural, infrastructural or regulatory differences influence the sustainability effects of cloud use.

Thirdly, there is a lack of long-term analyses that capture the effects of cloud adoption over longer periods of time. Many of the findings to date are based on cross-sectional data, which means that potential long-term effects and rebound effects, for example, through increased resource utilization, cannot yet be adequately assessed. Long-term empirical studies are therefore necessary to enable a reliable assessment of the actual sustainability effects.

Fourthly, it remains unclear to what extent potential negative effects of cloud use occur. Only two of the 23 studies analyzed explicitly mention such effects. Future studies should therefore also

systematically investigate potential risks and undesirable side effects in economic, ecological and social terms.

In addition, new technological developments offer numerous starting points for further research. The integration of AI-based optimizations in cloud environments opens up new opportunities for increasing efficiency, although the actual ecological and social implications for SMEs are still largely unclear. Similarly, the impact of “green” cloud initiatives, such as the increased use of renewable energy in data centers, on the sustainability performance of SMEs needs to be further researched.

Finally, future studies should systematically investigate the influence of changing regulatory frameworks on cloud adoption, such as emissions requirements and sustainability reporting obligations. Interdisciplinary long-term studies that consider ecological, economic and social dimensions in an integrative manner and take regional and sector-specific characteristics into account appear particularly promising in this regard. A stronger integration of technology and management research could also provide valuable insights into how emergent technologies and organizational practices jointly shape the sustainability balance of SMEs.

## 6. CONCLUSION

This SLR examined the research question: “What are the effects of cloud computing adoption on the ecological, economic, and social sustainability of SMEs?”.

The results show that cloud computing can make a significant contribution, particularly in terms of economic sustainability. Cost savings, increased operational efficiency and improved competitiveness are key positive effects that are confirmed in almost all the analyzed studies. In addition, two studies point to ecological benefits such as reduced energy consumption and resource savings, although these effects have so far been largely indirect and rarely systematically quantified. The social dimension also remains largely under-researched, meaning that there is a considerable need for research in this area.

Overall, this work covers a broad spectrum of relevant literature from 2011 to 2024 and offers a well-founded overview of current findings at the interface of cloud technologies, SMEs and sustainability.

However, the analysis also reveals existing research gaps: An uneven treatment of the three pillars of sustainability, a geographical focus on Asian countries and a lack of longitudinal studies limits the generalizability of the findings to date.

In conclusion, cloud computing is an important tool for promoting sustainable business practices in SMEs, but its full potential is not yet fully exploited or understood. Future studies should therefore capture environmental and social impacts more systematically, consider different regional contexts and analyze long-term developments to provide a more comprehensive picture of the sustainable transformation of SMEs through cloud technologies.

In summary, this analysis underlines the need for long-term, interdisciplinary and geographically diversified research approaches to gain a sound and holistic understanding of the sustainable transformation of SMEs through cloud computing.

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# Distinguishing Genuine SDG Reporting from Greenwashing: A Critical Analysis and Practical Guide for Corporate Sustainability

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ESG;  
Green



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**Abstract:** *The United Nations' Sustainable Development Goals (SDGs) are frequently included in the sustainability reporting of for-profit companies, whether voluntarily or mandatorily. Companies can enhance their reputation in the eyes of all stakeholders and the broad public by engaging in sustainable actions related to the SDGs. However, if they are suspected of greenwashing, their reputation could be seriously damaged, especially if the trust of consumers is lost. The financial performance of such firms could be significantly decreased. This study compares various definitions of greenwashing with the reporting of SDG information and outlines exemplary best and worst practices across different industries. Most SDGs are potentially suitable for all for-profit companies, as all of them can pursue many of these goals. However, there are significant risks of greenwashing. Specifically, SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 13 (Climate Action), SDG 14 (Life Below Water), SDG 15 (Life on Land), SDG 16 (Peace, Justice, and Strong Institutions), and SDG 17 (Partnerships for the Goals) are considered only exceptionally suitable. Unfortunately, many companies attempt to exploit these goals through "green marketing" without making meaningful progress in the areas of action they claim. Furthermore, SDG 16 is deemed unsuitable for ESG (Environmental, Social, and Governance) reporting by for-profit companies because supporting peace, justice, and strong institutions is primarily seen as the responsibility of governments or non-profit sectors. Corporate claims, even though commonly cited to show the strength of their governance structures and policies, can be viewed with skepticism. To offer hands-on guidance, our study highlights best practices and instances of greenwashing related to all 17 SDGs. To be on the safe side, companies generally need to focus on how their core business practices positively and visibly impact a few specific SDGs without overemphasizing the role of ancillary projects. By doing so, they can reduce the risk of being accused of greenwashing and make a genuine, positive impact on our lives on this planet.*

## 1. INTRODUCTION

Greenwashing attempts have become increasingly common in recent years, as highlighted by news involving companies like British Petroleum, Lufthansa, and Volkswagen (Aichner et al., 2021; Lane & Maznewski, 2019; Resch, 2024). With the implementation of the United Nations' Sustainable Development Goals (SDGs) and the rising importance of social and environmental issues, all stakeholders, including consumers, are changing their behavior. Nowadays, stakeholders are looking to invest in eco-friendly companies or projects, while consumers prefer to purchase environmentally friendly products over traditional ones. Additionally, investors are becoming wary of dealing with companies that engage in deceptive green practices. For instance, banks are now charging higher interest rates on loans for non-green firms (e.g., Horobet et al., 2024). Increasingly,

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both consumers and investors are shunning companies they perceive as misrepresenting their social and environmental efforts. This trend prompted the European Union to implement the Green Claims Directive (GCD) in March 2023, which aims to restrict manipulation and prevent a breach of trust among stakeholders, as well as protect the reputations of the companies involved.

Given this context, our study raises the critical question: Which SDGs can companies genuinely report on? Additionally, which SDGs could be considered indicative of greenwashing? To safeguard the interests of all stakeholders, this study proposes an “SDG Suitability Classification” developed based on company reports and case studies, contributing to the existing literature on the subject (e.g., [Costa et al., 2025](#); [Dangelico et al., 2017](#); [Deloitte, 2021](#); [Kassinis & Panayiotou, 2018](#); [Kraft et al., 2024](#); [Ruggeri et al., 2025](#); [Siano et al., 2017](#); [Visual GPS, 2019](#)). While many firms reference multiple SDGs to demonstrate commitment, only a few align their core business models and outcomes with these goals in a verifiable way. Transparent companies cite a selected number of relevant SDGs (9, 12, and 13), whereas those engaging in purpose-washing often list many SDGs without metrics or accountability. The “SDG Suitability Classification” is a guideline to differentiate credible sustainability strategies from greenwashing. In order to mitigate greenwashing risks, companies should focus on how their core practices positively impact SDGs 3 to 12 and relate exceptionally to SDGs 13, 14, 15, 17, 1, and 2, rather than emphasizing the impact of ancillary projects on almost all SDGs.

In the following section, Section 2 provides the background on relevant definitions and greenwashing-related literature, while Section 3 describes the methodology. The discussion of empirical results follows in section 4, while section 5 concludes the paper.

## 2. BACKGROUND AND LITERATURE REVIEW ON GREENWASHING

### 2.1. Definitions and Recent Literature

Our study investigates which SDG reporting practices align with a firm’s core business and which may indicate greenwashing. Greenwashing is the practice of misleading stakeholders by presenting products, strategies, or operations as more environmentally friendly than they are. While definitions vary, they generally involve exaggerating or fabricating sustainability performance. Key greenwashing definitions include:

- **United Nations (2025):** Misleading the public about a company’s environmental efforts, including false claims on emissions and vague language.
- **World Bank (2023):** In the context of Sustainability-Linked Bonds, greenwashing can weaken the connection between sustainability commitments and financial outcomes.
- **European Union (2024):** Making misleading environmental claims about products and services with proposed criteria to ensure credibility.

The German equivalent of the SEC, **BaFin (2023):** Misrepresentation in product or financial service distribution, where companies fail to provide a clear sustainability profile, potentially misleading investors.

As can be seen, these definitions emphasize the deceptive nature of greenwashing and its impact on consumer trust and environmental initiatives (**BaFin, 2023**). When analyzing corporate behavior, we can identify five types of greenwashing following **Terra Choice (2009):**

- (1) **Obfuscation:** Companies emphasize minor eco-friendly aspects while downplaying harmful practices. For example, claiming a product is recyclable despite its energy-intensive manufacturing process.

- (2) Hidden trade-offs: Sustainable claims lack evidence or certifications, misleading consumers about product sustainability.
- (3) Vague claims: Terms like “eco-friendly” or “natural” are used without clear definitions or proof.
- (4) Irrelevant references: Companies highlight true but unrelated features (e.g., vegan mineral water) or make claims based on carbon offsets rather than actual changes.
- (5) Outright falsehoods: Misleading images or ads suggest environmental benefits that don’t exist, distracting from unethical practices.

Although a standard legal definition of greenwashing is still absent, on March 22, 2023, the European Commission proposed the Green Claims Directive to combat greenwashing and promote credible and verifiable information for consumers. The opposite of greenwashing is green marketing (Dangelico et al., 2017). The snowballing effect of adopting a green lifestyle and promoting SDGs helps companies align their missions and strategies with social and environmental trends. This effect illustrates how individual or community actions can accumulate and lead to broader social changes. Pro-environmental behaviors spread through social networks, influenced by the Social Contagion Theory (Christakis & Fowler, 2013) and the Value-Belief-Norm Theory (Stern et al., 1999). As more individuals adopt green habits, these behaviors become mainstream. Positive examples include (Bollinger & Gillingham, 2012; Laestadius et al., 2016): Energy Use and Efficiency: Households installing solar panels can inspire neighbors. Sustainable Fashion: A shift toward ethical brands encourages market adaptations like Zalando’s “sustainability” filter. Meat Reduction Campaigns like “Meatless Monday” can shift consumption patterns.

Rising global market competition drives the production of high-quality and eco-friendly products. This shift from overconsumption to a green lifestyle alters consumer behavior and increases demand for sustainable offerings, pushing companies to modernize and align with SDG principles. Researchers focusing on greenwashing also formulated definitions and recommendations to regulatory bodies, as greenwashing has been a longstanding concern in sustainability discussions. Greenwashing is generally associated with companies misleading stakeholders about their environmental practices to improve their reputation or hide controversies (e.g., Crilly et al., 2016; Kim & Lyon, 2015). This phenomenon allows firms to gain unearned advantages by overstating their social and environmental impacts, often with little alignment between their claims and actual practices (Wickert et al., 2016). High-profile cases, including British Petroleum and Volkswagen, illustrate the widespread nature of greenwashing across various sectors (Kassinis & Panayiotou, 2018; Siano et al., 2017). Interestingly, companies driven by ESG goals may succumb to stakeholder pressure, leading to greenwashing, especially in more masculine cultures (Esposito et al., 2025). Costa et al. (2025) found that many firms report on SDGs but often do so symbolically, with motivations affecting their authenticity (Nishitani et al., 2025). Research also shows that about 7% of large and mid-cap companies engage in greenwashing, particularly in the energy and materials sectors (Keresztúri et al., 2025). Reliable reporting requires accurate data and methodologies, yet many companies are reluctant to disclose true emissions (Ruggeri et al., 2025). A PwC survey indicates that 87% of investors suspect greenwashing and prefer externally assured reports (PwC, 2022). Stricter regulations are proposed to prevent misleading sustainability claims (e.g., Henao-Rodríguez & Lis-Gutiérrez, 2025). Finally, financial studies reveal that dubious sustainability claims can raise financing costs, highlighting the need for thorough auditing and transparency (e.g., Horobet et al., 2024).

For the aforementioned reasons, our study guides for-profit corporations on how to structure their reporting on the SDGs and highlights which statements and inconsistencies to avoid. We discuss which SDGs can be embraced by all companies without the risk of being accused of greenwashing and identify which SDGs should be avoided in corporate communication.

## 2.2. A Brief Explanation of SDG 1 to SDG 17

The 17 SDGs were adopted by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development. These goals are a universal call to action to end poverty, protect the planet, and ensure that all people worldwide enjoy peace and prosperity. Table 1 presents a brief overview of each SDG (UN SDG Report, 2023):

**Table 1, All 17 SDGs Briefly Explained**

SDG Number/Topic	General Explanation
SDG 1 – No Poverty:	Eradicate poverty in all its forms everywhere.
SDG 2 – Zero Hunger:	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
SDG 3 – Good Health and Well-being:	Ensure healthy lives and promote well-being for all at all ages.
SDG 4 – Quality Education:	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
SDG 5 – Gender Equality:	Achieve gender equality and empower all women and girls.
SDG 6 – Clean Water and Sanitation:	Ensure the availability and sustainable management of water and sanitation for all.
SDG 7 – Affordable and Clean Energy:	Ensure access to affordable, reliable, sustainable, and modern energy for all.
SDG 8 – Decent Work and Economic Growth:	Promote inclusive and sustainable economic growth, full and productive employment, and decent work for all.
SDG 9 – Industry, Innovation, and Infrastructure:	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
SDG 10 – Reduced Inequalities:	Reduce inequality within and among countries.
SDG 11 – Sustainable Cities and Communities:	Make cities and human settlements inclusive, safe, resilient, and sustainable.
SDG 12 – Responsible Consumption and Production:	Ensure sustainable consumption and production patterns.
SDG 13 – Climate Action:	Take urgent action to combat climate change and its impacts.
SDG 14 – Life Below Water:	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
SDG 15 – Life on Land:	Protect, restore, and promote sustainable use of terrestrial ecosystems, manage forests sustainably, combat desertification, halt and reverse land degradation, and halt biodiversity loss.
SDG 16 – Peace, Justice, and Strong Institutions:	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.
SDG 17 – Partnerships for the Goals:	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

**Source:** Authors' interpretation

## 3. DATA AND METHODOLOGY

To identify how likely a company's reference to a specific SDG is genuinely contributing to sustainability or instead used for marketing or reputational purposes (greenwashing), we rely on patterns observable in officially available documents and information, e.g., annual reports and case studies (as partially presented in section 2). Several authors like [Delmas and Burbano \(2011\)](#), [Rodrigues and Baker \(2012\)](#), [Neumann and Forthmann \(2024\)](#), [Wickert et al. \(2016\)](#), [Wiegant et al. \(2024\)](#), and [Abouarab et al. \(2025\)](#) described positive and negative examples for sustainable behavior. More positive examples related to Ben & Jerry's ([Chiou, 2020](#)), Cisco ([Law, 2025](#)), Adidas ([Rankine, 2023](#)), Patagonia ([Alonso, 2023](#)), Microsoft ([BBC, 2020](#)), SAP ([SAP, 2022](#)), Walmart ([WBCSD, 2020](#)), and other firms are discussed by or in [Alonso \(2023\)](#), [Bowman \(2022\)](#), [DSM \(2022\)](#), [Johnson & Johnson Care Community \(2025\)](#), [LexisNexis \(2021\)](#), [Pfizer \(2025\)](#), and [Reichel \(2022\)](#). Table 2 provides a positive example for each SDG in the for-profit context.

**Table 2.** Real-world Examples of Companies that Notably Contribute to the 1-17 SDGs

SDG No.	For-profit Companies' Context
SDG 1	<b>Danone</b> co-created <b>Grameen Danone Foods</b> in Bangladesh – a social business venture that produces and sells affordable, nutrient-rich yogurt (Shokti+) to combat child malnutrition. The project also creates jobs by employing local women as sales agents (called “Shokti Ladies”), thus generating income for low-income communities.
SDG 2	<b>DSM</b> – The nutrition company DSM partnered with the World Food Programme to fortify foods, reaching tens of millions suffering from malnutrition.
SDG 3	<b>Johnson &amp; Johnson</b> – Works with partners to support frontline health workers in the world’s poorest regions, strengthening healthcare systems and promoting well-being.
SDG 4	<b>Cisco</b> – Through its Networking Academy, Cisco has trained over 20 million learners in IT skills worldwide, aligning its talent pipeline development with SDG 4.
SDG 5	<b>SAP</b> is committed to reaching gender parity in leadership roles by 2030 and has already achieved 100% pay equity in several key markets. It has transparent gender KPIs, mandatory bias training, sponsorship programs for women, and external partnerships to support women in tech.
SDG 6	<b>Procter &amp; Gamble</b> – P&G’s Children’s Safe Drinking Water initiative has provided over 24 billion liters of clean water to communities in need, improving water access on a global scale.
SDG 7	<b>Ørsted</b> transitioned from being one of Europe’s most coal-intensive energy companies to a global leader in offshore wind power. By 2020, it had reduced its coal consumption by 91% and now generates over 90% of its energy from renewable sources like wind and solar (climate-friendly profitability). Ørsted’s transformation directly supports SDG 7 by making large-scale clean energy infrastructure widely available. It also addresses system-level change in the energy sector without relying on problematic technologies like lithium batteries or unsolved recycling chains.
SDG 8	<b>Unilever</b> – Invests in decent livelihoods across its supply chain, e.g. helping 2.58 million small and mid-sized enterprises grow their businesses via digital platforms, which drives inclusive economic growth.
SDG 9	<b>Siemens</b> – The engineering firm Siemens deploys “smart factory” solutions using IoT and AI to automate production, illustrating how innovation in industry improves efficiency and business outcomes while advancing SDG 9.
SDG 10	<b>Ben &amp; Jerry’s</b> actively advocates for social justice, including fair wages, refugee rights, LGBTQ+ inclusion, and racial equity. They support policy change, partner with grassroots organizations, and embed equality in hiring, supplier selection, and community reinvestment.
SDG 11	<b>BYD</b> – Electric vehicle maker BYD has delivered over 70,000 electric buses worldwide, greening cities, public transit, and contributing to more sustainable urban transportation systems.
SDG 12	<b>Patagonia</b> – The outdoor apparel company uses 87% recycled materials in its products and runs repair/reuse programs, proving that responsible production can build brand loyalty and business success.
SDG 13	<b>Microsoft</b> – Committed to becoming <i>carbon negative by 2030</i> and to remove all its historical emissions by 2050. This ambitious climate action pledge goes hand-in-hand with Microsoft’s business strategy to drive innovation in green technologies.
SDG 14	<b>Adidas</b> – In a partnership with Parley for the Oceans since 2015, Adidas turned recycled marine plastic into products, making over 30 million pairs of shoes with ocean plastic by 2023. This showcases a corporate effort to reduce marine pollution, even though it’s not directly profit-driven (beyond brand value).
SDG 15	<b>Walmart</b> – Aims to help protect, manage, or restore at least 50 million acres of land by 2030 through its sustainability initiatives. The world’s largest retailer is investing in regenerative agriculture and conservation, aligning long-term resource security with environmental stewardship.
SDG 16	<b>LexisNexis</b> – Through its Rule of Law initiatives, LexisNexis (a legal information company) contributes to SDG 16 by using its data and tools to increase legal transparency and access to justice. This supports strong institutions, even though it’s driven by corporate citizenship more than revenue.
SDG 17	<b>Pfizer</b> – Pfizer partnered with global health organizations (through the COVAX facility led by WHO, Gavi, CEPI) and logistics companies to deliver COVID-19 vaccines to remote communities. This public-private collaboration exemplifies SDG 17, showing how partnerships enable solutions at scale.

**Source:** Authors’ interpretation

Finally, we classify all SDGs from 1 to 17, aiming to end poverty, protect the planet, and ensure peace and prosperity, into three categories based on analyzing corporate reporting patterns, i.e., comparing best versus worst practices obtained from corporate reports and (case) studies into: Potentially suitable, Exceptionally suitable, Not suitable at all. Here are the three categories of the “SDG Suitability Classification“ explained:

1. Potentially Suitable are these SDGs that companies can cite to credibly and measurably show how they contribute to their business models, products, and operations.
  - Indicators: Strong alignment between SDG and core business activities is visible. Measurable KPIs, verified impact, and transparent methodologies are presented.

- Examples: SDG 12 (Responsible Consumption and Production): A circular economy firm reducing resource use. SDG 13 (Climate Action): A company is disclosing and reducing Scope 1–3 CO<sub>2</sub> emissions.
2. Exceptionally Suitable are these SDGs, which are frequently cited in corporate sustainability materials, but lack meaningful, measurable, or direct contribution to the sustainability progress of a company. This makes them highly prone to greenwashing claims.
    - Indicators: Vague claims are made, e.g. “we support gender equality” without showing structural actions. Symbolic actions are taken rather than systemic changes implemented.
    - Examples: SDG 5 (Gender Equality): A firm promoting “Diversity Days” while having no women in leadership positions. SDG 10 (Reduced Inequalities): A luxury brand claiming inclusivity while sourcing under poor labor conditions.
  3. Not Suitable At All are SDGs that are typically not fulfillable by for-profit companies without significant distortion. Claims here are almost always purpose- or greenwashing.
    - Indicators: No direct business link is observable. Social goals lie far beyond corporate influence or control.
    - Examples: SDG 1 (No Poverty): A tech firm claims to be fighting global poverty by offering premium software. SDG 16 (Peace, Justice and Strong Institutions): A logistics firm linking customs compliance to peace-building.

The “SDG Suitability Classification” will help stakeholders to spot hollow sustainability claims. Regulators and investors can focus on material SDG contributions, while companies may improve their ESG credibility and avoid reputational risks or severe greenwashing claims.

#### 4. RESULTS

After studying the greenwashing definitions from the United Nations, EU, BaFin, and other organizations in section 2, it becomes clear that for most companies, pursuing a credible sustainability strategy is becoming a must. However, this requires clear criteria to prevent greenwashing through a clear interpretation of sustainable actions. In our study, we offer a “SDG Suitability Classification” where all SDGs can be classified on individual corporate level either as potentially suitable (= no greenwashing claim is assumed in standard), exceptionally suitable (= first association is a greenwashing attempt as often claimed without meaningful, measurable, or direct contribution) or not suitable at all (= cannot seriously be fulfilled by for-profit companies and is oftentimes greenwashing).

“Potentially Suitable SDGs” presented in Table 3 are those where businesses can credibly demonstrate measurable impact aligned with their core operations, avoiding the pitfalls of symbolic or vague sustainability claims. Companies like Novo Nordisk contribute to SDG 3 with diabetes treatment and prevention efforts to defeat diabetes (Novo Nordisk, 2025), Siemens to SDG 11 through smart infrastructure and innovation, Salesforce to SDG 5 with their equal pay initiative (Salesforce, 2023), Fairphone with their world’s most ethical and sustainable phone (Yourcoop, 2023) and the GIZ with achieving inclusive and environmentally sound industrialisation and developing quality, sustainable and resilient infrastructure to SDG 9 (GIZ, 2025) and IKEA to SDG 12 (Cosmo & Yang, 2017) by promoting circular product design. More positive examples related to Cisco (Law, 2025), Ørsted (Neubert & Tryggestad, 2020), and other firms are discussed by Motz et al. (2025), Heilen (2024), Lyytimäki et al. (2022), Kim and Lyon (2015), and Banomyong and Julagasigorn (2017). All the leaders show that sustainability can be strategically integrated and profit-generating when tied to scalable, verifiable business practices. Their approaches prove that achieving SDGs in the private sector depends not on the quantity of SDGs referenced but on

the quality of alignment with a few and transparency. From these examples, we learn that truly impactful sustainability starts with materiality, authenticity, and long-term transformation efforts, not marketing thinking.

**Table 3.** “Potentially Suitable SDGs” with Positive and Negative “Best Practice” Examples

Potentially Suitable SDGs	Positive Example	Negative Example
<b>SDG 3: Good Health and Well-being</b>	Novo Nordisk (diabetes treatment and prevention efforts)	Soda companies promoting “well-being”
<b>SDG 4: Quality Education</b>	Cisco (free online education)	Social media firms are sponsoring schools while harming youth mental health
<b>SDG 5: Gender Equality</b>	Salesforce (equal pay initiative)	Cosmetic brands using feminist slogans with poor internal equality
<b>SDG 6: Clean Water and Sanitation</b>	Unilever (water access projects)	Oil companies claim to offer clean water support while polluting Waterways
<b>SDG 7: Affordable and Clean Energy</b>	Ørsted (renewable energy transition)	Fossil fuel firms promoting minor renewables efforts
<b>SDG 8: Decent Work and Economic Growth</b>	Fairphone (ethical labor practices)	Gig economy firms claiming to create “entrepreneurs”
<b>SDG 9: Industry, Innovation and Infrastructure</b>	GIZ (generating environmentally sound industrialisation and developing quality, sustainable and resilient infrastructure)	Crypto companies calling themselves “infrastructure builders”
<b>SDG 10: Reduced Inequalities</b>	Ben & Jerry’s (advocacy for racial and economic justice)	Luxury brands are making vague equality claims
<b>SDG 11: Sustainable Cities and Communities</b>	Siemens (smart city solutions)	Real estate developers labeling unaffordable housing “sustainable”
<b>SDG 12: Responsible Consumption and Production</b>	IKEA (circular economy initiatives)	Fast fashion brands are pushing “recycled” lines with overproduction

**Source:** Authors’ own elaboration

**Table 4.** “Exceptionally Suitable SDGs” with Positive and Negative “Best Practice” Examples

Exceptionally Suitable SDGs	Positive Example	Negative Example
<b>SDG 1: No Poverty</b>	Patagonia (fair wages, living wages initiatives)	Fast fashion brands claiming to “end poverty” by creating low-wage jobs
<b>SDG 2: Zero Hunger</b>	Danone (nutrition programs)	Big agriculture corporations claim to fight hunger while promoting monoculture
<b>SDG 13: Climate Action</b>	NextEra Energy (renewable energy expansion)	Airlines promising “carbon neutral flights” via CO <sub>2</sub> offsets
<b>SDG 14: Life Below Water</b>	Patagonia (ocean conservation efforts)	Plastic producers claiming ocean sustainability
<b>SDG 15: Life on Land</b>	The Body Shop (reforestation projects)	Logging companies claiming replanting is “restoring forests”
<b>SDG 17: Partner-ships for the Goals</b>	B Corps like Patagonia (collaborating on SDGs)	Tokenistic coalitions with no real action or transparency

**Source:** Authors’ own elaboration

“Exceptionally Suitable SDGs” presented in Table 4 are those that are often cited in sustainability reports but require extraordinary commitment and systemic change to be fulfilled credibly. Companies like Patagonia, standing for SDG 14 (Life Below Water), and The Body Shop ([Terra Genesis](#),

2023), supporting SDG 15 (Life on Land) activities, demonstrate that meaningful contributions are possible when activism and accountability are built into the business model. NextEra Energy leads with concrete contributions to SDG 13 (Climate Action), proving that private enterprises can scale renewable infrastructure while remaining profitable. Certified B Corps set a benchmark for integrating SDG 17 (Partnerships for the Goals) into governance structures, supply chains, and community impact. Although frequently referenced to demonstrate the strength of governance structures and policies, SDG 16 is generally considered unsuitable for ESG reporting by for-profit companies. Promoting peace, justice, and strong institutions is generally viewed as the role of governments or non-profit organizations.

All these examples show that even the most ambitious SDGs can be achieved – if the business is willing to lead with values, transparency, and long-term social investment. The lesson is clear: addressing “Exceptionally Suitable SDGs” is not about checking boxes. It’s about fundamentally redefining what a business stands for. In sum, if companies take this sustainable path seriously, they don’t just reduce harm – they become forces for structural good in society.

## 5. CONCLUSION

The goal of the study is to guide for-profit corporations on how to structure their SDG reporting and highlight which statements and inconsistencies to avoid. In particular, this study focuses on showing which SDGs can be embraced by all companies without the risk of being accused of greenwashing and identifying which SDGs should be avoided in corporate communication. Applying the developed “SDG Suitability Classification” to firm statements allows everyone to be on the safe side. Companies generally need to focus on how their core business practices positively and visibly impact the SDGs without overemphasizing the role of ancillary projects. Most SDGs, especially those numbered from 3 to 12, are potentially suitable for “green marketing” as many goals can be genuinely pursued by for-profit companies, but greenwashing risks exist. SDGs 1 and 2, 13, 14, 15, 16, and 17 are exceptionally suitable; thus, many firms exploit them for PR activities without making real progress (= greenwashing), while SDG 16 is almost always not suitable for for-profit companies.

Our “SDG Suitability Classification” guides how firms can reduce their risk of being accused of greenwashing. The classification of SDGs into potentially suitable, exceptionally suitable, and generally not suitable at all for for-profit companies serves as a powerful tool to differentiate credible sustainability strategies from greenwashing tactics. While many companies reference too many SDGs to showcase commitment, only a few align their core business models, value chains, and measurable outcomes with these goals in a verifiable way. Through this lens, communication patterns can be recognized: Firms with material alignment and transparency tend to cite a focused set of relevant SDGs (e.g., SDG 9, 12, 13), while those engaging in purpose-washing often list around ten SDGs without metrics, context, or accountability – especially those from the exceptionally suitable or not suitable categories. Future research can further differentiate which corporate misbehaviors should be avoided. The results of our study are relevant to corporate leaders, employees, the broad public, investors, and politicians, and help them spot hollow sustainability labels or severe greenwashing claims.

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# The Development and Challenges of the Life Insurance Market in Albania: Structural Trends and Policy Implications

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**Abstract:** *The Albanian insurance market is underdeveloped, with life insurance comprising only 7.44% of the sector, largely overshadowed by non-life insurance, particularly motor coverage. This study explores the historical development, consumer perceptions, and key factors influencing life insurance engagement in Albania. Through a literature review and quantitative research, data from 843 respondents across 26 cities assess awareness, trust, financial literacy, and demographic influences on life insurance adoption. Findings highlight low consumer awareness, distrust in insurers, and economic barriers as major challenges. Key determinants of life insurance uptake include income, education, risk perception, and financial literacy. To drive market growth, targeted educational initiatives, improved product accessibility, and stronger consumer trust are essential. This research enhances the understanding of life insurance demand in Albania, providing valuable insights for policymakers, insurers, and financial institutions aiming to boost consumer engagement and expand the market.*

## 1. INTRODUCTION

The financial system in Albania is predominated by the banking sector in the share of total assets to gross domestic production (GDP). The Albanian insurance market is underdeveloped and is characterized by its small size, with a significant portion of the market dominated by motor insurance and a limited presence of life insurance products. Currently, 12 insurance companies are operating in the Albanian market, eight of which are focused on the non-life insurance industry. It is worth noting that the majority of these insurers are locally incorporated, with two major Austrian insurance groups holding a significant market share. Furthermore, many insurance companies in Albania are part of larger groups that have multiple insurance entities both within the country and in neighboring regions. Non-life insurance, particularly compulsory motor third-party liability, makes up the majority of gross written premiums, accounting for over 90% of the market. In contrast, life insurance remains underdeveloped, with credit life policies, where a bank serves as the policyholder, being a prominent product in the market. Despite the presence of various insurers, the overall penetration of insurance products in Albania remains low, with premiums as a percentage of GDP standing at only 1.02% in 2021. This figure is significantly lower compared to other European countries, highlighting the potential for further growth and development within the Albanian insurance sector. The insurance market in Albania as in other developing countries is underdeveloped for many reasons, like political, cultural, educational, etc. Regarding the insurance market structure non-life insurance products, occupy 92.56% of the market while life insurance products stand for 7.44% of the market. In this paper, we are focused on the Life insurance sector in Albania and its historical development through the years. The purpose of the study is to identify the perception of individuals and consumers on life insurance products, and the indicators that affect customer behavior and their tendency to engage on life insurance policy.

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## 2. LITERATURE REVIEW

In terms of life insurance in Albania, the literature is very limited, almost concentrated in determining the factors indicating the demand for life insurance products, and the impact that life insurance has on economic growth. On the other hand, there is a large range of literature on this topic for developed, emerging and developing countries. At its first session in 1964, the United Nations Conference on Trade and Development (UNCTAD, 1964) formally acknowledged, “a sound national insurance and reinsurance market is an essential characteristic of economic growth” (p. 55). Major of the studies have concentrated on identifying factors that influence the demand for life insurance. (Tanjung & Cahyanti, 2025). Other studies analyzed the relationship between financial development and the development of the life insurance sector in developing countries. Its results show that life insurance development is significantly related to personal disposable income and the country’s level of financial development (Dawd & Benlagha, 2023; Outreville, 1996). Other studies have found evidence that the development of the insurance sector is related to economic growth (Nasri et al., 2024; Soo, 1996; Ward & Zurbruegg, 2000; Webb et al., 2000). Consumer perceptions and behavioral indicators play a crucial role in shaping the life insurance market. Factors such as customized services, company reputation, service quality, customer convenience, tangible benefits, and customer relationships influence consumer perceptions (Chaudhary & Kaur, 2016). Psychological factors, including coping mechanisms and stressors, also impact attitudes toward insurance products (Pantazi, 2021). In the rural market, socio-demographic and economic variables significantly influence consumer perceptions (Hwang & Greenford, 2005). Behavioral anomalies in insurance can lead to market equilibria that may benefit consumers (Baker & Siegelman, 2014). Perception of life insurance and intention to purchase is influenced by social influence agents, consumer knowledge, and attitude (Bhatia et al., 2021; Lajuni, 2020; Lim et al., 2020). Service quality indirectly affects behavioral outcomes in the life insurance industry (Durvasula et al., 2004). Gender differences in attitudes and perceptions also play a role in insurance decision-making (Stroe & Iliescu, 2013).

Consumer behavior has significantly changed in recent years as a result of changes in the social, economic, and information contexts. Finding pertinent characteristics that can be connected to the perspective of life insurance would be advantageous to both industry participants and policy-makers because perception creation is a difficult process, especially given the intangible nature of financial goods like life insurance (Sang et al., 2020). Understanding the consumer’s perception of insurance is critical to the success of insurance services and the creation of demand for life insurance. Individuals are finding it more difficult to determine the quality and riskiness of life insurance products due to their intangible nature (Sang et al., 2020). According to the findings in Jurkovičová (2016), women are more risk-averse than men. In the case of women, it has also been established that the proclivity to engage in risky behavior decreases with age. In terms of demand behavior, men see insurance as an investment to a greater extent, and they are more likely to cancel or refuse to renew the insurance contract if the insured event does not occur during the insured period. This paper aimed to bring together various non-financial factors that influence the behavior of insurance demand, namely those that neoclassical economics ignores. Neoclassical economic theory assumes that consumers have access to all relevant risk information and can make informed decisions about insurance purchases by weighing the expected benefits and costs of various policies (Jurkovičová, 2016; Sakvarelidze, 2024). In classical economics theory, purchasing insurance is viewed as a rational decision made by consumers attempting to maximize their lifetime utility under wealth and information constraints (Giri, 2018). People who are more financially literate can comprehend the functions and how life insurance operates better, which makes them more likely to have a positive impression or perception of life insurance (Sang et

al., 2020). A significant relationship between perception and behavioral intention toward buying life insurance was found in the study by Sang et al. (2020), providing empirical support for the relationship between perception and the decision-making process in the context of life insurance purchase intention. In the study by Maia et al. (2020), SPSS software was used to perform Cronbach's alpha, exploratory factor analysis, KMO, Bartlett's test, and regression analysis. The results of this study demonstrate that factors such as intention to buy, opinions, financial knowledge, and product accessibility all affect consumers' decisions to purchase life insurance. According to the survey of Lika and Kurti (2014) regarding life insurance in Albania, to ascertain whether they are prepared to pay for the insurance policy, and to ascertain the causes of this low level of development, findings show that the most commonly used forms of policies are mandatory, and the level of knowledge about the importance of life insurance is quite low. A range of economic, demographic, and institutional factors have been identified as determinants of life insurance consumption across countries. Economic indicators such as inflation, income per capita, and banking sector development have been consistently linked to life insurance consumption (Ćurak et al., 2009; Striani, 2023; Webb & Beck, 2003). Based on the findings of Lee et al. (2016), Dragos (2017), and Maia et al. (2020) institutional factors, particularly governance effectiveness, have also been found to play a significant role in insurance consumption. National culture, specifically individualism, has been shown to have a positive effect on life insurance consumption (Chui & Kwok, 2009; Yin et al., 2024). However, the impact of income distribution on life insurance demand varies across countries (Dragos, 2017). Education level and inflation have been found to negatively affect life insurance consumption (Celik, 2017). These findings suggest that a combination of economic, institutional, and cultural factors shapes life insurance consumption patterns.

### 3. METHODOLOGY

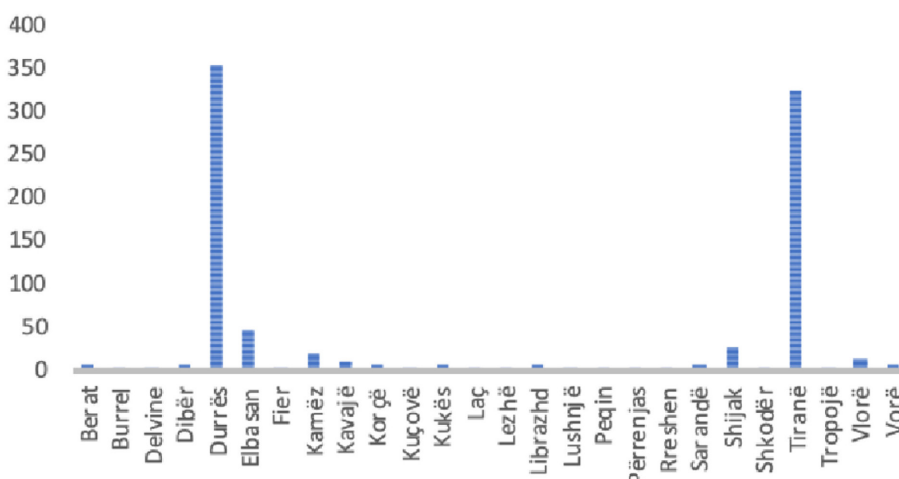
This study aims to analyze consumer perceptions of life insurance products and the factors influencing purchasing decisions. The key objectives include:

Assessing consumer perception, focusing on trust, policy comprehension, and perceived value. Identifying information sources that shape awareness, such as advertisements, word-of-mouth, and educational programs. Examining risk perception, and understanding how life insurance mitigates financial uncertainties. Analyzing decision-making factors, including demographics, psychology, and behavioral biases. Evaluating trust and credibility, exploring how transparency and reputation influence consumer confidence. A quantitative research design was employed, utilizing a structured questionnaire with closed-ended questions. The survey was conducted during 2023-2024 and targeted individuals over 20 years old across 26 cities in Albania. With a 99% confidence level and a 5% margin of error, a sample of 665 respondents was required, while 843 individuals completed the survey. Descriptive statistics and graphical analysis were used to interpret the findings.

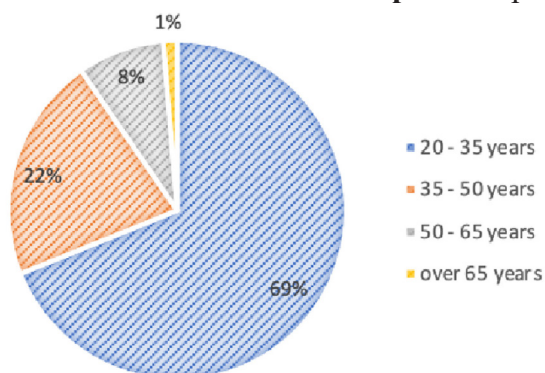
### 4. DATA ANALYSIS

The survey analyzed 843 valid responses from a diverse Albanian population (INSTAT, 2024), focusing on demographics, life insurance awareness, ownership, and behavioral insights. The findings provide a comprehensive understanding of consumer tendencies toward life insurance. The majority of respondents were young adults (20-35 years old), accounting for 69%, followed by 22% in the 35-50 age group and 8% between 50-65 years old. This distribution reflects a strong representation of individuals in their prime working years, who are often at a critical stage for financial decision-making. However, younger respondents demonstrated lower awareness and

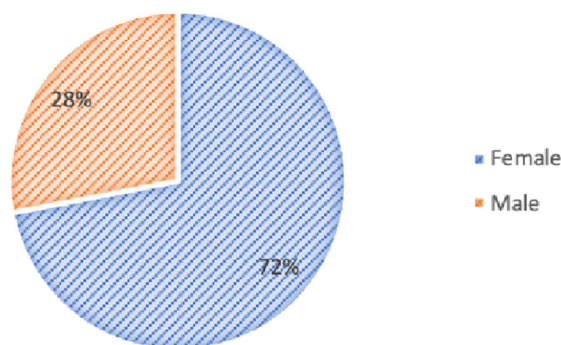
engagement with life insurance, likely prioritizing immediate financial commitments such as education, housing, and loans. Gender representation was skewed toward females (72%), indicating a stronger female presence in the study. This may suggest that women are more inclined toward financial planning discussions or more accessible through the survey method used. Marital status showed that 55% of respondents were married, 44% single, and 1% widowed. Married individuals exhibited a greater awareness of life insurance benefits, likely due to their family and financial responsibilities.



**Graph 1.** Respondents based on cities



**Graph 2.** Respondents based on Age

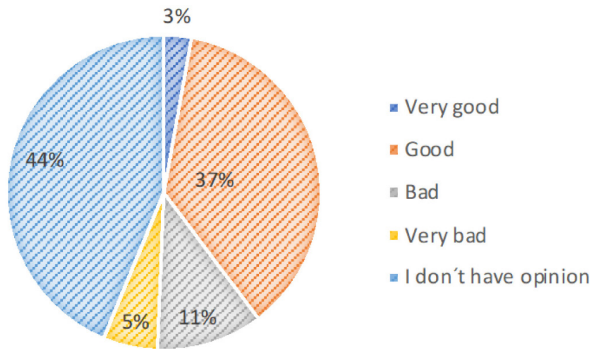


**Graph 3.** Respondents based on Gender

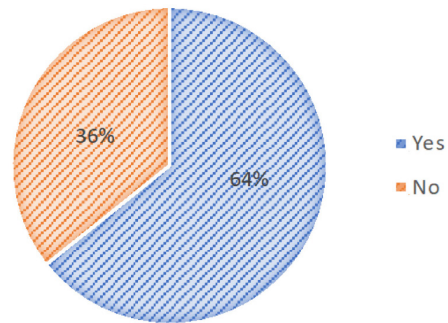
**Source:** Own research

In terms of education, the findings revealed a highly educated sample, with 90% holding a university degree. This suggests that financial literacy is relatively strong among respondents, reinforcing the expectation that higher education correlates with increased awareness of financial products, including life insurance. The study captures responses from across Albania, with the highest representation from Durrës, Tirana, and Elbasan, key economic and educational hubs. Urban respondents likely exhibit greater financial awareness and insurance engagement compared to rural areas. This geographic diversity allows for a deeper analysis of how location influences life insurance perceptions and ownership trends. Additionally, age is a critical factor, as it shapes financial priorities and awareness of insurance products, providing valuable insights into consumer behavior and market gaps. Based on Graph 2, it is obvious that the study sample is predominantly young adults (20-35 years old, 69%), followed by 22% aged 35-50, 8% aged 50-65, and 1% over 65. This age distribution is influenced by online data collection, which is more accessible to younger individuals. Younger respondents may prioritize immediate financial obligations like student loans and housing over life insurance, leading to lower awareness levels. In contrast, older

individuals (35+) with family and mortgage responsibilities show greater awareness and demand for life insurance. Based on Graph 3 gender distribution is skewed toward females (72%), possibly reflecting a stronger inclination toward financial planning discussions. Married individuals (55%) exhibit greater awareness of life insurance benefits as a financial safety net, while single respondents (44%) are more focused on personal financial goals rather than long-term security. The high educational attainment (90% of university graduates) suggests that financial literacy is relatively strong. Higher education often correlates with increased financial awareness, making respondents more likely to recognize the long-term benefits of life insurance. However, despite their education, gaps in awareness remain, emphasizing the need for targeted financial education initiatives to improve engagement across all demographic groups.



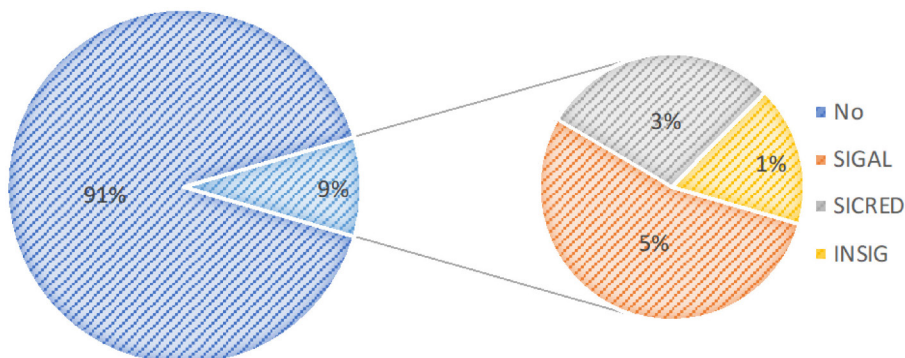
**Graph 4.** The opinion for Life Insurance Companies



**Graph 5.** Information about Life Insurance Products

Source: Own research

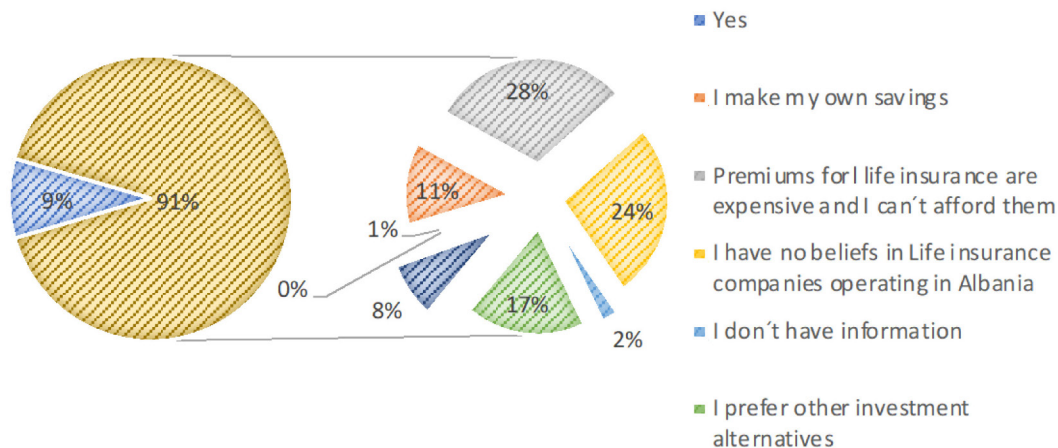
We also based our demographic questions on Personal monthly income, and we may notice that 47% of the respondents have an average income between 40.000 to 60.000 ALL, 29% gain between 60.000 to 150.000 ALL, 20% have a maximum income of 40.000 ALL and only 4% have an income over 150.000 ALL. We also analyzed the savings of our respondents and from the data collected we found out that 1% of them could not save at all, 5% could save 1.000 ALL up to 10.000 ALL, 18 % save over 100.000 ALL, 27% save 30.000 to 100.000 ALL and 49% can save from 10.000 to 30.000 ALL. After analyzing the demographic data, we asked our population about their opinion of Life Insurance Companies (Graph 4) and we found out that 44% of the respondents have a very good opinion related to insurance companies, 37% of them would rate their opinion as good, 11% rate the insurance companies as bad, 5% rate them as very bad, and 3% of the respondents do not have an opinion on the insurance companies.



**Graph 6.** Do you own a life insurance policy? The Life insurance company you are insured

Source: Own research

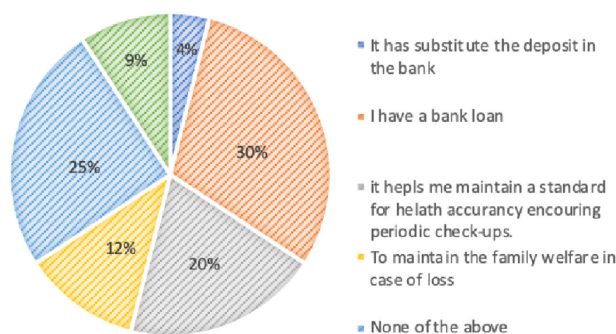
The study reveals low awareness and ownership of life insurance in Albania, with 64% of respondents aware of insurance products, yet 91% lacking coverage (Graph 5 & 6). Key barriers include (Graph 7) insufficient information (36%), lack of trust in insurers (24%), and perceived high costs (17%). Some prefer bank deposits (8%) over life insurance for financial security. The primary motivation for purchasing life insurance is loan requirements imposed by banks, while employer-provided coverage is often misunderstood as life insurance. Awareness campaigns and marketing strategies appear ineffective, highlighting the need for targeted education and affordable, transparent products to encourage greater adoption.



**Graph 7.** Do you own a life insurance policy? Not Insured

Source: Own research

Survey results show significant gaps in insurance information among respondents (Graph 5). While 60% felt well-informed, 20% lacked essential details, and another 20% had partial knowledge but lacked confidence in decision-making. This disparity highlights the need for improved communication strategies by insurers and encourages individuals to actively educate themselves on available policies, risks, and benefits. Clearer information and transparency are crucial, as understanding insurance terms directly impacts financial security and decision-making.

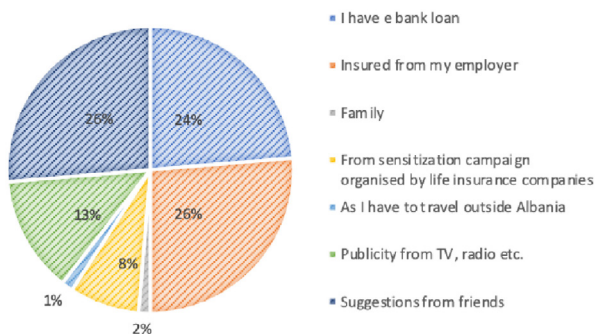


**Graph 8.** Reasons for getting a life insurance policy

Source: Own research

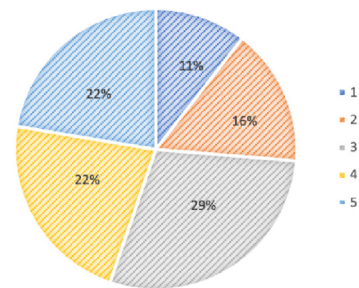
When asked about the reasons for obtaining a life insurance policy (Graph 8) we noticed that life insurance decisions in Albania are driven by financial obligations, health awareness, and family security. 30% of respondents acquired insurance due to bank loan requirements, ensuring loan repayment in case of death. 20% found insurance beneficial for health management, encouraging regular check-ups. 12% prioritized family welfare, emphasizing personal responsibility in financial planning. A small portion (4%) viewed it as a savings alternative, indicating limited understanding

of its broader financial benefits. Additionally, 20% cited diverse reasons, such as investment, tax benefits, or peace of mind, highlighting the multifaceted nature of insurance choices. These findings underscore the need for enhanced financial literacy and targeted educational initiatives to improve life insurance awareness and adoption.



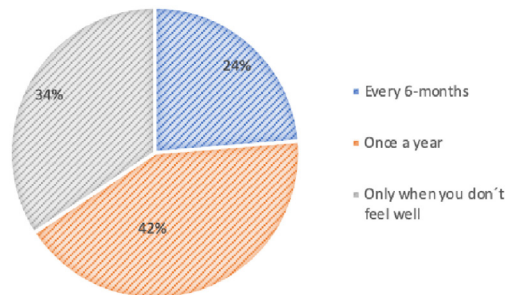
**Graph 9.**

Initiative to get a life insurance policy



**Graph 10.**

Do you have enough information

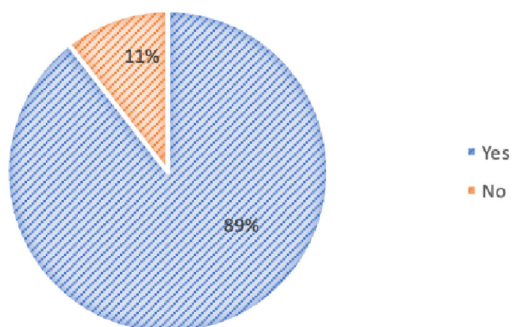


**Graph 11. Periodic check-ups**

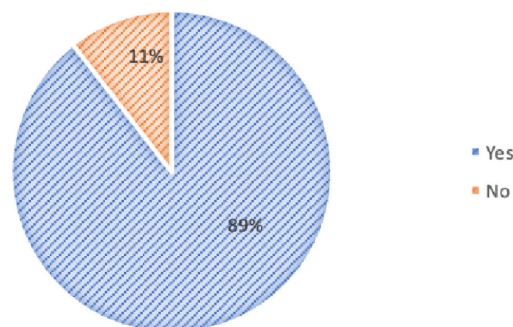
Source: Own research

Our study found that 42% of insured individuals undergo annual health check-ups (Graph 11), while 24% have biannual check-ups, indicating an awareness of preventive healthcare. However, 34% seek medical attention only when unwell, suggesting a reactive approach that could lead to higher long-term healthcare costs and reduce the protective benefits of life insurance. Regular check-ups facilitate early detection of health issues, promoting intervention and reducing future financial burdens. Life insurance can encourage healthier lifestyles, as policyholders may feel responsible for maintaining their well-being for their families' security. The biannual check-up group reflects a balance between proactive and reactive health management, likely due to specific health concerns or lifestyle factors. Overall, these findings highlight the need for greater awareness of preventive healthcare in the insurance context. Insurance providers and healthcare institutions can collaborate to promote regular check-ups, ultimately lowering mortality rates, improving individual health outcomes, and enhancing the perceived value of life insurance. A significant 93% of respondents reported having a family member diagnosed with a terminal illness (Graph 12), underscoring the emotional and financial impact of such experiences. This exposure often prompts individuals to prioritize life insurance as a means of ensuring financial stability for their families. The emphasis on preventive healthcare and comprehensive insurance coverage may increase as individuals witness the toll of terminal illnesses, leading to greater discussions on health screenings and lifestyle modifications. Conversely, 7% of respondents with no direct experience of terminal illness may underestimate the importance of life insurance, highlighting the need for targeted educational campaigns. These findings suggest that personal experiences significantly influence insurance adoption and financial planning behaviors. Addressing the emotional and financial concerns associated with serious illnesses can foster a culture of preparedness, benefiting

both individuals and their families. A strong 89% of respondents intend to renew their life insurance policies (Graph 13), reflecting a commitment to financial security for themselves and their families. This decision is largely driven by an awareness of life insurance as a critical financial planning tool, particularly as individuals progress through major life stages such as marriage and parenthood. Additionally, personal experiences witnessing the benefits of life insurance within their social circles contribute to a cycle of reinforcement, increasing renewal rates. In contrast, 11% of respondents do not plan to renew, citing reasons such as changing financial priorities, shifting family dynamics, and a lack of understanding of long-term financial planning.



**Graph 12.** Any of your family member or relatives is diagnosed with a terminal disease



**Graph 13.** Policy renewal

**Source:** Own research

Some perceive alternative investments as more beneficial, while others may no longer see the necessity of life insurance due to changes in health or financial situations. This disparity in renewal intentions underscores the importance of continuous engagement by insurance providers, including personalized consultations, transparent communication, and targeted educational initiatives. Addressing these concerns can help ensure that policyholders make informed decisions that align with their evolving financial needs. An overwhelming 89% of respondents stated they would recommend life insurance to relatives and friends, signaling growing awareness of its value in Albania. This trend suggests a shift in perceptions towards life insurance as a tool for financial security and peace of mind. Personal experiences and knowledge of life insurance benefits, such as protecting loved ones during unforeseen events, likely contribute to this positive sentiment. Additionally, the willingness to discuss financial planning within social circles may indicate an increasing demand for life insurance products. Further research could explore key drivers behind this trend, including life events or educational initiatives that may have influenced consumer attitudes. This strong endorsement presents an opportunity for insurance companies to leverage word-of-mouth marketing and enhance consumer education efforts in Albania.

## 5. CONCLUSION

The insurance market in Albania as in other developing countries is underdeveloped for many reasons, like political, cultural, educational, etc. Regarding the insurance market structure non-life insurance products, occupy 92.56% of the market while life insurance products stand for 7.44% of the market. In this paper, we are focused on the life insurance sector in Albania and its historical development through the years. Based on this we conducted this study on the Albanian market customers and their opinion on life insurance products. The purpose of the study is to identify the perception of individuals and consumers on life insurance products, and the indicators that affect customer behavior and their tendency to engage on life insurance policy. For this study, we distributed 1000 questionnaires, from which 843 could be taken into consideration by the authors. Through the questionnaires, we

could analyze the demographic data of the respondents and relate them to the respondents' opinions on the insurance policy market. Based on the objectives of this paper and the data analysis we come to the following conclusions: the life insurance market in Albania is underdeveloped. Personal monthly income is very low, 67% of the persons answered that have a monthly income of 0-550\$/month even though 90% of the persons have a university degree. 60% of the persons don't have any opinion or have a bad/very bad opinion of Life Insurance Companies. Only 9% of the persons own a life insurance policy and 50% of them declare that this was compulsory because, either they have a bank loan or they were insured by the employer. 58% of the persons have no belief in Life insurance companies or think that Premiums for Life Insurance are very expensive and can't afford them. 38% of the people prefer other investment alternatives. 65% of the people answered that if they have more information, they will buy a life insurance policy. According to our knowledge, this is the first research that aims to identify the perception of individuals and consumers for life insurance products, and the indicators that affect customer behavior and the tendency they have to get a life insurance policy. This is the first step in further research which could help to understand what factors determine the demand for life insurance products.

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# Managerial Accounting in Non-Profit Organizations: The Role of Quality Assurance Systems

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**Abstract:** *The purpose of this study is to examine how managerial accounting practices differ between non-profit organizations that apply formal quality assurance standards and those that operate without such a framework. Drawing on institutional theory, the study specifically examines whether quality certification serves as an institutional driver for the adoption of more sophisticated managerial accounting systems. Using data from an online survey of 359 Croatian nonprofit associations, the analysis reveals statistically significant differences in the implementation levels of managerial accounting techniques, based on compliance with quality standards. The results show that non-profit organizations that comply with quality standards systematically use more managerial accounting practices than their non-compliant counterparts. This suggests a strong association between quality assurance frameworks and the sophistication of managerial accounting systems in the nonprofit sector.*

## 1. INTRODUCTION

Today, numerous non-profit organizations (NPOs) play a significant role in society. Their unique position—operating outside the market and the state—allows them to connect with citizens, adapt flexibly, and foster private initiatives for public good (Yang et al., 2014). As intermediaries, NPOs help individuals access essential goods and services (Morris, 2000). However, despite their charitable missions, these organizations are not immune to fraud and fund misappropriation (Arshad et al., 2015). High-profile scandals have eroded public trust, prompting growing demands for transparency and accountability. In response, many NPOs are working to meet external expectations from donors, regulators, and partners, improving their operational quality to restore confidence.

NPOs also differ fundamentally from for-profit organizations. Their capital sources, operational transactions, revenue structures, financing, and legal treatment are distinct (Anthony, 1995). While for-profits aim to maximize revenue relative to expenses, NPOs face unique pressures: excessive surpluses may signal inefficiency (Rose-Ackerman, 1996), while persistent deficits threaten sustainability. Despite these differences, both sectors share similarities—generating revenue, incurring costs, and requiring effective resource management. Thus, this paper argues that tools developed for for-profit enterprises can be adapted to strengthen NPOs, enhancing their efficiency, accountability, and long-term viability.

Consequently, every non-profit organization requires managerial accounting systems that enable performance monitoring, link internal processes to outcomes, and provide insights to guide strategic decision-making for improved efficiency. While mandatory financial reporting remains essential, its limited scope often fails to capture critical operational details or adequately reflect organizational performance (Clancy & Collins, 1979). Managerial accounting complements rather than replaces mandatory reporting by bridging informational gaps, thereby enhancing planning, control, and evaluation processes.

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As non-profit organizations increasingly adopt external quality standards, managerial accounting becomes essential. It provides leaders with accurate financial data - including cost analyses, revenue tracking, and budgetary information - that support both operational efficiency and compliance with quality requirements. This dual function not only optimizes internal processes but also strengthens external transparency and stakeholder trust.

This study examines the implementation of managerial accounting in non-profit organizations and investigates whether its application differs between organizations that adhere to quality standards and those that do not. Using data from an online survey of 359 Croatian non-profit associations, the Mann-Whitney U test was used to compare these two groups based on managers' responses. The results show significant differences in managerial accounting practices between standard-compliant and non-compliant organizations.

By establishing a connection between quality systems and managerial accounting, this research offers valuable insights into how quality requirements influence accounting practices in the non-profit sector. The study contributes to existing literature by demonstrating the importance of managerial accounting adoption for improving nonprofit operations, accountability, and transparency.

The paper is structured as follows. Section 2 presents the literature review and hypothesis development. Section 3 details the research methodology and data, followed by key findings. The concluding section summarizes the study's implications and final remarks.

## 2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A quality assurance system in non-profit organizations comprises formal rules, procedures, and standards that ensure consistent, transparent, and high-quality service delivery to stakeholders. Unlike for-profit entities, where market mechanisms provide clear performance metrics (Hall & O'Dwyer, 2017), non-profits lack equivalent evaluation frameworks. Their success depends on three key dimensions: maintaining organizational identity and mission, ensuring stakeholder satisfaction, and managing external relations while preserving autonomy (Fowler, 1996). Consequently, non-profits must not only establish appropriate quality standards but also implement them systematically (Čorkalo et al., 2015). Many are adopting quality assurance frameworks (e.g., SOKNO, ISO 9001) to enhance efficiency, transparency, and professionalization.

Despite their non-profit nature, these organizations share several operational similarities with for-profit entities. While they are not profit-driven, non-profits equally require clear mission statements, continuous organizational learning, results-oriented management, and accountability (Drucker, 1989). Their fundamental purpose revolves around fulfilling missions that are essentially linked to available resources (Weikart et al., 2013).

Facing frequent resource constraints, non-profit managers must conduct regular internal assessments to effectively plan and control operations. These analyses typically include evaluating client needs and service demand within target populations, assessing the prevalence of specific social problems, developing programs aligned with organizational goals, managing budget allocation and resource utilization, and measuring program outcomes and effectiveness (Sorensen & Grove, 1977).

Non-profit organizations frequently experience service demand that outpaces available resources. This creates a dual challenge for managers: they must simultaneously allocate limited internal resources while competing for external funding. To make optimal resource decisions that advance

organizational effectiveness and fulfill their mission, non-profit managers require a comprehensive understanding of their programs' full costs (Colby & Rubin, 2005). This growing resource-pressure makes management accounting implementation increasingly critical. Unlike for-profit and public sector entities, non-profit organizations require management accounting systems that account for their unique characteristics - particularly their distinct funding sources, cost structures, mission-driven operations, and service delivery models.

Research on managerial accounting in the non-profit sector remains limited, yet consistently emphasizes the importance of internally generated accounting information for improving efficiency. Holder (1987) demonstrates that non-profit organizations require such information to evaluate program implementation effectiveness and to properly allocate resources between administrative and program activities, ensuring uninterrupted service delivery. Despite sectoral differences, Zietlow (1989) advocates for adapting sophisticated for-profit accounting techniques in non-profits, particularly financial planning and control methods, to maximize benefits given their resource constraints.

Further research reveals specific applications of managerial accounting in non-profit organizations. Kaplan (2001) shows how strategic monitoring systems can bridge the gap between mission and daily operations, while Ip et al. (2003) highlight how activity-based costing enables operational improvements. Pizzini's (2006) work on non-profit hospitals establishes a positive relationship between detailed cost information and financial performance. Chenhall et al. (2010) further argue that managerial accounting enhances resource management, and Ryan and Irvine (2012) demonstrate its role in building public confidence through cost transparency. Such accounting information significantly impacts funding acquisition and strengthens relationships with key stakeholders like donors and government agencies (Conaty & Robbins, 2021; Henderson & Lambert, 2018).

However, Anheier et al. (2013) present an alternative perspective, noting that non-profit stakeholders rarely demand accounting information beyond mandatory reporting requirements. They caution that while improved accounting systems could theoretically provide better information, they may simply increase costs without necessarily enhancing organizational performance.

Existing research and conceptual papers demonstrate that while non-profit organizations require internally-oriented accounting systems to meet their informational needs, such systems have already been shown to enhance performance in both for-profit and public sectors. Building on these findings, this study posits that all non-profit organizations need internal accounting information to: (1) monitor organizational performance and efficiency, (2) align internal processes with outcomes, and (3) generate performance data that informs managerial decisions for improved effectiveness. These requirements become especially critical when implementing quality standards, which demand rigorous reporting, planning, and evaluation processes. Institutional theory (DiMaggio & Powell, 1983) suggests that while organizations may adopt such standards primarily for legitimacy, improved efficiency often emerges as a beneficial secondary outcome.

The basic assumption of this study is that non-profit organizations that adopt a quality assurance system will demonstrate greater reliance on management accounting to satisfy quality requirements, a relationship formally hypothesized as:

*H1. There is a significant difference in the level of managerial accounting application between non-profit organizations that implement a quality assurance system and those that do not implement a quality assurance system.*

### 3. RESEARCH METHODOLOGY AND SAMPLE

This empirical study employed a cross-sectional research design utilizing quantitative data collection through a mail questionnaire survey. The target population consisted of larger non-profit organizations (associations) in Croatia meeting two key selection criteria: (1) implementation of double-entry bookkeeping systems, and (2) engagement of more than ten employees/volunteers. From the Register of Non-Profit Organizations in Croatia, 1,000 associations fulfilling these criteria were selected as the survey population. The sampling approach, where the survey population closely reflects the target population, enhances the validity of investigating management accounting practice variations (Burkert & Lueg, 2013; Kennedy & Fiss, 2009).

The structured questionnaire incorporated three main parts. The first part focused on management accounting practices, adapting instruments from King et al. (2010) and Perica (2021) while modifying them for the non-profit context. This included adding NPO-specific techniques, such as monitoring the added value of volunteers. Respondents indicated usage frequency on a 5-point Likert scale (1 = “Not at all” to 5 = “Weekly”) in response to the question: “How systematically does your organization use the following management accounting techniques?” The second part examined quality assurance compliance, asking whether organizations adhered to quality standards. The final part collected general information about respondents and their organizations. The survey was mailed to leaders of non-profit organizations as they were expected to possess comprehensive knowledge about management accounting applications. This approach yielded 359 responses, representing a 36% response rate.

Demographic and professional profiles of survey respondents are presented in Table 1. Age distribution shows that the most respondents are aged 36–55, with fewer younger respondents. Professional experience levels are notably high, with 53.2% possessing over 10 years of work experience. Managerial experience follows a similar pattern, with 31.5% having over 10 years in leadership roles. Only a small percentage are early-career professionals or new to management roles.

**Table 1.** Demographic and Professional Profile of Survey Respondents

Category	Group	Percentage (%)
Age	Under 25	1.7
	25–35	25.1
	36–45	27.9
	46–55	28.1
	55+	17.3
Professional Experience	Less than 1 year	4.7
	2–5 years	16.7
	6–10 years	25.3
	More than 10 years	53.2
Managerial Experience	Less than 1 year	11.7
	2–5 years	31.8
	6–10 years	25.1
	More than 10 years	31.5

**Source:** Own calculations

Table 2 contains general information regarding the revenues of the non-profit organizations surveyed. The distribution of annual revenues shows that most of the non-profit organizations in the sample operate on relatively modest budgets. Almost a third (31.5%) report revenues between 133,000 and 400,000 euros, while 28.7% have annual revenues of less than 66,500 euros. Only

7% of organizations report revenues of more than 1,330,000 euros. In general, 81.3% of the non-profit organizations surveyed have annual revenues of less than 400,000 euros. In terms of funding sources, institutional support dominates. EU funding is the main source of revenues for 35.4% of organizations, followed by funding from ministries (22.6%) and support from local or regional authorities (14.5%). Traditional sources of funding for non-profit organizations are less common. Only 10.9% rely mainly on donations and only 4.5% on membership fees or the sale of products and services.

**Table 2.** Distribution of annual revenues and main funding source among non-profit organizations

Category	Subcategory	Number of NPOs	%	% (Cumulative)
<b>Amount of Annual Revenues (EUR)</b>	up to 66,000	103	28.7	28.7
	66,000 – 133,000	76	21.2	49.9
	133,000 – 400,000	113	31.5	81.3
	400,000 – 1,333,000	42	11.7	93.0
	over 1,333,000	25	7.0	100.0
	<b>Total</b>		<b>359</b>	<b>100.0</b>
<b>Largest Source of Revenues</b>	Donations	39	10.9	10.9
	Membership fees	16	4.5	15.4
	Local/regional self-government units	52	14.5	29.9
	Ministries	81	22.6	52.5
	EU funds	127	35.4	87.9
	Foundation	11	3.1	91.0
	Own products/services sales	16	4.5	95.5
	Other	17	4.5	100.0
	<b>Total</b>		<b>359</b>	<b>100.0</b>

**Source:** Own calculations

Following descriptive analysis, the Mann-Whitney U test was employed to examine differences between two distinct groups: (1) non-profit organizations implementing quality assurance systems and (2) those without such systems. This nonparametric method was selected as the appropriate analytical tool given the ordinal nature of our Likert-scale dependent variables and their confirmed non-normal distributions.

The analysis satisfied all fundamental assumptions of the Mann-Whitney U test. All dependent variables were appropriately measured using ordinal Likert-type scales, while the independent variable consists of two categorical, independent groups (quality assurance systems implementers versus non-implementers). Observations from both groups were completely independent and variables violated normality assumptions.

#### 4. RESEARCH RESULTS

The survey results reveal distinct patterns in the adoption of managerial accounting techniques among non-profit organizations (Table 3).

The findings expose distinct patterns in how systematically non-profits implement various management accounting techniques. Overhead cost monitoring by activity emerges as the most widely adopted practice, with the highest average implementation score (M=4.02), closely followed by

monitoring direct and indirect project cost (M=3.94). Organizations also show relatively strong adoption of monitoring cost by functional classification (by program/project) (M=3.77) and monitoring of costs according to a predetermined plan (M=3.67), along with moderate use of monitoring of costs by funding sources (e.g., by donors) (M=3.68).

However, other techniques show notably lower adoption. Internal monitoring of efficiency indicators (program cost indicator, administrative cost indicator, etc.) is moderately (M=3.46), while cash flow planning lags behind (M=3.08). Internal monitoring of the added value of volunteers demonstrates the lowest implementation level (M=2.66), suggesting this remains a significant gap in managerial accounting practices in non-profit organizations.

**Table 3.** Adoption of managerial accounting techniques among non-profit organizations

Technique	Mean (M)	Standard Deviation (SD)
Overhead cost monitoring by activity	4.02	0.883
Monitoring direct and indirect project costs	3.94	0.864
Monitoring cost by functional classification (program/project)	3.77	0.940
Monitoring of costs by funding sources (e.g., by donors)	3.68	0.977
Monitoring of costs according to a predetermined plan	3.67	1.005
Internal monitoring of efficiency indicators (program cost indicator, administrative cost indicator, etc.).	3.46	1.043
Cash flow planning	3.08	1.085
Accounting activity planning (activity-based budgeting)	2.60	0.891
Internal monitoring of the added value of volunteers (personal growth, recognition, awards, etc.).	2.66	1.089

**Source:** Own calculations

The questionnaire also investigated the extent to which non-profit organizations adhere to quality assurance standards. Analysis of the responses revealed that approximately 45% (163 out of 359) of the surveyed organizations reported compliance with these standards.

Table 4 presents the results of the Mann-Whitney U test, comparing managerial accounting application between non-profit organizations that implement a quality assurance system and those that do not. For each managerial accounting technique, Table 4 presents mean ranks, sum of ranks, Mann-Whitney U and Wilcoxon W statistics, Z-scores, and two-tailed asymptotic significance values (Asymp. Sig.), with statistically significant differences ( $p < 0.01$ ) indicated in bold.

The results indicate that non-profit organizations that implement a quality assurance system show significantly higher mean ranks across all examined management accounting techniques—from cost monitoring (by funding source, activity, and project) to planning (accounting activities, cash flow) and performance tracking (efficiency indicators, volunteer value). This suggests that these organizations are more likely to systematically implement managerial accounting practices compared to non-profit organizations that do not implement a quality assurance system, confirming the hypothesis. The significant p-values (all below 0.01) confirm that these differences are statistically meaningful, highlighting a strong association between quality assurance compliance and the use of managerial accounting techniques in the non-profit sector. This difference can be explained by the fact that organizations following quality standards aim for greater transparency and accountability. Compliance requires better tracking of costs and efficiency, which leads to the use of managerial accounting techniques for improved resource use and decision-making.

**Table 4.** Comparison of Groups Using the Mann-Whitney U Test

Managerial accounting techniques	QA Compliance	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z Score	Asymp. Sig. (2-tailed)
Monitoring of costs by funding sources (e.g., by donors)	No	196	164.53	32,248	12,942	32,248	-3.288	<b>0.001</b>
	Yes	163	198.60	32,372				
Monitoring of costs according to a predetermined plan	No	196	166.06	32,548	13,242	32,548	-2.971	<b>0.003</b>
	Yes	163	196.76	32,072				
Monitoring direct and indirect project costs	No	196	167.85	32,899	13,593	32,899	-2.678	<b>0.007</b>
	Yes	163	194.61	31,721				
Monitoring of costs by functional classification	No	196	166.15	32,565.5	13,259.5	32,565.5	-3.062	<b>0.002</b>
	Yes	163	196.65	32,054.5				
Overhead cost monitoring by activity	No	196	162.40	31,829.5	12,523.5	31,829.5	-3.843	<b>0.000</b>
	Yes	163	201.17	32,790.5				
Accounting activity planning (activity-based budgeting)	No	196	167.30	32,791	13,485	32,791	-2.829	<b>0.005</b>
	Yes	163	195.27	31,829				
Cash flow planning	No	196	159.88	31,336	12,030	31,336	-4.212	<b>0.000</b>
	Yes	163	204.20	33,284				
Internal monitoring of efficiency indicators	No	196	165.20	32,379	13,073	32,379	-3.180	<b>0.001</b>
	Yes	163	197.80	32,241				
Internal monitoring of the added value of volunteers	No	196	165.76	32,488.5	13,182.5	32,488.5	-2.958	<b>0.003</b>
	Yes	163	197.13	32,131.5				

Source: Own calculations

## 5. CONCLUSION

The results presented in the study demonstrate that non-profit organizations compliant with quality assurance standards show significantly higher adoption (all  $p < 0.01$ ) of all managerial accounting techniques analyzed. These findings indicate a strong association between quality assurance implementation and the adoption of advanced managerial accounting practices. Organizations that prioritize quality standards are more likely to employ managerial accounting methods, leading to improved resource management, accountability, and organizational performance. This underscores the role of quality assurance systems as a key driver of professionalization and financial management development in the non-profit sector.

This study highlights the critical link between quality standards and managerial accounting in non-profits, demonstrating how these practices enhance transparency, efficiency, and decision-making. By focusing on an area often overlooked in comparison to for-profit organizations, this research contributes to a deeper understanding of sector-specific accounting practices and their relationship with quality frameworks. This study expands the existing literature on how managerial accounting techniques are utilized by non-profit organizations. First, it provides empirical evidence linking quality management and managerial accounting in non-profits - an understudied area compared to for-profit sectors. Second, the study identifies specific managerial accounting practices in non-profit organizations. Third, the study develops a framework for understanding how quality certification processes drive professionalization. For practitioners, the findings emphasize how integrating quality assurance with managerial accounting can strengthen governance, build stakeholder trust, and optimize resource allocation.

While providing important insights, this study has several limitations, such as a geographical focus on Croatian non-profits, which limits generalizability to other cultural and regulatory contexts. In addition, the study omitted organizational size and funding structure as control variables that may influence managerial accounting practice adoption.

Future research directions should expand on these findings by examining non-profit organizations in other geographical and cultural contexts. Additional studies could explore the influence of organizational size or funding structure on managerial accounting and quality standards adoption rates, and the potential differences between various types of non-profits. Comparative research across sectors could further clarify the unique challenges and opportunities in non-profit organizations.

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# Financial Literacy in Response to Economic Disruption: Trends, Challenges and Future Implications

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## Keywords:

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**Abstract:** *This paper provides a systematic overview of global and Croatian research on financial literacy, supported by a bibliometric analysis of publications in the Scopus database (2001-2024) and visualizations created with VOSviewer software tool. Financial literacy is defined as a multidimensional concept that includes knowledge, skills, attitudes and behaviors and is becoming increasingly important in the context of digitalization and sustainability. The analysis shows the growing academic interest and identifies key thematic clusters and research gaps. National studies in Croatia, based on the OECD methodology, show a gradual improvement in financial literacy from 56% in 2015 to 62% in 2023. While financial knowledge has improved, challenges in financial behavior and digital literacy remain. The findings underscore the need for a comprehensive, lifelong education policy that provides not only knowledge, but also practical and digital skills. This paper offers insights into future research, policy development and educational initiatives aimed at strengthening financial resilience and inclusion.*

## 1. INTRODUCTION

In the context of increasing economic and financial instability and disruption, financial literacy is recognized as an important tool for strengthening the resilience of individuals and households. Defined as a combination of knowledge, skills, attitudes and behaviors necessary to make informed and responsible financial decisions, it plays a critical role in an individual's ability to manage crises and reduce financial risk. Financial literacy is a continuous and lifelong learning process that is most effective when it begins at a young age. The global financial crisis of 2008 further highlighted the damaging consequences of low levels of financial literacy and confirmed the need for systematic financial education and proactive personal financial management. Especially after the financial crisis and in today's complex financial environment, financial literacy has been recognized as a vital and increasingly important personal skill (OECD, 2012; Atkinson & Messy, 2012). The post-crisis experience shows that low levels of financial literacy can have significant negative consequences and additional costs, not only for individuals, but also for society, financial markets and households (OECD, 2012). Over the past decade, the academic and professional community's interest in financial literacy has increased significantly, as evidenced by the growing number of published papers. At the same time, many countries, including the Republic of Croatia, are actively seeking effective measures to improve the financial literacy of their citizens and are developing national financial education strategies that enable continuous knowledge acquisition across all stages of life (Atkinson & Messy, 2012).

The primary aim and purpose of this paper is to provide a systematic review of the main academic research on financial literacy at both global and national levels. Other specific objectives of the paper are to analyze trends in financial literacy research, to systematize and analyze national studies on financial literacy, and to identify the main challenges and guidelines for the further development of financial literacy, both in academic and practical contexts.

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The following sections of the paper begin with an analysis of the theoretical definition of financial literacy, followed by a presentation of the methodological framework for the bibliometric analysis of scientific publications indexed in the Scopus bibliographic and citation database, including the results obtained with the VOSviewer software tool. The fourth chapter provides an overview of the most cited international and national academic papers that have shaped current research approaches in the field of financial literacy. The fifth chapter focuses on the presentation and interpretation of the results of the institutional studies conducted in Croatia. It then discusses the findings and their implications and suggests guidelines for future research, while the conclusion summarizes the main findings and the contribution of the paper to the academic and professional community.

## 2. THE CONCEPT AND RELEVANCE OF FINANCIAL LITERACY

In recent decades, financial literacy has become a key factor in understanding and managing personal finances. Although definitions may vary, most emphasize the importance of knowledge, skills, attitudes and behaviors related to financial decisions. The differences in definitions of financial literacy depend on the research approach and objectives, but a common element in all definitions is the emphasis on the ability to understand and manage financial resources. According to the Organisation for Economic Co-operation and Development (OECD) definition (2022), financial literacy is defined as a combination of awareness, knowledge, skills, attitudes and behaviors necessary to make sound financial decisions and thus achieve individual financial well-being. Atkinson and Messy (2012) further emphasize that financial literacy encompasses the ability to manage financial resources, understand financial risks, and make decisions that support financial security. Lusardi and Mitchell (2014) define financial literacy as the ability to process economic information and make informed decisions regarding financial planning, asset accumulation, retirement and borrowing. The authors emphasize that financial literacy is not only about knowing basic financial concepts such as interest rates, inflation and risk diversification, but also about applying this knowledge to everyday financial decisions such as saving, investing and debt management. According to Fernandes et al. (2014), financial literacy refers to the extent to which an individual understands basic financial concepts and has the skills and confidence necessary to effectively manage personal finances, make sound short-term decisions and plan for the long term, considering life circumstances and changes in the economic environment. Xu and Zia (2012) emphasize that financial literacy encompasses not only the level of knowledge but also the ability to apply this knowledge in managing personal finances and making financial decisions, which helps to reduce information asymmetries and increase economic inclusion. Lučić et al. (2023) emphasize that financial literacy consists of financial knowledge and skills, including the understanding of financial concepts, products and services, as well as the ability to apply this knowledge and skills in the use of financial goods and services. In the Croatian context, according to the National Strategic Framework for Improving Consumer Financial Literacy in the Republic of Croatia (Ministry of Finance of the Republic of Croatia, 2021), financial literacy is defined as a set of knowledge and skills necessary to understand basic financial concepts and products, as well as the ability to use this knowledge to make informed decisions about personal finances.

The importance of financial literacy is evident on several levels (OECD, 2012; Xu & Zia, 2012; Lusardi, 2019). At the individual level, higher financial knowledge is associated with higher income, higher levels of education, better personal financial management, better savings and investment planning and responsible borrowing. At the household level, financial literacy contributes to greater financial security, crisis resilience and better retirement planning. At a societal level, greater financial literacy reduces the risk of systemic financial crises and contributes to the stability of the financial system and thus to the overall stability of the economy. It is particularly important to emphasize that the concept of financial literacy has evolved considerably over time.

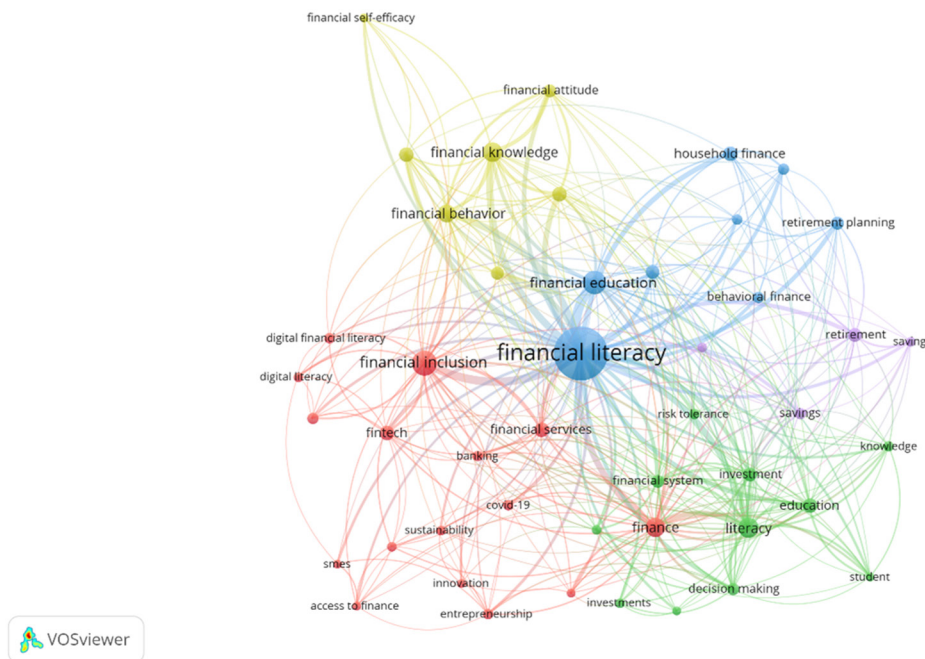
The **OECD (2023)** has introduced the concept of digital financial literacy, which encompasses the ability to use digital financial services safely and effectively in everyday life. Financial literacy is becoming an increasingly complex and dynamic concept that is essential for personal and economic prosperity in today's global and digital environment.

### **3. METHODOLOGICAL FRAMEWORK AND BIBLIOMETRIC FINDINGS**

For this study, a bibliometric analysis of scientific publications on financial literacy was conducted using the Scopus database. The search covered the period from 2001 to 2024, with the aim of capturing comprehensive and relevant literature. The first step was to search for the term “finance”, within which the term “financial literacy” was further filtered to determine the proportion of publications dealing with financial literacy in the total scientific output in the field of finance. A separate search was then conducted for the term “financial literacy” to obtain a broader overview of the entire academic output, irrespective of the thematic classification. The search was conducted by title, abstract and keywords and included all document types, with scientific articles (articles) being the dominant category (over 90%). The analysis was limited to English-language publications in the fields of economics, econometrics and finance as well as economics, management and accounting. The chosen time frame is based on the fact that the first publications explicitly dealing with financial literacy appeared in the Scopus database in 2001, while the year 2025 has not yet been completed. A total of 3,627 academic papers were identified that met the specified criteria. The resulting dataset served as the basis for bibliometric analysis, which was carried out using the software tool VOSviewer, which enables the visualization and interpretation of important research trends, thematic clusters and, based on the number of citations, influential authors in the field under investigation.

A comprehensive analysis of the scientific literature based on the previously defined search criteria in the Scopus database identified a total of 67,866 scientific publications (April 2025) in an initial search using the term “finance”. Within this corpus, 3,035 papers (4.47%) deal explicitly with the topic of financial literacy. Although this represents a relatively small proportion of total finance-related publications, the data show a growing academic interest in this topic, particularly following the global financial crisis of 2008, which has undoubtedly reinforced the need to improve financial literacy. Financial literacy is thus becoming an increasingly important interdisciplinary area of research, particularly in relation to consumer behavior, retirement planning, personal financial management and financial inclusion. In order to obtain a broader overview of the scientific output directly related to this topic, a separate search for the term “financial literacy” was conducted using the same search criteria as the previous query. This search yielded a total of 3,627 academic publications with a total of 7,640 keywords, confirming the presence of this topic in academic literature and its growing theoretical and practical importance. The discrepancy in the number of papers found is due to the different search areas - the search for financial literacy within the thematic area of finance only includes papers relating to this area, while the broader search also encompasses publications from other areas that also deal with financial literacy.

The bibliometric analysis (Figure 1), conducted with the VOSviewer software, shows that financial literacy is a multidimensional concept that appears in a variety of contexts in academic literature. The central concept of financial literacy is strongly associated with topics such as financial education, personal finance, financial knowledge, financial behavior and financial inclusion (keywords not relevant to the research topic were excluded from the visualization). The identified clusters reflect the different perspectives from which the researchers approach the topic, confirming its interdisciplinary nature and practical relevance. The visualization of the thematic clusters enables a clearer understanding of the prevailing research topics and current challenges in the field of financial literacy.



**Figure 1.** Bibliometric map of key concepts in financial literacy research  
**Source:** Own processing (VOSviewer)

The blue cluster (financial education, household finance, retirement planning, retirement, behavioral finance) includes terms related to financial literacy, education and behavior in relation to households and retirement planning and highlights the link between financial literacy and personal financial planning. The focus is on the impact of financial literacy on individual financial decisions and preparation for retirement. Financial education is an important subtopic, indicating its central role in this area. The yellow cluster (financial knowledge, financial behavior, financial attitude, financial self-efficacy) covers the psychological and social aspects of financial literacy and focuses on how knowledge, behavior, attitudes and perceptions about money influence individual financial behavior. The red cluster (financial inclusion, fintech, digital literacy, digital financial literacy, banking, financial services, access to finance and sustainability) covers topics related to financial inclusion, digitalization and the development of financial services. It emphasizes the importance of access to financial products and services and the role of digital technologies in improving financial inclusion, especially in the context of rapid technological change and the emergence of new forms of financial services. The green cluster (financial system, investments, education, decision-making, students, knowledge and literacy) is oriented towards fundamental economic and financial concepts and the process of financial decision-making. This cluster addresses key issues related to financial literacy, formal and informal education and the development of essential skills and habits required for effective personal financial management.

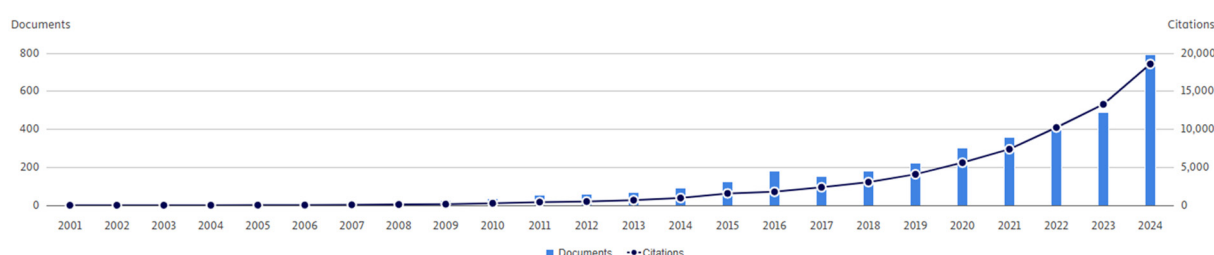
The analysis of the co-occurrence of keywords (Table 1) shows that the term financial literacy is the central, most frequently occurring and most strongly linked term within the analyzed corpus of academic literature. Closely related thematic keywords include financial inclusion, financial education, financial behavior, literacy, finance, and financial knowledge, which together form the conceptual core of the research area under study. Terms related to behavior, attitudes and decision-making point to the psychological and social dimensions of financial literacy. Keyword analysis also reveals important applications in the areas of digital finance, investment decision-making, retirement planning and financial inclusion, further confirming the breadth and relevance of the topic in the current academic context.

**Table 1.** Rankings of keyword occurrences

No.	Keyword	Ocurrences
1	financial literacy	1796
2	financial inclusion	285
3	financial education	248
4	financial behavior	215
5	literacy	168
6	finance	153
7	financial knowledge	152
8	education	83
9	household finance	81
10	financial well-being	80

Source: Own processing (VOSviewer)

The analysis of publication and citation trends on financial literacy in the Scopus database from 2001 to 2024 (Graph 1) shows a clear upward trend in academic interest over the last decade. In the period up to 2008, the number of publications was extremely low (< 20) and the number of citations was negligible, suggesting that financial literacy was not yet a significant focus of academic research. After the global financial crisis of 2008, a gradual and steady increase in both the number of publications and citations can be observed. This reflects the growing awareness of the need for financial education and the increased academic attention to financial literacy in response to economic uncertainty and the need to improve citizens' financial knowledge. A slight decrease in the number of publications can be observed in 2017, followed by a clear upward trend from 2018 onwards, peaking in 2024 with a record of almost 800 articles published. The number of citations has increased exponentially throughout the entire period, confirming the increasing scientific and social relevance of this topic. The rising research interest can be linked to the impact of the COVID-19 pandemic, the accelerated digitalization of financial services and sectors, and the increasing integration of environmental, social and governance (ESG) principles into educational and financial policy frameworks.

**Graph 1.** Trends in scientific publications and citations on financial literacy (2001-2024)

Source: Scopus database

The analysis of publications by country based on data from the Scopus database shows that the United States is the leader with a significantly higher number of published articles (743), confirming its strong influence on research and its long-standing presence in the development of theoretical and empirical frameworks on this topic. They are followed by India with 473 publications, Indonesia (284), Malaysia (232) and the United Kingdom (219) - countries where interest in financial literacy, financial behavior and financial inclusion issues has steadily increased over the past decade, particularly in the context of rapid economic and technological change. Countries such as

China (189), Australia (183), Germany (151), Italy (145) and South Africa (111) also make a notable contribution, underlining the increasingly international dimension of financial literacy research and the diversity of regional approaches and challenges. In this context, Croatia, with a total of 22 published academic papers, shows that it is present on the international research scene, but also that there is still much room for progress. The relatively low number of publications shows that there is a need to intensify scientific activity, promote interdisciplinary research and strengthen international cooperation in order to promote a systematic understanding and improvement of financial literacy at the national level.

In addition, the most frequently cited academic works in the field of financial literacy were identified. The five most cited papers at both global and national levels are listed in Table 2 below.

**Table 2.** Ranking of the most cited research papers on financial literacy

No.	Global		National	
	Research paper	Citations	Research paper	Citations
1	Lusardi & Mitchell (2014)	2268	Barbić et al. (2019)	53
2	Van Rooij et al. (2011)	1622	Lučić et al. (2023)	18
3	Fernandes et al. (2014)	1145	Špiranec et al. (2012)	18
4	Lusardi & Mitchell (2007)	1102	Lučić et al. (2020)	15
5	Huston (2010)	1071	Pavković et al. (2018)	8

Source: Own processing (Scopus database, VOSviewer)

#### 4. REVIEW OF PREVIOUS SCIENTIFIC RESEARCH AND PUBLICATIONS

This chapter provides a concise analysis and interpretation of the main findings and conclusions of the five most frequently cited papers on financial literacy at global and national levels (Table 2). Lusardi and Mitchell (2014) provide a comprehensive overview of theoretical and empirical research and emphasize that financial literacy plays a crucial role in shaping financial behavior and defines financial literacy as a form of investment in human capital. Their analysis of international and national data shows that higher levels of financial literacy led to more responsible use of savings, investments and debt, with the most vulnerable groups identified as women, young people, the less educated, and minorities. The importance of early financial education is emphasized because of its long-term impact and stresses that financial literacy is essential for both individual and societal stability. Van Rooij et al. (2011) examine the relationship between financial literacy and stock market participation in the Netherlands. Their findings suggest that people with higher levels of financial literacy are more likely to invest in shares, while a lack of basic knowledge about the capital markets is a major barrier to participation. Formal education alone is no substitute for specific financial knowledge, and the authors emphasize the importance of targeted financial education programs. Fernandes et al. (2014) conducted a meta-analysis of the relationship between financial literacy, financial education, and financial behavior and analyzed 168 studies. They conclude that educational measures have only a very limited impact on financial behavior, especially among low-income groups. The effect of such measures usually wears off quickly if the acquired knowledge is not applied immediately. Existing levels of financial literacy show a stronger correlation with behavior, although these are often biased. The authors suggest “just-in-time” financial education and the development of more precise measures of financial literacy that are not based solely on general education. Lusardi and Mitchell (2007) analyze the relationship between financial literacy, planning and wealth accumulation among pre-retirees in the United States, with a particular focus on the baby boomer generation. Individuals who actively

plan for retirement have 20–30% higher net worth than those who do not, confirming that financial literacy is a key factor in planning and saving. Particularly vulnerable groups include those with less education and lower incomes, as well as blacks and Hispanics. The authors conclude that targeted interventions and financial education can have a measurable positive impact on retirement preparedness and economic stability, especially among the most vulnerable groups. [Huston \(2010\)](#) systematically analyzes the conceptualization and measurement of financial literacy in 71 studies. Most of the literature reviewed lacks a clear definition of financial literacy and often conflates the terms skills, knowledge and education. A standardized, two-dimensional approach to measurement is proposed that includes both knowledge and the ability to apply that knowledge. The study also recommends the standardization of measurement tools to enable comparative research and more effective evaluation of financial education outcomes.

[Barbić et al. \(2019\)](#) analyze responsible financial consumer behavior (RFCB) in Croatia and, based on a sample of 494 respondents using PLS-SEM analysis, find that financial literacy, positive financial attitudes and perceived behavioral control are significant predictors of RFCB, with attitudes proving to be the strongest factor. Financial literacy exerts an indirect influence via attitudes. The authors develop a new RFCB index comprising six items: self-control in spending, planning for the future, seeking information, education, rational decision-making and solvency. They emphasize the need to combine knowledge, attitudes and psychological factors, as well as the development of measurement tools and targeted educational measures. [Lučić et al. \(2023\)](#) address the concept of financial capability and provide a comprehensive synthesis of existing theories through a systematic review of 14 theoretical frameworks and over 270 academic articles and institutional reports. They propose a new conceptual model - the personal financial management system - that includes financial capability, motivation, opportunity, psychological capability and environmental influences. The study highlights the importance of the interplay between socio-demographic, cognitive-affective and personal factors in financial behavior and calls for further empirical research and a stronger theoretical foundation. The integration of findings from the behavioral sciences and the consolidation of theoretical approaches could improve future research and policy design in financial literacy and skills. [Špiranec et al. \(2012\)](#) examine the conceptual link between information literacy and financial literacy and the role of libraries in promoting financial literacy. They show that libraries, especially in developing countries, can play an important role in improving the financial inclusion of citizens, especially by providing accurate and unbiased information and educating vulnerable groups. The authors highlight the example of a financial education project conducted at the Belgrade City Library in collaboration with the U.S. Agency for International Development, which showed that libraries can effectively empower citizens to make better financial decisions, especially among at-risk groups. They advocate for the institutional integration of financial literacy into library programs and the ongoing training of librarians. [Lučić et al. \(2020\)](#) examine the impact of financial education on the financial knowledge of young people in Croatia through the “My money, My future” program. The empirical study, conducted on a sample of 330 high school students, shows that education significantly increases financial knowledge, with the most important predictors being financial education, interest in personal finance and ownership of a bank account. The study underlines the importance of early introduction of financial education in schools and confirms the effectiveness of targeted educational programs. [Pavković et al. \(2018\)](#) examined the factors that influence the financial literacy of students at the University of Zagreb. The study found that participation in finance-related courses and academic discipline of study is associated with higher levels of financial literacy. In addition, years of study and work experience were found to be statistically significant, while grade point average and gender were not significant. The results emphasize the importance of socio-demographic factors and course characteristics in developing measures to improve students’ financial literacy.

## 5. INSTITUTIONAL RESEARCH AT THE NATIONAL LEVEL

Nationally representative surveys on financial literacy in Croatia, conducted according to internationally comparable methods, are carried out by the Croatian supervisory authorities - the Croatian Financial Services Supervisory Agency (HANFA) and the Croatian National Bank (HNB) - together with the Ministry of Finance, which acts as the national coordinator for all activities related to financial literacy in the Republic of Croatia. These surveys are based on the internationally standardized OECD methodology, which enables a comparison of results both between countries and over time. All previous studies were conducted on nationally representative samples. Instruments were used to assess financial knowledge, financial behavior and financial attitudes - in particular attitudes towards money and spending. Since 2023, the surveys have also included a component on digital financial literacy. The results were analyzed using the same core dimensions so that trends can be observed and comparative analyses can be carried out over several survey cycles (Table 3).

The first systematic study on the financial literacy of adults in Croatia was conducted in 2015 in cooperation with HANFA, HNB and the Ministry of Finance. The survey was conducted among a sample of 1,049 Croatian citizens aged 18 to 79. The study resulted in an average total score of 11.7 out of a possible 21 points (56%), with financial knowledge at 60%, financial behavior at 51.1% and financial attitudes at 60%. Key results show that the lowest scores are found among people under 19 years old (9.3), while the highest scores are found among people with higher education (12.8), citizens with higher household income (12.8) and people living in cities with more than 100,000 inhabitants (13.1). In general, it was found that Croatians are financially responsible and risk-averse. However, systematic education for young people, low-income groups and people with lower levels of education is essential (HANFA & HNB, 2015). The second national survey on adult financial literacy in Croatia was conducted in 2019, showing a slight increase in the overall level of financial literacy with an average score of 12.3 out of 21 points (59%). Citizens demonstrated an improvement in their financial knowledge (65%) and financial behavior (56%), while financial attitudes (56%) decreased. The results suggest that the financial literacy and knowledge of Croatian citizens have improved overall but also show clear differences between certain demographic groups. The study highlights the need to focus more on influencing financial behavior than on imparting knowledge (HNB, 2023a, 2023b). According to the latest national financial literacy survey from 2023, Croatia scored 62 overall, with financial knowledge at 70% (above the OECD average), financial behavior at 53% (below the OECD average) and financial attitudes at 59% (above the OECD average). For the first time, digital financial literacy was also assessed in this survey. Respondents gave this a score of 4.87 out of 10 (49%), indicating a need for further development in this area. The results confirm a continued modest upward trend in financial literacy but also show that financial behavior and digital literacy are the weakest areas (HANFA & HNB, 2023; HNB, 2023a, 2023b).

**Table 3.** Overview of key results from national institutional research

Year	Overall Score	Knowledge	Behavior	Attitudes	Digital Literacy	Key Findings
2015	11,7/21 (56%)	4,2/7 (60%)	4,6/9 (51%)	3,0/5 (60%)	-	Low level of financial literacy, need for education
2019	12,3/21 (59%)	4,5/7 (65%)	5,0/9 (56%)	2,8/5 (56%)	-	Progress in financial knowledge, a greater focus needed on financial behavior and attitudes
2023	12,4/20 (62%)	4,9/7 (70%)	4,7/9 (53%)	2,4/4 (59%)	4,9/10 (49%)	Increase in financial knowledge, challenges in financial behavior and digital literacy

**Source:** Own processing based on HANFA and HNB (2015, 2023) and HNB (2023a, 2023b)

In addition to the national research conducted in cooperation with the HNB and the Ministry of Finance, HANFA continuously monitors the level of financial literacy, educates the public and specific target groups and conducts independent research initiatives. In 2021 and 2022, HANFA conducted studies on the financial literacy of secondary school students. The results showed that students scored highest in financial behavior (58%), followed by financial attitudes (46%), while financial knowledge scored lowest (43%). In the second cycle of the study, a decline was observed in all components (knowledge 40%; behavior 54%; attitudes 42%). In addition, HANFA conducted a national survey on financial literacy of young adults (20-35 years) in 2022, which showed an increase in financial literacy to 61%, an improvement on the 2019 OECD survey (55%). In addition, a study was conducted on the financial literacy of citizens aged 50-65, in which financial literacy was rated at 12.2 out of 20 points (61%), which is two percentage points higher than the level of financial literacy of the adult population in Croatia measured in the 2019 OECD survey (HANFA, n.d.).

## 6. DISCUSSION AND FUTURE RESEARCH DIRECTIONS

The bibliometric analysis of academic literature on financial literacy in the Scopus database shows that research interest in this topic has increased significantly and continuously over the last ten years. The trends in the number of publications and citations confirm that financial literacy is becoming one of the most important areas of academic research. The growth in both volume and citations of publications reflects not only quantitative expansion but also qualitative progress that indicates an increasing scientific relevance and a worldwide recognition of the importance of financial literacy. The results confirm that financial literacy is a multidimensional concept that encompasses knowledge, skills, attitudes and behavior as well as the ability to adapt in the face of uncertainty and technological change. The central role of the term financial literacy in the analyzed keyword network and its strong associations with topics such as financial education, financial knowledge and behavior, inclusion and digital literacy reflect current trends and challenges in this field. The analysis of the geographical distribution of academic output shows the differences in the number and influence of publications between countries. Countries such as the United States and India lead in publication volume and have a major impact on research, while in smaller countries, including Croatia, significant research potential remains untapped. This suggests that there is still much scope for increased initiatives in science and education. Accordingly, this paper contributes to the identification of research gaps and can serve as a basis for the development of new research initiatives in the field of financial literacy. Key findings of international and national studies suggest that higher levels of financial education have a positive impact on responsible financial behavior, participation in financial markets, retirement planning and the prudent use of debt and savings. However, the impact of formal education is often limited if the knowledge acquired is not applied in practice. The most vulnerable groups tend to be young people, people with lower levels of education, women and low-income citizens. The results of the national institutional studies reflect a steady and continuous progress in the financial literacy of Croatian citizens, but also show notable differences between age and socio-demographic groups, as well as persistent challenges in the areas of financial behavior and digital literacy. These findings suggest that the continued implementation of targeted educational programs and measures is essential - not only to impart knowledge, but also to strengthen citizens' practical and digital skills and increase financial awareness at all levels of formal and informal education.

For future research, it is recommended to intensify education and training programs, especially in digital financial literacy, with a particular focus on vulnerable groups such as the elderly, young people and rural dwellers, given the growing influence of digital technologies on financial services and daily money management. In addition, there is a need for interdisciplinary and longitudinal research that addresses the psychological, social and technological aspects of financial literacy, including the impact

of digital financial services, the digital environment and new forms of financial fraud. It is also recommended to develop standardized measurement tools in scientific research to enable comparability of results and a more reliable evaluation of the effectiveness of educational interventions. In addition, a stronger integration of behavioral economic theories into financial literacy research is recommended to deepen the understanding of how knowledge, attitudes and psychological factors influence financial behavior. Future studies should also analyze regional and socio-demographic differences in financial literacy in detail to support the design of targeted policy measures and educational interventions. Equally important is the evaluation of the effectiveness of national financial education strategies and action plans, with a focus on identifying best practices and necessary corrective actions. Given the increasing importance of sustainability, it is advisable to examine the relationship between financial literacy and sustainable investment decisions and socially responsible financial behavior. Finally, a comparative analysis of the effectiveness of financial education in different countries can bring additional benefits. They could identify the most successful and efficient approaches and facilitate the transfer of best practices to the Croatian context. Strengthening cooperation between academia, financial institutions and policymakers is essential for developing sustainable strategies to improve financial literacy and prepare citizens for future financial challenges.

## 7. CONCLUSION

The bibliometric analysis of global and Croatian scientific output, supported by visualizations created with the VOSviewer software, clearly shows that financial literacy is a multidimensional and dynamic concept. It is increasingly recognized as a fundamental tool for strengthening the resilience of individuals and households in times of economic disruption, and its importance is growing in the context of digitalization and sustainability. By integrating findings from international and Croatian studies, this paper contributes to a better understanding of the structure and thematic trends in the literature, as well as the identification of research gaps that can inform future science and education policy. Key findings highlight the continued need for the development of comprehensive educational programs and policies, particularly in the areas of financial behavior and digital literacy. The study provides a comprehensive overview of research trends, thematic clusters, dominant concepts and authors, and existing research gaps in the field of financial education. As such, it offers valuable insights for further academic research, the development of effective strategies, and the formulation of public policies in the field of financial literacy. It highlights the importance of standardizing measurement tools, promoting interdisciplinarity and monitoring long-term trends - especially considering the challenges posed by the digital financial environment and the growing need for sustainable financial behavior.

In the Croatian context in particular, the results confirm the need to strengthen cooperation between the academic community, financial institutions and policy makers in order to enable systematic monitoring, evaluation and improvement of the level of financial literacy. This study thus contributes to a broader understanding and promotion of financial literacy as a strategic resource for economic prosperity and social inclusion and serves as a basis for future initiatives and further scientific, educational and practical activities - especially at national level. Future efforts should focus on comprehensive financial education that covers all stages of life and whose content is tailored to current trends and market needs. In conclusion, the study emphasizes the strategic importance of financial literacy as a driver of economic stability and social inclusion and calls for the continuous development of research, education and practice in this area. In this way, the study contributes to the development of effective strategies and cooperative initiatives that will further improve the financial preparedness and well-being of Croatian citizens in an increasingly dynamic economic environment.

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# Harnessing Potential: A Comprehensive Bibliometric Analysis of Female Representation and Intellectual Capital as Catalysts for Future Organisational Success

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## Keywords:

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**Abstract:** *This study explores the relationship between intellectual capital (IC) and female representation through a comprehensive bibliometric analysis. We utilise data from the leading academic database Web of Science to examine publication trends, citation dynamics, author productivity, and research networks. Our findings indicate a growing scholarly interest in this intersection since 2019, with the United States showing the highest volume and influence in this area. Key thematic clusters suggest that gender diversity enhances various forms of capital — human, structural, and relational — ultimately improving corporate transparency, performance, and innovation. Additionally, we identify significant gaps related to systemic challenges and institutional barriers that limit women’s full contributions. By mapping state-of-the-art findings and pinpointing leading contributors in the field, this study aims to enrich the academic discourse and encourage further inquiry among scholars and policymakers on the importance of gender-inclusive knowledge economies.*

## 1. INTRODUCTION

Over the past two decades, female representation has become a cornerstone of global governance reform. Beyond ethical imperatives, recent literature highlights its strategic value, particularly in enhancing intellectual capital (IC), defined as the collective knowledge, skills, and intangible resources that drive organisational innovation and success. Various legislative measures have been enacted to enhance diversity within corporate boardrooms. Notable initiatives to increase the representation of women on corporate boards can be observed in Norway, France, and Spain, where a minimum quota of at least 40% is mandated. Additionally, Belgium requires a 33% representation of women, while Malaysia mandates a 30% representation. These initiatives are primarily motivated to ensure gender diversity, driven by both equity and performance objectives (Ahmad et al., 2018; Ali et al., 2014). Regulatory measures on quotas are vital for addressing gender imbalances, as shown by South Korea’s new initiatives. In countries with quota systems, male to female representation often nears a 50/50 ratio. Starting in 2022, listed companies with over 2 trillion KRW in assets must appoint at least one female director. This regulation promotes corporate governance reform while factoring in institutional and cultural contexts. Despite some resistance, early evidence indicates improved board deliberation quality and enhanced disclosure transparency. These developments signify a greater integration of gender diversity in Asia’s corporate internal control strategies. (Alkhawaja et al., 2023; Jeyhunov et al., 2025).

As the modern knowledge-based economy increases organisations’ dependence on intangible assets, it is vital to understand how gender diversity influences intellectual capital. Intellectual capital represents an organisation’s collective knowledge, skills, and competencies, and is increasingly

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recognised as a key driver of innovation and competitive advantage. According to standard classifications, intellectual capital has three main components: human capital, structural capital, and relational capital (Anderson et al., 2019; Beattie & Thomson, 2007; Bontis, 2002; Cabrita & Bontis, 2008; Stewart, 1997; Stewart & Losee, 1994). Gender diversity significantly influences intellectual capital components. Human capital (HC) is enriched by diverse leadership styles and empathetic governance. Relational capital (RC) benefits from inclusive communication and trust fostered by female board members. Structural capital (SC) is enhanced through transparency, reduced information asymmetry, and better disclosure. The link between intellectual capital and female representation in organizations has gained attention, highlighting diversity's crucial role in improving performance. (Demirbag et al., 2022; Isola et al., 2020; Nadeem et al., 2019). Table 1 summarises findings from existing literature.

**Table 1.** The impact of gender diversity on IC: a summary of published literature

Autor(s) and year	Focus area	Analysed IC components	Link between gender diversity and IC – key findings
Nadeem et al. (2019)	Board gender diversity and IC efficiency	HC, SC	Female directors improve efficiency through better decision-making and oversight. Their presence boosts IC efficiency in companies with boards.
Isola et al. (2020)	Board gender participation in Nigeria	HC, RC, SC	Women's involvement enhances knowledge management and builds stakeholder trust. Gender-diverse boards improve information communication in developing nations.
Herli et al. (2021)	Gender diversity and IC disclosure in Indonesia	IC disclosure	Increasing women's presence on boards enhances IC reporting and disclosure. Female directors improve strategic control, making gender diversity crucial for better environmental information and addressing challenges from asymmetric information in capital markets.
An et al. (2015)	IC disclosure in China	SC	Female leadership encourages transparency and minimizes information asymmetry. It is widely believed that this benefits organisational performance, as female directors typically excel over their male counterparts in skills such as multitasking, risk management, and communication.
Kanadli et al. (2018)	Board openness and decision-making	RC, Governance	Female board members foster collaboration and strengthen relational capital. Women enhance relational dynamics and decision-making. Diverse expertise is crucial for understanding financial goals and the impact of business strategies on stakeholders. Gender diversity boosts a board's collective intelligence, expands the talent pool for management, and improves oversight.
Nielsen & Huse (2010)	Women's contribution to board effectiveness	HC	Women enhance board communication and leadership, boosting human capital. Their presence improves engagement and communication. Women directors' effectiveness stems from active involvement in board activities and reduced conflict levels. Their unique leadership styles significantly contribute to board discussions. Women on boards heighten effectiveness through conflict reduction and improved development initiatives. They demonstrate intense attentiveness to others' well-being, highlighting empathy, sensitivity, and nurturing qualities.
Saeed & Sameer (2017)	Gender diversity and dividend policy	RC, Governance	Female directors advocate for transparent governance and policies focused on stakeholders. Gender diversity enhances dividend payouts and improves board performance.
Saeed et al. (2019)	Green HRM and pro-environmental behaviour	HC, SC	Including women encourages ethical practices and sustainable actions within organizations. Management with gender diversity enhances environmental stewardship and ethical conduct.
Abad et al. (2017)	Gender diversity and information asymmetry	HC, SC	Women decrease market uncertainty by enhancing corporate information disclosure. Their board presence alleviates information asymmetry in equity markets. Women's communication and leadership improve human capital in the boardroom, foster better engagement, and promote transparency while addressing asymmetric information challenges.

Source: Own processing

## 2. METHODOLOGY AND DATA COLLECTION

This study undertakes a bibliographic analysis to identify trends and gaps in the intersection of artificial intelligence and intellectual capital. A bibliometric analysis examines empirical data from the published literature within this research domain, thereby highlighting key themes (Leung et al., 2017). The study employs mathematical and statistical methods applicable to various forms of communication and scholarly publications (Pritchard, 1969). Furthermore, this research follows the standard science mapping workflow established by Börner et al. (2003) and subsequently refined by Aria and Cuccurullo (2017), Cobo et al. (2011), and Zupic and Čater (2015) and applies keyword co-occurrence, Bradford’s law for journals, and Lotka’s law for authorship. This paper investigates the nexus between gender diversity and IC using a bibliometric approach to answer five core questions:

- RQ1:** What are the trends and citation patterns?
- RQ2:** Which countries are leading in research?
- RQ3:** What are the key topics based on keyword analysis?
- RQ4:** Which sources are the most relevant in publishing?
- RQ5:** Which authors contribute more significantly?

Data were collected on December 10, 2024, utilising the Web of Science database. This database was selected due to its esteemed reputation within the academic community for facilitating rigorous, reliable, and meaningful bibliometric analyses. English was established as the primary language. The choice of language is explained by its dominant position in research literature (more than 95% of articles, without language filtration, are written in English, while the remaining 5% are distributed among all other languages). Table 2 describes the criteria for data filtering.

**Table 2.** Filtering criteria for data collection

Keywords:	„Intellectual capital“ (All fields) AND („Female“ (All fields) OR „Gender“ (All fields))
Subject category:	„Economics“, „Management“, „Business“, „Business Finance“, „Multidisciplinary Sciences“, „Women’s Studies“, „Mathematic Interdisciplinary Applications“
Research area:	Business Economics
Language:	English
Final publication year:	1990 – 2024
Document type:	Article

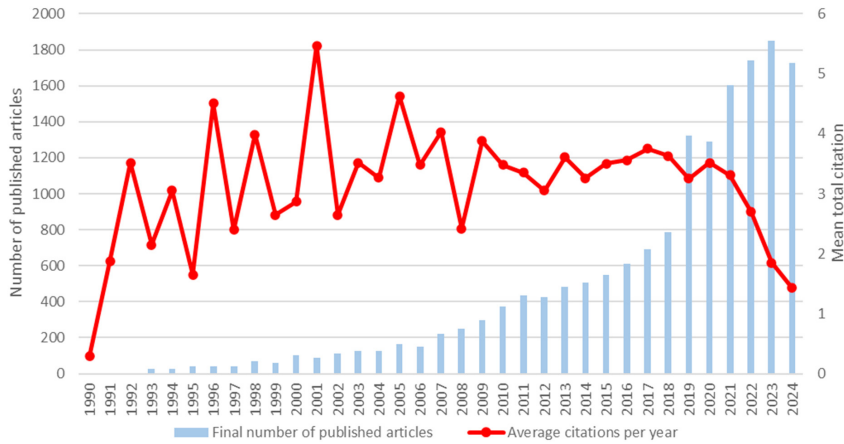
Source: Own processing

## 3. RESULTS

Interest in gender equality and female representation has increased over 30 years. A significant surge in publications started in 2010, with a sharp acceleration in 2019, when the number of published articles in this area nearly doubled. The steep upward trend observed after 2019 indicates an increasing scholarly focus on gender diversity in IC research.

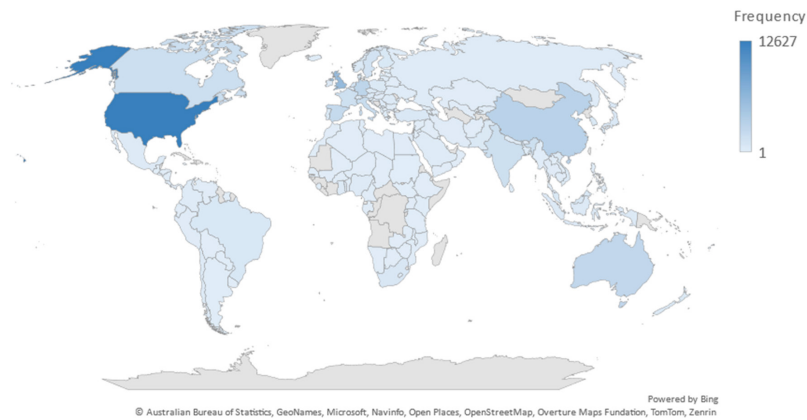
Data were collected comparing 139 countries worldwide regarding gender and intellectual capital relations research. The leading country in this domain is the United States of America, where

researchers published 12,627 articles, more than double the number attributed to the United Kingdom. In China, Australia, and several European nations, such as Germany, Spain, France, the Netherlands, and Sweden, the number of researchers ranges from 1,000 to 2,000.



**Figure 1.** Annual scientific production and average yearly total citations during 1990 - 2024

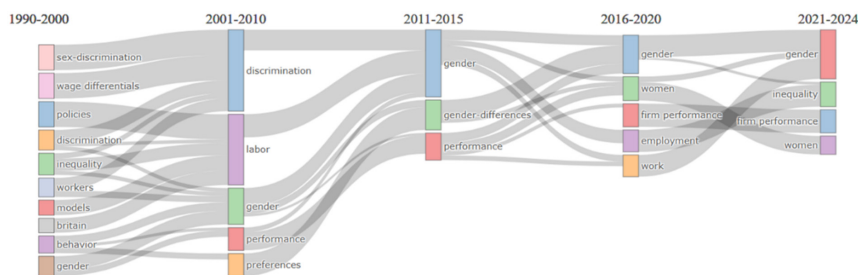
**Source:** Own processing



**Figure 2.** Scientific production worldwide

**Source:** Own processing

The literature has markedly evolved over time, transitioning from documenting inequality to focusing on the role of gender in value creation. To comprehensively analyse these evolving themes, our dataset has been segmented into five temporal intervals: 1990–2000, 2001–2010, 2011–2015, 2016–2020, and 2021–2024. The selection of these intervals is based on observed publication frequencies.



**Figure 3.** Topic evolution during 1990 - 2024

**Source:** Own processing

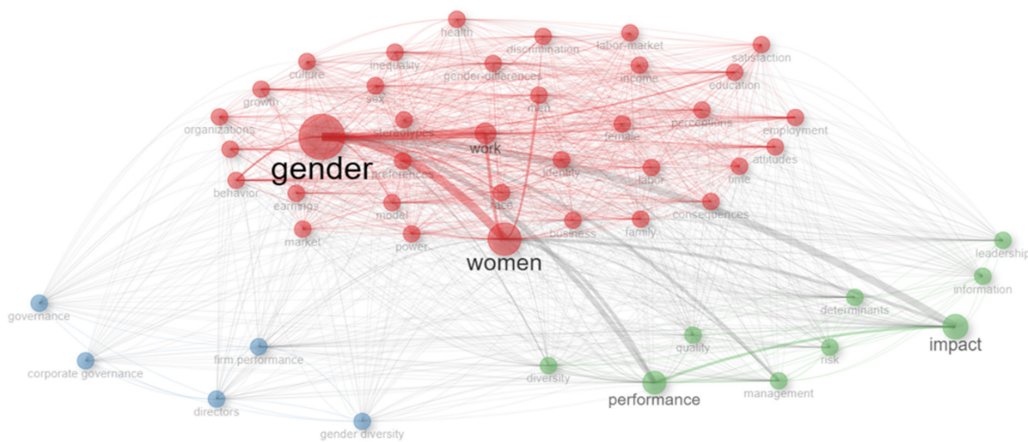
Early research primarily concentrated on structural exclusion and normative ethics. From 2010 onward, empirical investigations have explored the impact of female leadership on improving IC, transparency, and governance. The literature summary in Table 3 supports our results.

**Table 3.** Literature summary

Period	Focus	References
Pre-2000s	Inequality, exclusion, feminist critique	Benschop & Doorewaard (1998), Calás & Smircich (1993), Gherardi (1994)
2000 – 2010	Normative advocacy, quotas, and gender diversity	Adams & Ferreira (2009), Ali et al. (2011), Bear et al. (2010),
2010 - 2020	Board effectiveness, performance link	Nielsen & Huse (2010), Saeed & Sameer (2017), An et al. (2015), Kanadli et al. (2018), Ali et al. (2014)
2020 - present	Strategic impact on IC, governance value	Nadeem et al. (2019), Herli et al. (2021), Isola et al. (2020)

Source: Own processing

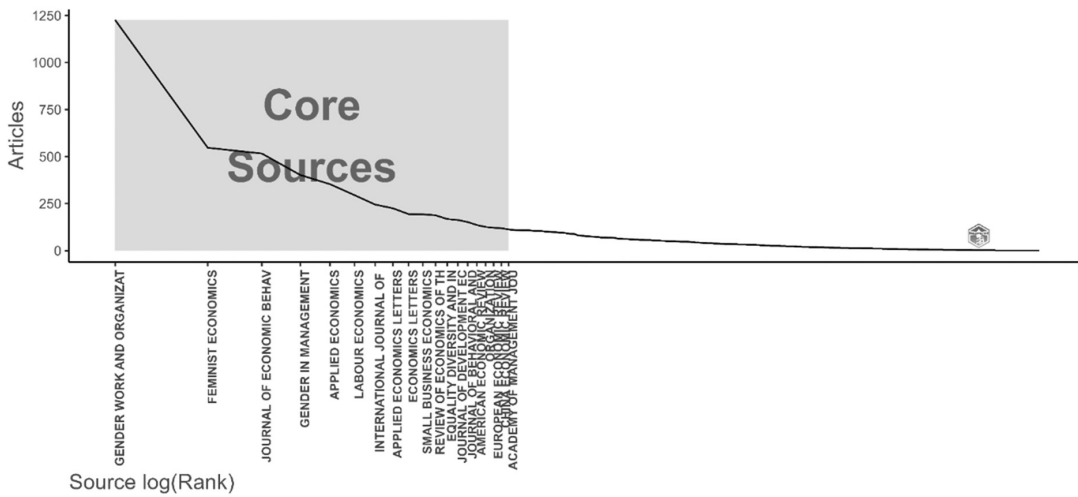
We analysed topics by examining keywords. These keywords were grouped into three clusters. The first cluster (red) pertains to themes surrounding gender, women, and work, focusing on equity and representation in labour markets. The second cluster (blue) addresses gender diversity in corporate governance and firm performance, emphasising board effectiveness and intellectual capital. The final cluster (green) relates to the effects, performance, and quality of information associated with gender, stressing the importance of intellectual capital transparency and efficiency.



**Figure 4.** Co-word map of main topics

Source: Own processing

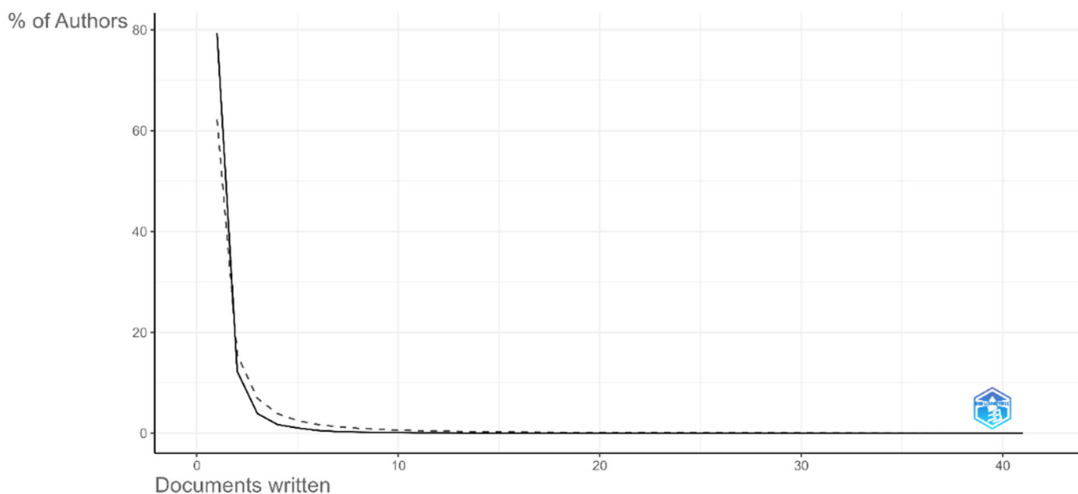
The main bibliometric analysis tool for journals is Bradford’s law. Bradford’s law is a pattern first described by Samuel C. Bradford in 1934 that estimates the exponentially diminishing returns of searching for references in science journals. According to the law, if the number of articles sorts journals in a field into three groups, each with about one-third of all articles, then the number of journals in each group will be proportional:  $1:n:n^2$  (Naranan, 1970). In many disciplines, this pattern is called a Pareto distribution. Bradford’s Law’s core sources contain the most impactful sources with higher citation counts, as indicated by their steep decline on the curve. According to the results of Bradford’s law 10 core sources are: “Gender, Work and Organisation”, “Feminist Economics”, “Journal of Economic Behaviour and Organisation”, “Gender in Management”, “Applied Economics”, “Labour Economics”, “International Journal of Human Resource Management”, “Applied Economics Letters”, “Economic Letters”, and “Small Business Economics”.



**Figure 5.** Core sources by Bradford's Law

**Source:** Own processing

Lotka's law is a fundamental informatics law for analysing authors. Lotka's law, named after Alfred J. Lotka, is a special application of Zipf's law that describes the frequency of publication by authors in any given field. Let us define  $X$  as the number of publications,  $Y$  as the number of authors with  $X$  publications, and  $k$  as a constant that depends on the specific field. Lotka's law states that  $Y \propto X^{-k}$ . Lotka initially claimed that  $k = 2$ , but subsequent research has shown that  $k$  varies depending on the discipline. Alternatively, Lotka's law can be expressed as  $Y' \propto X^{-k}$ , where  $Y'$  is the number of authors with at least  $X$  publications. These two expressions can be proven equivalent by taking the derivative. The results indicate that a small number of authors are responsible for the majority of published documents, while most contributors have only published a limited number of works. This observation closely aligns with Lotka's theoretical predictions, as demonstrated by comparing the theoretical and observed distributions in the chart. These findings emphasise that a core group of highly productive authors drives most knowledge dissemination in the field, while a larger group of less prolific contributors provides additional input. This distribution highlights the importance of identifying and supporting key contributors, as they significantly impact the advancement of research and shape the intellectual landscape of the discipline. The top 10 most relevant authors are: Zhang J., Wang Y., Li Y., Li H., Benschop Y., Nelson J.A., Pullen A., Branson D.M., Li J., Zhang L.



**Figure 6.** Author productivity through Lotka's Law

**Source:** Own processing

## 4. CONCLUSION

This study underscores the increasing acknowledgement of the positive correlation between intellectual capital and female representation, particularly in terms of enhancing organisational performance and promoting innovation. Our bibliometric analysis elucidates significant trends in publication activity, indicating a growing academic interest in this intersection.

Utilizing bibliographic analyses, we addressed five research questions. Our findings reveal an upward trajectory in publication trends, particularly since 2010, with a remarkable acceleration noted in 2019. The United States emerges as the foremost country in this research area, with a substantial disparity compared to other nations. Furthermore, more developed countries appear to have a greater inclination toward investigating female representation concerning intellectual capital. Empirical corroboration from other scholars reinforces the critical role of governance (regulatory frameworks) in the context of quotas. The results indicate a paradigm shift in the literature, moving from normative calls for equality to an evidence-based recognition of women as enablers of intellectual capital. A synthesis of existing literature further supports these conclusions. By employing Bradford's law and Lotka's law, we present foundational information concerning key sources and the author's output.

This research is not without limitations, as it relies exclusively on a single database, Web of Science. While the Web of Science represents a comprehensive repository, it does not include all pertinent articles related to intellectual capital. Consequently, our findings accurately mirror the articles within the Web of Science but may diverge when evaluated through other databases. Moreover, it is imperative for readers to approach our results with caution; the employed methodology does not encompass a full-text analysis but rather concentrates on titles, keywords, and abstracts of published studies. Nonetheless, bibliographic analysis proffers valuable advantages by offering a comprehensive overview of pertinent areas of interest.

This study significantly contributes to the ongoing discourse surrounding diversity, equity, and inclusion within knowledge-intensive sectors. Future research should prioritise addressing existing barriers and exploring feasible strategies to leverage female representation's potential to strengthen intellectual capital across various organisations and industries.

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# The Role of Justice in Increasing Job Satisfaction: An Investigation Into the Service Industry

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**Abstract:** Organizational justice is of central interest to companies seeking equal employment opportunities and fair labor practices. Across cultures, some aspects of justice appear to be related to feelings about certain employment issues. The purpose of this study is to examine how organizational justice affects job satisfaction. In addition, the constructs of distributive, procedural, interpersonal, and informational justice are assessed in the context of a developing country. The study sample consisted of 567 employees in the service industry. The results show that organizational justice has a significant impact on employee job satisfaction. Only two components of organizational justice are significant, with distributive justice having a greater influence than procedural justice. The demographic data was also examined, and it was found that men have higher job satisfaction than women. The theoretical and practical implications of the findings are discussed, along with some suggestions for management to focus more on improving justice programs and policies.

## 1. INTRODUCTION

Fierce competition and rapid change in the global economy are putting increasing pressure on companies to improve employee morale and productivity and to attract and retain a talented workforce (Park et al., 2016). Organizational justice is a promising concept for understanding deviant behavior in the workplace (Krings & Facchin, 2009). The concept of organizational justice extends traditional models of work behavior, which tend to view job demands, job control, and social support as the most important determinants of individual well-being and productivity (Baldwin, 2006). Understanding organizational justice is extremely important for organizations because it is related to employees' job satisfaction and organizational commitment, and thus their propensity to look for another job (DeConinck & Stilwell, 2004).

Based on these developments, the purpose of this study is to examine the impact of organizational justice on job satisfaction. The authors focused on the service sector for two reasons. First, Albania's growing economy relies primarily on the service sector, which accounts for 65.2% of the total employed population (Instat, 2025). Secondly, there is a dearth of studies that address this relationship. Furthermore, examining organizational justice as a construct that encompasses all four types provides insights, implications, and recommendations for managers and developers of work practices that aim to promote equal and fair opportunities for all employees.

## 2. LITERATURE REVIEW

Organizational justice is a personal assessment of the ethical and moral reputation of management behavior. According to this approach, the establishment of justice requires management to adopt the perspective of employees (Cropanzano et al., 2007). The two most important dimensions of organizational justice are distributive justice and procedural justice (Lambert et al., 2007). Distributive

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justice has been defined as the extent to which the appropriate distributive norm is followed in a given decision-making context (Colquitt, 2012). Procedural justice contains information about the individual's position within the group, so that a positive evaluation of group membership is accompanied by stronger identification with the group, which leads to compliance with authority and a more positive attitude towards the group (Silva & Caetano, 2016).

While the prevailing approaches to procedural justice shed light on how the underlying nature of procedural justice differs from that of distributive justice, they have not been able to effectively explain the interpersonal factors of the decision-making process (Park et al., 2016). Although the nature of the decision-making process is important in understanding people's reactions to the fairness of a decision, there is growing empirical evidence that people also focus on the conduct of the process (Bies & Shapiro, 1987). Fairness concerns, which refer to the appropriateness of the decision maker's behavior in carrying out procedures, represent the desire for interactional justice (Bies & Moag, 1986). Interactional justice refers to how one person treats another. The first part, referred to as informational justice, refers to whether you are honest and give a reasonable reason when things go badly. The second part, called interpersonal justice, refers to the respect and dignity with which one person treats another (Cropanzano et al., 2007).

Well-designed systems that promote distributive, procedural, and interactional justice benefit both the individual, who receives fair treatment, and the organization, which maintains control over potential challenges and threats from its employees while enjoying the benefits of being a preferred employer (Baldwin, 2006). Studies on organizational justice have generally concluded that organizational justice is associated with positive outcomes such as job satisfaction (Bayarçelik & Findikli, 2016; Nadiri & Tanova, 2010; Wicaksono et al., 2021), organizational commitment (Deressa et al., 2022; Imamoglu et al., 2019), organizational citizenship behaviors (Colquitt et al., 2013), job engagement (Deepa, 2020; Kang & Sung, 2019), organizational performance improvement (Fiaz et al., 2021) and a negative relationship between organizational justice and turnover intentions (Jepsen & Rodwell, 2007; Özkan, 2023).

Spector (1997) defines job satisfaction as employees' opinions on various aspects and areas of their work. Some influencing factors of job satisfaction are distributive justice and interactional justice (Wicaksono et al., 2021). In other studies, procedural justice has a greater influence on satisfaction than distributive justice (Clay-Warner et al., 2005; Lambert et al., 2010); however, no significant relationship was found between procedural justice and job satisfaction (Bakhshi et al., 2009). The multidimensionality of the organizational justice construct is justified by research showing that while all dimensions relate to the role of fairness, they have different effects and personal and organizational correlates (Cohen-Charash & Spector, 2001). Multiple levels of socio-cultural influences affect perceptions of fairness and responses in different societies (Silva & Caetano, 2016).

### 3. METHODOLOGY

The sample selected for this study refers to information collected from employees of different hierarchical levels working in the service sector. The analysis refers to specific issues related to organizational justice and its dimensions as well as job satisfaction. The sample consists of 567 people of different genders, ages and educational levels. The questionnaire survey was conducted in the district of Tirana, where these activities are most widespread. The data was collected via the Google Forms platform.

The model constructs were assessed using a five-point Likert scale (from 1 "strongly disagree" to 5 "strongly agree"). The 20-item organizational justice scale by Colquitt (2001) was used to assess

participants' perceptions of organizational justice. Questions adapted from Spector (1985) were used to measure job satisfaction. The Cronbach's alpha reliability coefficient was calculated for all questions in each dimension, except for those questions whose factorial weighting was less than 0.4 (Stevens, 2002).

#### 4. RESULTS OF THE ANALYSES

The majority of the 567 respondents are specialists (66%), 13% are in lower management positions, and 31% in higher management positions. Most respondents are women (68%), with 32% being in management positions. Half of the respondents (50%) are between 18 and 30 years old, and 42% of them are in the 31-45 age group. The majority (49%) have less than 2 years of work experience, 13% have up to 10 years. However, 15% have more than 10 years' experience, mainly in management and operational/executive positions.

**H0.** *Organizational justice has a positive and significant effect on employee job satisfaction.*

To examine this hypothesis, a simple linear regression equation was developed. First, an ANOVA analysis was conducted to determine whether there was a relationship between the two factors. Sig. = 0.000 < 0.05 indicates a statistically significant relationship between organizational justice and job satisfaction.

**Table 1.** ANOVA Results for the Regression Model Predicting Job Satisfaction

ANOVA <sup>a</sup>					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	29.224	1	29.224	115.653	.000 <sup>b</sup>
Residual	142.769	565	0.253		
Total	171.993	566			

a. Dependent Variable: Job Satisfaction

b. Predictors: (Constant), Organizational Justice

**Source:** Own research

After the analysis, the authors develop a simple linear regression equation with a significance level of  $0.000 < 0.05$ :

$$(\text{job satisfaction}) = 1.921 + 0.298 (\text{organizational justice}).$$

**Table 2.** Regression Results for Organizational Justice and Job Satisfaction

Model	R <sup>2</sup>	Adjusted R <sup>2</sup>	t	Sig.
Constant	0.170	0.168	18.791	0.000
Organizational Justice			10.754	0.000

**Source:** Own research

Organizational justice has a significant impact on employee job satisfaction ratings. This relationship is positive because the  $\beta$  coefficient is positive (0.298). The coefficient of determination for this equation is  $R^2 = 17\%$ . In addition, the authors examine which dimension of organizational justice has a particular influence on the job satisfaction of these employees. The multiple linear regression equation provides a statistically valid answer.

The data show that there is no negative correlation between the dimensions that measure organizational justice and their interaction with the dependent variable. Therefore, the analyses continue with the construction of this equation, again starting with ANOVA analysis. The data analysis indicates a true and statistically significant relationship as indicated by a Sig. value of  $0.000 < 0.05$ .

**Table 3.** Multicollinearity between organizational justice dimensions

	Procedural Justice	Distributive Justice	Interpersonal Justice	Informational justice
Procedural Justice	1			
Distributive Justice	.495**	1		
Interpersonal Justice	.571**	.479**	1	
Informational Justice	.608**	.542**	.633**	1

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

**Source:** Own research

**Table 4.** ANOVA Results for the Multiple Regression Model Predicting Job Satisfaction

ANOVA <sup>a</sup>					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	42.008	4	10.502	45.407	.000 <sup>b</sup>
Residual	129.985	562	0.231		
Total	171.993	566			

a. Dependent Variable: Job Satisfaction

b. Predictors: (Constant), Distributive Justice, Procedural Justice, Interpersonal Justice, Informational justice

**Source:** Own research

The regression equation has the form:

$$(\text{job satisfaction}) = 1.858 + 0.068 (\text{procedural justice}) + 0.283 (\text{distributive justice})$$

**Table 5.** Multiple Regression Results for Justice Dimensions Predicting Job Satisfaction

Model	R <sup>2</sup>	Adjusted R <sup>2</sup>	t	Sig.
<i>Constant</i>	0.244	0.239	17.791	0.000
Procedural Justice			2.077	<b>0.038</b>
Distributive Justice			8.959	<b>0.000</b>
Interpersonal Justice			0.017	0.986
Informational Justice			0.800	0.424

**Source:** Own research

**Table 6.** Test of independence

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Job Satisfaction	Equal variances assumed	0.969	0.325	2.898	565	0.004	0.143	0.049	0.046	0.240
	Equal variances not assumed			2.882	350.371	0.004	0.143	0.050	0.045	0.240

**Source:** Own research

The equation shows that only two of the four dimensions of organizational justice have a significant relationship with job satisfaction, with Sig. values of 0.038 and 0.000, both less than 0.05.

The distributive justice dimension has the greatest influence of these two dimensions, with a coefficient  $\beta$  of 0.283, which is much larger than the coefficient of the procedural justice dimension. However, both coefficients are positive, indicating that their increase leads to an increase in job satisfaction, fair evaluation of their job performance, results and performance-related incentives. The coefficient of determination for this equation is  $R^2 = 24.4\%$ .

The influence of age, gender or length of service was also analysed. The Tukey approach was used to conduct a post-hoc test. Only gender showed a significant contribution to the data analysed. The results of this test show that the value of  $\text{Sig.} = 0.325 > 0.05$ , indicating that the variances of these two groups are equal, or that the groups are homogeneous among themselves.

This conclusion is supported by the evidence that the standard deviation (Std. Deviation)  $M = 0.553$  and (Std. Deviation)  $F = 0.545$ , which are almost identical (Table 7).

**Table 7.** Group statistics

Gender		N	Mean	Std. Deviation	Std. Error Mean
Job Satisfaction	Male	182	3.09	0.553	0.041
	Female	385	2.95	0.545	0.028

**Source:** Own research

After this conclusion, the authors turn to the t-test to compare the means, which shows that the value of  $\text{Sig. (2-tailed)} = 0.004 < 0.05$ . This shows that there are significant differences between the two groups of employees in terms of job satisfaction. The data even indicates that men with  $MM = 3.09$  and  $MF = 2.95$  have higher job satisfaction than women, which can be attributed to higher leadership positions or greater rewards.

## 5. CONCLUSION

The study aims to examine the components of organizational justice that are associated with job satisfaction. In line with the results of previous studies (Mete & Sökmen, 2019; Parker & Gerbasi, 2016; Zagladi et al., 2015), the authors were able to demonstrate that both procedural and distributive justice increase job satisfaction among employees in the service industry, with the second type having a slightly greater effect. These results contrast with previous studies that indicated that satisfaction is related to interpersonal and informational justice (Loi et al., 2009; Palaiologos et al., 2011). From a practical perspective, developing an organizational culture based on fair communication and employee evaluations is critical to maintaining fairness within an organization, which in turn affects employee satisfaction at work.

The study also suggests that men have a higher level of job satisfaction than women. There are different results about gender-specific differences in job satisfaction. Peccei and Lee (2005) found that job satisfaction has a greater positive impact on men than on women, and Zou (2015) reports significantly higher job satisfaction among women than among men. Furthermore, studies found no gender differences in job satisfaction factors (Fapohunda, 2013; Nielsen & Madsen, 2017).

Employees' perceptions of organizational justice, i.e., distributive and procedural fairness, are positively related to job satisfaction. This study has important implications for managers who should promote job satisfaction by adopting fair methods of workplace treatment, decision-making, and rewards. Promoting fair communication with employees and fostering a fair culture in the organization are critical to maintaining equity within an organization, which positively impacts overall function by creating value.

The limitations of this study should be noted. The sample size could be even larger to achieve better representativeness. In addition, mixed methods could provide an even more valid result. Further studies should examine other practices related to the variables under investigation, such as organizational commitment, organizational citizenship behaviors and employee turnover.

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# Exploring Employee Stress Levels and Job Satisfaction in the Albanian Workforce: Interrelations and Coping Mechanisms

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**Abstract:** *Employee well-being is a critical determinant of organizational productivity and economic stability. In Albania, workplace stress and job satisfaction are increasingly relevant due to labor market challenges, evolving workplace expectations, and high workforce migration rates. This study aims to explore the relationship between stress levels and job satisfaction among Albanian employees, investigating how workplace stress impacts overall job satisfaction. The study tends to answer the following research questions: 1) What are the primary sources of workplace stress among employees in Albania?, 2) Is there any significant relationship among employee stress levels and overall job satisfaction in Albania?, and 3) Are there differences in job stress and satisfaction levels depending on employee gender, age, sector, position, experience and type of employment?*

*Randomly administered employee surveys were conducted with a sample of 240 individuals to explore these research questions. Recommendations are offered as well on future research areas for a better understanding of the dynamics characterizing the relationship between job related stress and overall employee satisfaction.*

## 1. INTRODUCTION

Employee well-being is a key factor influencing organizational productivity and long-term economic stability (Adamopoulos & Syrou, 2022; Lin et al., 2024; Yang et al., 2021). In the context of Albania, the issues of workplace stress and job satisfaction have gained significant attention in recent years due to the challenges facing the labor market, changing workplace expectations, and the high rates of workforce migration (Drishti & Carmichael, 2022; Prendi et al., 2023). This study aims to explore the relationship between job-related stress and overall job satisfaction among Albanian employees, by identifying what are the dynamics that shape these critical aspects of the work environment. It investigates the primary sources of stress in the case of Albanian employees and seeks to determine whether demographic factors such as gender, age, sector of employment, job position, work experience, and employment type play a significant role in shaping employees' stress and satisfaction levels.

To investigate these relationships, a survey was conducted across a diverse sample of Albanian employees, gathering insights that will contribute to a better understanding of the workplace environment. By exploring the connections between stress and job satisfaction, this study aims to offer recommendations for organizations and policymakers in Albania to promote a healthier and more productive workforce. Future research directions are provided as well with the intent to further deepen the exploration of the job stress-job satisfaction relationship among Albanian employees.

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## 2. LITERATURE REVIEW

### 2.1. The Relationship Between Job Stress and Job Satisfaction

The relationship between job stress and job satisfaction has been the subject of numerous studies over the years in organizational behavior, with a significant amount of literature exploring its nature and implications (Adamopoulos & Syrou, 2022; Brewer & McMahan-Landers, 2003; Chung et al., 2017; Dodanwala et al., 2023; Li et al., 2023; Lin et al., 2024; Nabirye et al., 2011; Yang et al., 2021). Job stress is generally defined as an individual's psychological or physiological response to environmental demands that cause pressure. It arises when there is a perceived gap between job requirements and an employee's capabilities or resources. It might result from negative workplace conditions, perceived threats, or obstacles to achieving goals, leading to tension, anxiety, and decreased well-being. Job stress is shaped as well by how individuals interpret and respond to pressures in their work environment (Hurrell et al., 1998, as cited in Li et al., 2023; Lazarus & Folkman, 1984; McGrath, 1982, as cited in Mittal & Bhakar, 2018; Montgomery et al., 1996, as cited in George & K.A., 2018). *Job satisfaction*, on the other hand, has been defined by literature as a positive emotional state or attitude that results from an individual's appraisal of their job or job experiences. It reflects how people feel about their job, regarding specific job aspects such as rewards, responsibilities, organizational support, and the work environment (Dodanwala et al., 2023; Kemelgor, 1982, as cited in George & K.A., 2018; Locke, 1976, as cited in Li et al., 2023; Spector, 1985). Extensive research has demonstrated a *significant negative relationship between job-related stress and job satisfaction*, identifying job stress as an antecedent—meaning that higher levels of stress are typically associated with lower levels of job satisfaction (Adamopoulos & Syrou, 2022; Bemana et al., 2013; Brewer & McMahan-Landers, 2003; Cheng et al., 2015; Khalatbari et al., 2013; Lin et al., 2024; Mansoor et al., 2011; Nabirye et al., 2011; Rizwan et al., 2014). In contrast, other theoretical and empirical studies suggest that job stress may arise because of employee dissatisfaction with the job. This perspective points to a potentially reciprocal relationship among the two constructs, where dissatisfaction can contribute to increased stress levels, while higher job satisfaction is often linked to reduced stress (Dodanwala et al., 2023).

Literature has identified and proved various job stressors, such as role ambiguity, role overload, work-family conflict, lack of autonomy, lack of supervisory support, poor rewards, or poor physical work environment, which contribute to negative emotional states and poor performance. Lin et al. (2024), in their study focusing on the banking industry in Taiwan, revealed significant relationships between various job stress factors, job satisfaction, and turnover intentions among employees. Specifically, stress arising from lack of job autonomy, workload, and interpersonal relationships stress were all positively correlated with overall job stress, indicating that increases in these specific stressors correspond with increases in overall job stress. Furthermore, these stressors were found to be negatively correlated with both intrinsic and extrinsic job satisfaction, suggesting that higher levels of job-related stress are associated with lower job satisfaction across different dimensions, which aligns with the literature on occupational stress and its impact on work outcomes. A similar relationship was also supported by the research of Brewer and McMahan-Landers (2003), who revealed that lack of organizational support had a significant negative impact on teacher educators' satisfaction with their job. According to Dodanwala et al. (2023) and Li et al. (2023), satisfaction can also act as a mediator in the relationship between job stressors and job stress. High levels of stressors can decrease job satisfaction, which in turn can lead to increased stress levels. This has been observed respectively in the construction industry and among Chinese government employees.

However, the relationship between job stress and job satisfaction might not always be linear. Adamopoulos and Syrou (2022), who refer to the International Labor Organization's research,

mention a curvilinear relationship as well among these constructs, where job satisfaction is more significant at ideal stress levels than when stress motivates the individual. Employees are dissatisfied when faced both with very low and very high stress levels. In addition, some studies have also shown an insignificant or even positive correlation between job stress and job satisfaction in specific contexts. [Mittal and Bhakar \(2018\)](#), citing studies by [Riaz et al. \(2016\)](#) on nurses and [Manzoor et al. \(2011\)](#) on university faculty members in Pakistan, suggested that job stress may, in some cases, have a positive influence on job satisfaction.

## 2.2. The Impact of Employee Gender, Age, Sector, Position, Experience and Type of Employment on the Levels of Job-Related Stress and Job Satisfaction

To understand the complex dynamics of workplace well-being, it is essential to examine how individual and job-related characteristics influence employees' experiences. This section explores the impact of gender, age, sector, position within the company, professional experience and type of employment on levels of job stress and job satisfaction. These factors not only shape how employees perceive and cope with work-related demands but also contribute to variations in motivation, performance, and overall psychological health. By analyzing these dimensions, we can identify patterns that help companies build more inclusive and effective human resource policies, ultimately fostering a healthier and more productive work environment.

As far as *gender* is concerned, various research contributions show different results. [Çali et al. \(2024\)](#), exploring the specific tasks that impact overall satisfaction among university lecturers in Albania, concluded that gender is the only demographic variable significantly influencing overall satisfaction, with men reporting being less satisfied than women. On the other hand, [Adib-Hajbaghery et al. \(2017\)](#), studying the relationship between job stress and job satisfaction in the case of Iranian nurses, revealed a significant difference in mean job stress scores between females and males, with females reporting higher stress ( $p=0.042$ ), but no significant difference in job satisfaction scores ( $p=0.764$ ). Other researchers, such as [Bemana et al. \(2013\)](#), [Yang et al. \(2021\)](#), and [Lin et al. \(2024\)](#), found no significant gender-based differences in terms of its impact on job stress and satisfaction.

In terms of *age*, [Chandraiah et al. \(2003\)](#), who tested specifically its impact on job stress and satisfaction among managers in India, concluded that younger managers (25–35 years) experienced higher job stress and lower job satisfaction than middle-aged (36–45) and older managers (46–55). On the other hand, in the case of [Lin et al. \(2024\)](#), employees over 50 years reported the highest job stress levels across all dimensions. Other research papers suggest a potential or indirect impact of age on job stress and satisfaction levels, such as in the case of [Yang et al. \(2021\)](#), [Li et al. \(2023\)](#), and [Çali et al. \(2024\)](#).

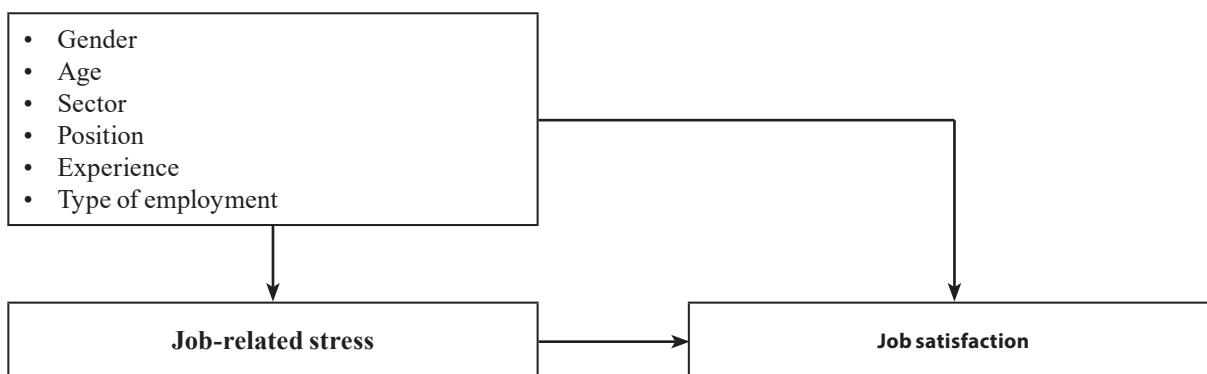
While many research articles admit or imply that the *sector* of employment may affect job stress and satisfaction, only some directly study public or government employees, but they do not provide detailed comparative findings between sectors. [Li et al. \(2023\)](#) focus specifically on government employees in China, examining how job stressors affect their health, with job satisfaction acting as a mediator. However, they do not provide comparisons with other sectors. Additionally, [Rizwan et al. \(2014\)](#), conducted research in both the private and public sectors in Bahawalpur to explore job-related stress. However, the specific differences in the relationship between job stress and satisfaction based on the sector were not fully elaborated.

[Kawada and Otsuka \(2011\)](#) highlighted a clear relationship between an employee's *position* within the organization and his/her level of job stress and satisfaction. Their findings revealed that managers

reported significantly lower levels of support than general workers, and that both job control and support played a key role in shaping job satisfaction. Additionally, unskilled manual workers showed greater dissatisfaction compared to clerical employees, emphasizing how job-related roles influence the experience of stress and satisfaction in the workplace. In contrast, Yang et al. (2021) included job position as a demographic variable in their analysis of stress, satisfaction, and performance, but did not provide specific findings regarding how position affects the relationship between job stress and satisfaction.

Literature has also indicated that a lack of *experience* might contribute to specific stressors like role conflict, but it does not provide a comprehensive analysis of how varying levels of general work experience directly influence overall job stress or job satisfaction. Instead, related demographic factors like age are discussed as moderators, with some findings suggesting that age (potentially as a proxy for experience or other life factors) is associated with differing levels of job stress and satisfaction. Rizwan et al. (2014) supported the argument that employees lacking experience and knowledge often face increased role conflict due to unclear responsibilities, which can increase job stress. On the other hand, Lin et al. (2024) found that age moderated the relationship between job stress, satisfaction, and turnover intention. Younger, higher-income, and more educated employees reported lower stress and higher satisfaction, whereas older participants (over 50) experienced higher stress and lower satisfaction. These insights suggest that while experience per se is not comprehensively analyzed, it may contribute to job stress and satisfaction indirectly through its relationship with role clarity and demographic substitutes such as age.

Regarding the impact that the *type of employment* (full-time vs. part-time) has on job stress and satisfaction levels, Kim and Cho (2020) provide direct and comprehensive evidence on this topic. Their study explicitly compared regular (full-time) and irregular (part-time/contract-based) employees, finding higher job autonomy and job satisfaction among regular employees, a higher job demand among irregular employees, together with a significant relationship between job stress and job satisfaction in both groups. They also concluded that management strategies should differ by employment type to enhance satisfaction and reduce stress. On the other hand, Yang et al. (2021) included in their model variables such as seniority and position, which could be correlated with employment type. But they did not provide specific findings directly linking employment type to job stress or satisfaction.



**Figure 1.** Proposed research model

Source: Own processing

Based on the above-mentioned arguments on the relationship between job-related stress and satisfaction, as well as those on the impact of gender, age, sector, position, experience and type of employment on job stress and satisfaction, we propose the following hypotheses and conceptual model for the case of the Albanian workforce:

- H1.** There is a significant relationship among employee stress levels and overall employee job satisfaction in Albania.
- H2.** There is a significant relationship among employee gender, age, job sector, job position, experience and type of employment and employee job stress levels.
- H3.** There is a significant relationship among employee gender, age, job sector, job position, experience and type of employment and employee job satisfaction levels.

### **3. RESEARCH METHODOLOGY**

#### **3.1. Sample and Data Collection**

To empirically examine the proposed hypotheses concerning the relationship between job-related stress and job satisfaction among Albanian employees, as well as the moderating effects of gender, age, sector, job position, work experience, and type of employment, a structured survey was administered. The survey targeted a randomly selected sample of employees across Albania, encompassing diverse demographic and professional characteristics, including both genders, a range of age groups, public and private sector affiliations, various job positions and experience levels, and both full-time and part-time employment statuses. A total of 250 questionnaires were distributed via Google Forms, of which 240 were deemed complete and valid for subsequent statistical analysis. The questionnaire used for the survey was based on a combination of two previously validated instruments, the Perceived Stress Scale (PSS) developed by [Cohen et al. \(1983\)](#) to measure perceived stress levels and the Job Satisfaction Survey (JSS) developed by [Spector \(1985\)](#) to measure employee attitudes about the job and various aspects of the job, i.e., job satisfaction.

The Perceived Stress Scale (PSS) is one of the most popular psychological tools for assessing stress perception. It evaluates the degree to which individuals perceive situations in their lives as stressful, unpredictable, uncontrollable, and strained over the past month. The original scale consists of 14 items (PSS-14), but there is also a shorter version consisting of only 10 items (PSS-10), which was used for this research. Respondents must rate each item on a 5-point Likert scale, and higher scores indicate greater perceived stress. The PSS is valued for its simplicity, reliability, and validity across diverse populations. For purposes of this research the PSS was adjusted to include questions that deal with job-related stress and the ability of employees to manage it.

The Job Satisfaction Survey (JSS), on the other hand, is designed to measure employees' overall job satisfaction as well as satisfaction across nine specific job aspects: pay, promotion, supervision, fringe benefits, contingent rewards, operating conditions, coworkers, nature of work, and communication. It consists of 36 items rated on a 6-point Likert scale, ranging from "disagree very much" to "agree very much". Items are written in both directions, so around half of them must be reverse-scored. This questionnaire allows researchers and practitioners to assess both intrinsic and extrinsic aspects of job satisfaction. The JSS has been validated across various organizational settings and is particularly noted for its comprehensive scope and ease of application in both public and private sectors.

The collected data were subjected to factor analysis and reliability testing to assess the internal consistency and construct validity of the job stress and job satisfaction measures within the Albanian context. Subsequently, a multiple regression analysis was conducted to examine the relationship between job stress and job satisfaction, as well as to evaluate the influence of gender, age, employment sector, job position, work experience, and type of employment on both constructs.

### 3.2. Demographic Profile

The demographic profile of the respondents participating in this study is characterized by a female majority, comprising 80% of the sample. In terms of age distribution, there is a relatively balanced representation across various age groups, with participants aged 36–45 accounting for the largest share (35%), followed by those aged 26–35 and 46–55, each representing 25%. Participants aged 56 and above accounted for only 7% of the total. Regarding the employment sector, just over half of the respondents (51%) are employed in the public sector, while 45% in the private sector. Only 4% of them are employed in non-profit organizations. In terms of job positions, middle-level ones are the most common (45%), followed by high-level positions (35%). Operational level and executive roles are less represented, at 13% and 7% respectively. As for work experience, nearly half of the respondents (46%) have over 16 years of professional experience. The remaining participants fall into the following experience categories: 6–10 years (20%), 11–15 years (18%), and 0–5 years (16%). Employment type is predominantly full-time, with 92% of respondents indicating full-time work. Part-time employment accounts for 5%, while freelancers and temporary employees make up only 2% and 1% of the respondents, respectively.

### 3.3. Measures

#### 3.3.1. Job-related stress JRS

This variable was operationalized as a multidimensional construct based on an adjusted version of the scale developed by [Cohen et al. \(1983\)](#). Items used to measure this dimension are the following: 1) Over the past month, how often have you felt that you couldn't handle your work responsibilities? 2) Over the past month, how often have you felt that you had too many tasks to handle at the same time? 3) Over the past month, how often have you felt nervous or stressed due to unexpected challenges at work? 4) Over the past month, how often have you felt that the workload was more than you could manage? 5) Over the past month, how often have you felt that you had no control over your schedule or work responsibilities? 6) Over the past month, how often have you felt confident in your ability to handle pressures at work? (R) 7) Over the past month, how often have you felt that your work was affecting your personal well-being? 8) Over the past month, how often have you felt physically or mentally exhausted after a work shift? 9) Over the past month, how often have you been frustrated by work situations that were out of your control? 10) Over the past month, how often have you felt that you were managing stress effectively at work? (R). A five-point Likert scale (0 = "never"; 5 = "very often") was used to measure all these items. The negatively worded items (R) were reverse-coded before analysis to ensure they aligned with the intended construct measurement.

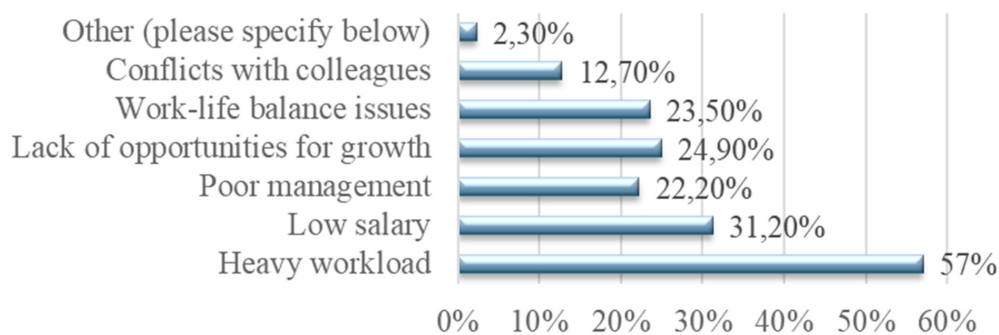
#### 3.3.2. Job satisfaction

This variable was operationalized as a multidimensional construct using the scale developed by [Spector \(1985\)](#). As mentioned above, this instrument contains 36 items which can be grouped by 4 into nine categories, each representing a specific aspect of job satisfaction: 1) pay, 2) promotion, 3) supervision, 4) fringe benefits, 5) contingent rewards, 6) operating procedures, 7) coworkers, 8) nature of work, 9) communication. A six-point Likert scale (1 = "very much disagree"; 6 = very much agree") was used to measure the items. 19 out of 36 of them were negatively worded; therefore, to be in line with the intended construct measurement, they were reverse-coded (items: 2, 4, 6, 8, 10, 12, 14, 16, 19, 23, 23, 24, 26, 29, 31, 32, 34, 36)

## 4. RESULTS AND FINDINGS

### 4.1. Major Sources of Stress

The survey data revealed that the major sources of stress among Albanian employees are: 1) work overload (in 57% of cases), 2. low salary (in 31.2% of cases), and 3) poor management, work-life balance issues and lack of growth opportunities (in 22.20%-24.90% of cases). As the following chart shows, conflicts with colleagues can also be a source of stress, but this was the case for only 12.70% of the respondents. Other sources of stress, which cumulatively accounted for 2.3% of the respondents, included student behavior and lack of discipline (in the case of the education sector), pressure to meet targets, lack of information from people in charge, staff overload, conflicts with supervisors, inconvenient transportation, political favoritism etc.



**Figure 2.** Major sources of stress

Source: Own processing

### 4.2. Factor and Reliability Analysis

Factor analysis is a statistical method used to reveal hidden relationships among observed variables by grouping them into latent constructs or factors (Meyers et al., 2013). It allows for the aggregation of diverse information from several variables into a reduced set of factors, making the data more concise and manageable. In this study, factor analysis was performed using Varimax rotation. When performing such an analysis, importance should be paid to the factorial weights of each item. The following presents a summary of the factor analysis results:

A principal component analysis was conducted for both job-related stress and job satisfaction, using the criterion of eigenvalues greater than one. Initially, the communalities for each item were examined to determine the proportion of variance explained by the extracted factors for both constructs. However, in the case of job-related stress, item JRS 7 was removed from the model due to its low factor loading (0.384). A subsequent analysis was then performed with the remaining nine items. The results are presented in the table above. The communalities in the case of job-related stress vary from 0.453 to 0.693, indicating varying degrees of contribution to the factors among items. So, items such as JRS 3, JRS 4, JRS 6, JRS 8 and 10 have relatively high communalities (ranging from 0.600-0.693), suggesting that they are well-represented by the extracted factors and contribute significantly to the job-related stress construct, whereas the remaining items can be considered as moderate contributors. Following the same logic, in the case of the job satisfaction construct, items such as JS 1 (0.772), JS 5 (0.813), and JS 10 (0.856) can be considered as strong contributors, while the remaining are moderate contributors. Cronbach Alpha coefficient was used to test the constructs' reliability (Hair et al., 2010). In both cases, it resulted in a value higher than 0.700, indicating a satisfactory level of reliability.

**Table 1.** Summary of measurement scales

Constructs	Items	Cronbach Alpha	Factor loading
<i>Job related stress JRS</i>	JRS 3. Over the past month, how often have you felt nervous or stressed due to unexpected challenges at work?	0.777	0.603
	JRS 4. Over the past month, how often have you felt that the workload was more than you could manage?		
	JRS 6. Over the past month, how often have you felt confident in your ability to handle pressures at work? (R)		
	JRS 8. Over the past month, how often have you felt physically or mentally exhausted after a work shift?		
	JRS 10. Over the past month, how often have you felt that you were managing stress effectively at work? (R)		
	JRS 1. Over the past month, how often have you felt that you couldn't handle your work responsibilities?		
	JRS 2. Over the past month, how often have you felt that you had too many tasks to handle at the same time?		
	JRS 5. Over the past month, how often have you felt that you had no control over your schedule or work responsibilities?		
	JRS 9. Over the past month, how often have you felt that you had no control over your schedule or work responsibilities?		
	JRS 7. Over the past month, how often have you felt that you were managing stress effectively at work? (R)		
<i>Job satisfaction JS</i>	JS 1. Pay	0.782	0.772
	JS 2. Promotion		0.664
	JS 3. Supervision		0.448
	JS 4. Fringe benefits		0.605
	JS 5. Contingent rewards		0.813
	JS 6. Operating procedures		0.662
	JS 7. Coworkers		0.673
	JS 8. Nature of work		0.441
	JS 9. Communication		0.856

Source: Own processing

### 4.3. Regression Analysis

Two regression analyses were conducted to test the hypothesis proposed in this research paper. At first, a multiple regression analysis was performed to test the impact of: 1) job-related stress (JRS), 2) gender (G), 3) age (A), 4) sector (Sec), 5) job position (JP), 6) experience (Ex) and 7) type of employment (TE), as independent variables on job satisfaction, as the dependent variable.

**Table 2.** Regression analysis 1 (model summary)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.595 <sup>a</sup>	.354	.331	.47539

a. Predictors: (Constant), Gender (G); Age (A); Sector (Sec); Job position (JP); Experience (Ex); Type of employment (TE); Job related stress (JRS)

Source: Own processing

**Table 3.** Regression analysis 1 (ANOVA)

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	24.980	7	3.569	15.791	.000 <sup>b</sup>
	Residual	45.651	202	.226		
	Total	70.631	209			

a. Dependent Variable: Job satisfaction (JS)

Source: Own processing

The results of this multiple regression analysis indicate that overall, the model is highly significant (F-value = 15.791, p-value = .000). All independent variables, taken together, explain the variance of the dependent variable, Job Satisfaction.

**Table 4.** Regression analysis 1 (Coefficients)

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.463	.282		15.820	.000
<b>Job related stress</b>	<b>-.392</b>	<b>.061</b>	<b>-.368</b>	<b>-6.462</b>	<b>.000</b>
Gender	-.191	.086	-.127	-2.216	.028
Age	.059	.052	.107	1.145	.254
<b>Sector</b>	<b>.457</b>	<b>.063</b>	<b>.436</b>	<b>7.251</b>	<b>.000</b>
Job position	-.008	.044	-.011	-.189	.850
Experience	-.037	.048	-.074	-.783	.435
Type of employment	-.204	.119	-.100	-1.711	.089

a. Dependent Variable: Job satisfaction

Source: Own processing

Additionally, as Table 4 shows, there is a significant inverse relationship between job-related stress (as an independent variable) and Overall job satisfaction among Albanian employees (as a dependent variable) (p-value = .000), indicating that the *H1 hypothesis is true*, as the literature suggests. The analysis suggests, as well a significantly positive relationship between the Sector employees are engaged in (as an independent variable) and employees' Overall job satisfaction as a dependent variable (p-value = .000), indicating that *H2 holds true only in the case of the job sector*. The other independent variables, such as gender, age, job position, experience and type of employment, seem to have little or no impact on Albanian employees' job satisfaction. The respective regression equation resulting from this analysis is as follows:

$$\text{Job Satisfaction (JS)} = 4.463 - 0.392 \times \text{JRS} - 0.191 \times \text{G} + 0.059 \times \text{A} + 0.457 \times \text{Sec} - 0.008 \times \text{JP} - 0.037 \times \text{Ex} - 0.204 \times \text{TE}$$

A second regression analysis was conducted as well to test the third hypothesis. As the following tables show, no significant relationships resulted among: 1) gender, 2) age, 3) sector, 4) job position, 5) experience, and 6) type of employment, as independent variables and Albanian employees' stress levels (Job related stress), as a dependent variable, indicating that H3 is not accepted.

**Table 5.** Regression analysis 2 (ANOVA)

ANOVA <sup>a</sup>					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.795	6	.132	.437	.853 <sup>b</sup>
Residual	61.467	203	.303		
Total	62.261	209			

a. Dependent Variable: JRS (job related stress)  
 b. Predictors: (Constant), Gender (G); Age (A); Sector (Sec); Job position (JP); Experience (Ex); Type of employment (TE);

Source: Own processing

**Table 6.** Regression analysis 2 (Coefficients)

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.977	.251		11.867	.000
Gender	-.010	.100	-.007	-.101	.920
Age	-.044	.060	-.085	-.742	.459
Sector	-.084	.073	-.086	-1.159	.248
Job position	.011	.050	.016	.216	.829
Experience	.006	.055	.013	.107	.915
Type of employment	.070	.138	.037	.504	.615

a. Dependent Variable: JRS (Job related stress)

**Source:** Own processing

## 5. FUTURE RESEARCH DIRECTIONS

This study is an added contribution to the literature dedicated to the relationship among job related stress and job satisfaction, confirming what most of the literature supports, an inverse relationship between these constructs. It also identified a strong positive relationship between the sector in which employees are engaged and job satisfaction, indicating a higher level of job satisfaction among private sector employees.

However, the study was subject to some limitations that can be overcome in future research contributions. At first, it did not differentiate among various industries operating in Albania. Future studies could investigate if sector-specific factors play a role in influencing stress and satisfaction levels, as well as their relationship. This would help identify necessary interventions organizations might undertake to address the unique stressors faced by employees in different sectors. Furthermore, as workplace dynamics in Albania continue to evolve, future research could also focus on the impact of emerging trends such as remote work and digitalization.

Coping mechanisms used by Albanian employees to manage job-related stress might also be a valuable contribution to future research. By identifying the strategies that employees utilize, researchers can offer practical understandings into how organizations can support their workforce in managing stress and increasing job satisfaction.

Lastly, the role of organizational factors such as perceived support, leadership quality, and communication transparency should be explored to identify how these elements influence the relationship between stress and job satisfaction. These areas of research will provide valuable insights for both employers and policymakers in Albania, helping them to create healthier work environments and improve the well-being of employees across industries.

## 6. CONCLUSION

This study contributes to the growing body of literature on the relationship between job-related stress and job satisfaction by focusing on the Albanian workforce. The findings of this research confirm the inverse relationship between job stress and job satisfaction, supporting the widespread

view in the literature that higher levels of stress are associated with lower levels of job satisfaction (Brewer & McMahan-Landers, 2003; Lin et al., 2024). Moreover, the study reveals that job satisfaction is significantly influenced by the sector in which employees are engaged, with those in the private sector reporting higher levels of job satisfaction. This result aligns with prior studies that highlight the positive correlation between job satisfaction and sector-specific characteristics (Li et al., 2023; Yang et al., 2021). The study also indicates that certain demographic factors, such as gender, age, job position, and work experience, do not demonstrate significant relationships with job-related stress or job satisfaction. This finding suggests that the impact of these factors may be more complex or context-dependent, and further research is needed to explore these dynamics in greater detail.

The research also identifies the major sources of workplace stress in Albania, such as work overload, low salaries, poor management, and work-life balance issues. These stressors are consistent with global findings and provide insight into the specific challenges faced by Albanian employees. By addressing these issues, organizations can improve employee well-being and enhance job satisfaction.

Besides its valuable contribution, this research is not without limitations. Future research should examine sector-specific factors that influence stress and satisfaction levels, as well as explore the effects of emerging workplace trends such as remote work and digitalization. Additionally, investigating the coping mechanisms employed by employees to manage stress would provide practical recommendations for organizations looking to support their workforce. Furthermore, the role of organizational factors like leadership quality and communication transparency should be explored to understand how these elements impact the stress-satisfaction relationship.

Overall, this study emphasizes the importance of promoting a healthier work environment in Albania by addressing key stressors and improving job satisfaction. Policymakers and organizational leaders should consider these findings when developing strategies to enhance employee well-being and productivity across different sectors.

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# The Impact of Employee Satisfaction on Customer Retention in the Software as a Service Sector

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**Abstract:** *Customer retention is a critical determinant of profitability in the Software as a Service (SaaS) industry due to its reliance on subscription-based revenue models. Although theoretical frameworks suggest that employee satisfaction, particularly among customer-facing roles, influences customer loyalty, empirical research in the SaaS context remains limited. This study investigates the relationship through a case study of a North Macedonian SaaS company, utilizing a mixed-methods approach with employee surveys and customer retention data over two years. Despite a high survey response rate (93.94%), the findings reveal no statistically significant direct correlation. Nevertheless, the results indicate that employee satisfaction may indirectly contribute to improved customer experience, supporting retention efforts. The study highlights the stronger role of relationship marketing in fostering loyalty and suggests that while employee satisfaction alone may not directly drive retention, it remains essential to sustaining a customer-focused workforce. Future research across broader contexts is recommended.*

## 1. INTRODUCTION

The relationship between employee satisfaction and customer retention has emerged as a critical topic within contemporary business research. Extensive literature posits that satisfied employees contribute to improved customer interactions, fostering greater loyalty and retention outcomes (Harter et al., 2002). Nonetheless, empirical exploration of how discrete dimensions of the employee experiences, such as job satisfaction, organizational culture, and development opportunities, impact customer retention in B2B and SaaS (Software as a Service) sectors remains underdeveloped.

Customer retention is of paramount importance within the SaaS industry, where subscription-based models necessitate long-term customer engagement for profitability (Cusumano, 2008; Gupta et al., 2004). Moreover, minimal switching costs heighten competitive pressures, requiring companies to continuously innovate and deliver value (Burnham et al., 2003). This study investigates the nexus between employee satisfaction and customer retention through a case study of a North Macedonian SaaS firm specializing in HR technology solutions. Operating in competition with multinational corporations such as Oracle and Workhuman, the firm's distinctive boutique service model and embedded employee engagement practices present an ideal setting for analysis. Employing a mixed-methods approach, the study seeks to elucidate how internal employee satisfaction initiatives translate into customer loyalty, contributing both to theoretical discourse and to practical strategies for SaaS organizations.

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## 2. LITERATURE REVIEW

### 2.1. Relationship Marketing and Its Connection to Customer Retention

Relationship marketing emerged in the early 1990s as a strategic shift away from transactional marketing, focusing on building long-term customer relationships rather than maximizing short-term sales (Gummerus et al., 2017). Unlike conventional marketing, which is sales-driven and short-term oriented (Šonková & Grabowska, 2015), relationship marketing emphasizes trust, commitment, service quality, and mutual value (Buttle, 1996; Marshall, 2010). Palmatier (2008) defines it as the process of identifying, developing, and maintaining relational exchanges to enhance performance, while Harker (1999) highlights the proactive development of profitable customer relationships over time.

Empirical research supports its influence on customer retention and behavioral loyalty (Bolton et al., 2000; Reichheld, 2001; Verhoef, 2003), showing that firms benefit from reduced churn, higher profitability, and stronger relational bonds (Sin et al., 2005; Sirdeshmukh et al., 2002). Relationship marketing proves especially effective in service industries, where trust and interaction compensate for product intangibility (Palmatier, 2008; Sijtsma, 2009). In the SaaS context, where switching costs are low and service quality expectations are high, relationship marketing helps firms foster loyalty and minimize churn (Berry, 1995; Dwyer et al., 1987; Palmer et al., 2013). Furthermore, satisfied customers influenced by relationship marketing tend to engage in advocacy and exhibit long-term loyalty (Aka et al., 2016; Alrubaiee & Al-Nazer, 2010).

### 2.2. Customer Retention in the Service Industry

Customer retention has gained strategic importance due to increased competition and customer choice (Gupta & Zeithaml, 2006; Raab et al., 2016). Defined as the ongoing commitment to repurchase from the same provider (Zineldin, 2000), retention enhances profitability through lower service costs, increased loyalty, and greater resistance to competitors (Coussement & De Bock, 2013; Harriet et al., 2024). Research indicates a strong correlation between retention and financial performance (Bernhardt et al., 2000), especially in mature markets (Bolton & Tarasi, 2007). The service sector's intangibility and high customer interaction demand retention-focused strategies (Aflaki & Popescu, 2014; Bolton et al., 2006). Service quality and satisfaction, though often equated, differ: quality involves service delivery dimensions (reliability, assurance), while satisfaction encompasses broader evaluations including pricing and context (Cronin et al., 2000; Hernon & Nitecki, 2001). Effective management of retained, at-risk, and churned customers supports long-term profitability (Griffin & Lowenstein, 2001; Peppers & Rogers, 2011). Retention also benefits from combining traditional and digital strategies (Osakwe & Anaza, 2018), and understanding churn triggers is essential for proactive customer engagement.

### 2.3. Customer Satisfaction as a Retention Driver

Customer satisfaction is a central construct in relationship marketing and a primary predictor of retention (Kotler, 1994; Rust & Zahorik, 1993). Long-term (cumulative) satisfaction has a stronger impact on loyalty and firm profitability than transaction-specific evaluations (Anderson et al., 1994; Boulding et al., 1993). Satisfied customers tend to repeat purchases, refer others, and are less price-sensitive (Hansemark & Albinsson, 2004; Mittal & Frennea, 2010). Importantly, satisfaction is not merely emotional; it is tied to expectations and perceived fulfillment (Homburg et al., 2005). Although satisfaction is widely accepted as a retention prerequisite, its direct correlation with actual repurchase behavior is complex. Studies using aggregate financial data show limited predictive validity due to confounding

variables (Anderson et al., 1994; Reichheld & Sasser, 1990). In contrast, individual-level studies using repurchase intentions also show inconsistencies due to common-method bias and intention-behavior gaps (Bolton, 2020). Real purchase data reveal only weak satisfaction-retention correlations, with many satisfied customers still switching brands (LaBarbera & Mazursky, 1983; Reichheld & Sasser, 1993).

## 2.4. The Role of Employee Satisfaction

A growing body of research identifies employee satisfaction as a key enabler of customer satisfaction and retention, especially in service-driven industries (Alshurideh, 2017; Chi & Gursoy, 2009). Satisfied employees tend to offer better service, express empathy, and positively influence customer experience (Al Kurdi et al., 2020; Van Dolen et al., 2004). Conversely, disengaged employees may hinder customer satisfaction through poor interactions (Ugboro & Obeng, 2000). The quality of front-line service directly impacts perceptions of the brand, loyalty, and repurchase behavior (Brown & Lam, 2008; Mägi, 2003).

Employee satisfaction is also foundational for successful CRM strategies, enabling consistent, personalized service and lower turnover (Homburg et al., 2009; Mithas et al., 2005). High turnover disrupts relationship continuity and erodes trust (Tett & Meyer, 1993). Moreover, employee satisfaction boosts engagement, skill development, and internal advocacy (Alshurideh et al., 2015; Matzler & Renzl, 2007), while dissatisfaction contributes to withdrawal, increased costs, and service inconsistency (Zeffane & Zarooni, 2008). While some early studies question the direct financial impact of employee satisfaction (Bernhardt et al., 2000), the majority of recent literature supports a positive link between employee satisfaction, service quality, and customer retention (Evanschitzky et al., 2011; Heskett et al., 1994).

## 3. RESEARCH METHODOLOGY

This research adopts a deductive approach, following the top-down logic of developing hypotheses from theory and testing them with empirical data (Creswell & Plano Clark, 2007). The central research question is: *Does employee satisfaction influence customer retention?* To explore this, we adopt the conceptual model developed by Jung and Yoon (2013), which illustrates the hypothesized relationships between employee satisfaction, customer satisfaction, and customer loyalty. To comprehensively address the research question, this study employs a mixed-methods strategy, combining both quantitative and qualitative data. As Soiferman (2010) notes, these methods are not mutually exclusive and can complement each other in deepening understanding. This study draws from both primary and secondary data sources. Secondary data was retrieved from internal company records regarding customer retention, employee-related policies, and initiatives for the years 2022 and 2023. This data helps determine the company's year-on-year customer retention rates. Primary data collection was conducted via an Employee Satisfaction Survey administered to all front-line employees (those in Sales, Customer Success, Customer Support, and Marketing roles), who maintain direct contact with customers. Out of 33 invited participants across North Macedonia, Croatia, and the USA, 31 responses were received, resulting in a 93.94% response rate. The sampling approach used was non-probability sampling, common in exploratory studies that target specific subgroups (Etikan, 2017). The survey developed is based on prior validated tools (Abdulla et al., 2011; Alegre et al., 2016), consisted of three segments: demographic information, 34 Likert-scale items across seven satisfaction categories, and one open-ended qualitative question. The Likert-scale questions were grouped into the following categories:

- Job Satisfaction (7 items),
- Company Culture (6 items),

- Professional Growth (6 items),
- Management Relationship (5 items),
- Compensation and Benefits (4 items),
- Rewards and Recognition (3 items),
- Work-Life Balance (3 items).

The qualitative question aimed to gather insights on year-over-year changes in the company's approach to employee satisfaction. This narrative component was later analyzed using narrative analysis, a method suited for open-ended survey responses.

The survey sample represents the customer-facing population of a company with 80 total employees. The gender distribution among respondents was 61.3% female and 38.7% male, which differs from national IT workforce trends (Inovativnost.mk, 2016) due to the non-technical nature of front-office roles. Most respondents were under the age of 41, and 84% held a Bachelor's degree. In terms of tenure, the largest segment had been with the company between one and two years (39%), followed by two to three years (29%).

Quantitative data from the surveys and company records were subjected to data cleaning, validation, and coding to ensure quality. Descriptive statistics were used to explore the dataset in terms of frequency, central tendency, and variation. To test the hypothesized relationships between employee satisfaction and customer retention, regression analysis was employed as an inferential method.

All participants were informed of the purpose and confidentiality of the study, and informed consent was obtained in line with ethical research principles. By employing both qualitative and quantitative methods, this research aims to offer a holistic understanding of how employee satisfaction impacts customer retention, particularly in a SaaS business context.

## **4. RESEARCH RESULTS AND ANALYSIS**

The fourth chapter will feature a presentation of the results of the research conducted for the purposes of this paper, along with an analysis of the data we gathered, and will set a base for the conclusions and recommendations.

### **4.1. Employee Satisfaction Survey Results Presentation**

The Employee Satisfaction Survey explored seven key dimensions of satisfaction among 31 front-line employees. Overall, the responses reflect a high level of satisfaction across most categories, with several areas identified for improvement.

**Job Satisfaction:** Most respondents felt their work is meaningful (83.9%) and that they have freedom in how they do their jobs (80.6%). A strong majority (58%) stated their workload is reasonable, while 90.3% believe they understand what's needed to meet objectives. Notably, 80.7% would recommend the company, and 80.7% felt their talents are utilized. While 58.1% reported low stress, about 20% did feel some stress from their job.

**Company Culture:** Employees generally enjoy the company culture (87.1%) and feel connected to coworkers (83.8%) with strong perceptions of teamwork (87.1%) and job satisfaction (87.1%). However, communication of important information showed mixed results, with 67.8% rating it positively and 12.9% expressing doubt. Most (67.7%) believe the company handles problems well.

**Professional Growth:** Positive views were reflected in statements about professional development. About 83.8% felt they are growing and developing new skills, and 77.4% believe their job utilizes their abilities. Promotion opportunities were recognized by 67.7%, though 16.2% expressed neutrality or dissatisfaction with growth paths.

**Management Relationship:** A large portion of employees feel supported by their managers—77.4% say their opinions are valued, and 83.8% feel appreciated. Furthermore, 87.1% agree that management is invested in team success and transparent in communication.

**Compensation and Benefits:** Most respondents (77.4%) feel their benefits are competitive, and 90.3% are satisfied with well-being/mental health support. Opinions on salary sufficiency were more varied, with 61.3% stating their pay prevents the need for a second job. Most (80%) feel comfortable requesting leave when needed.

**Rewards and Recognition:** Nearly 81% feel recognized for their extra effort, and 87.1% are satisfied with the recognition they receive. A majority (77.4%) agree that rewards are appropriate.

**Work-Life Balance:** Most respondents (64.5%) do not find their typical workday highly stressful, and 83.9% feel supported and given the flexibility needed to thrive. Moreover, 61.3% say they rarely have to cancel personal plans due to workload.

In summary, the results indicate high levels of satisfaction across employee engagement, culture, and growth areas. Some areas, such as communication clarity, career path visibility, and compensation, may benefit from closer review and targeted improvement initiatives.

## 4.2. Statistical Analysis of the Employee Satisfaction Data

This chapter presents the statistical results and interpretation of the Employee Satisfaction Survey, combining both quantitative and qualitative findings. The goal is to assess how different dimensions of employee satisfaction may influence customer retention.

### 4.2.1. Descriptive Statistics Summary

The survey encompassed 34 Likert-scale items across seven dimensions: Job Satisfaction, Company Culture, Professional Growth, Management Relationship, Compensation & Benefits, Rewards & Recognition, and Work-Life Balance. The highest mean scores were observed in items related to team collaboration, company culture, and management investment in team success (e.g., *“I feel my colleagues work as a team”* and *“I am satisfied working for the company”* both scored 4.48). These results indicate strong cohesion and satisfaction with company culture and management.

Professional Growth received generally favorable responses, with slightly lower mean scores (3.81 to 4.13), suggesting room for improvement in career path clarity and development opportunities. Compensation & Benefits showed a mixed picture: employees rated mental health and well-being benefits highly (4.45), while salary-related satisfaction was more varied (mean 3.81). Work-life balance results showed the widest range, with an average of 3.61 for daily stress levels, and only 1.94 for workload interfering with personal plans, suggesting that work-related stress and flexibility remain areas for improvement.

To validate the consistency of responses within each group of related questions, Cronbach’s alpha was calculated in Table 1.

**Table 1.** Cronbach’s alpha values per group

Group of questions (Factor)	Cronbach's alpha value
Job Satisfaction	$\alpha \approx 0.699$
Company Culture	$\alpha \approx 0.904$
Professional Growth	$\alpha \approx 0.942$
Management Relationship	$\alpha \approx 0.928$
Comp & Ben	$\alpha \approx 0.790$
Rewards & Recognition	$\alpha \approx 0.918$
Work-Life Balance	$\alpha \approx 0.071$

**Source:** Own calculations

These values suggest high internal consistency for most scales ( $\alpha > 0.7$ ), except for Work-Life Balance ( $\alpha \approx 0.071$ ), indicating poor internal reliability, likely due to limited cohesion among the items in that group. This aligns with cautions raised by researchers such as Cortina (1993), Ritter (2010), and Sijtsma (2009) regarding limitations in using Cronbach’s alpha alone.

As previously explained, the different sections of the survey represent the different factors that determine employee satisfaction. We divided the different types of variables and appointed Job Satisfaction as the outcome variable while all of the others (Company Culture; Professional Growth; Management Relationship; Compensation and Benefits; Rewards and Recognition; and Work-Life Balance) as predictor variables, having in mind that this is a non-experimental research and we do not have any influence or control of any of the variables (Skidmore, 2008). We ran a linear regression analysis and got the following results, presented in Table 2.

**Table 2.** Linear regression analysis results

Group of questions (Factor)	coef	std err	t	P> t	[0.025	0.975]
Job Satisfaction (const)	0.8785	0.289	3.040	0.006	0.282	1.475
Company Culture AVG	0.1456	0.223	0.654	0.519	-0.314	0.605
Professional Growth AVG	0.0512	0.130	0.394	0.697	-0.217	0.319
Management Relationship AVG	0.2865	0.109	2.628	0.015	0.061	0.511
Comp & Ben AVG	0.1859	0.141	1.314	0.201	-0.106	0.478
Rewards & Recognition AVG	-0.0297	0.121	-0.245	0.808	-0.280	0.220
Work-Life Balance AVG	0.1393	0.109	1.280	0.213	-0.085,	0.364

**Source:** Own calculations

The model’s R-squared = 0.873, meaning 87.3% of the variance in Job Satisfaction is explained by the included predictors—an excellent fit. However, only Management Relationship emerged as a statistically significant predictor ( $p < 0.05$ ), highlighting the vital role that supportive management plays in shaping overall satisfaction. Other dimensions, although positively correlated, lacked sufficient evidence to establish significance.

#### 4.2.2. Analysis of Qualitative Employee Satisfaction Data

The final survey question explored employees’ perception of year-on-year changes in the company’s efforts to improve their experience. Out of 31 valid responses, 11 employees reported positive changes, citing initiatives like psychological support programs, wellness activities, and enhanced recognition platforms. 6 employees gave unclear or non-applicable responses (e.g., new hires without historical context). 4 reported no notable changes, though still expressed general satisfaction. 2 expressed concern, noting reduced personal touch due to company growth or fewer perceived opportunities for development. These findings reinforce the quantitative results—employees generally perceive consistent or improving support, though a small minority signals areas for potential HR attention.

### 4.2.3. Customer Retention Data and Analysis

When it comes to the customer retention rates that the company marks, we have gathered secondary data from the company's reports and wider documentation. Since the data are confidential nature, specifics and details will not be disclosed in this paper. However, numeric data was at our disposal, and clearance was granted to use said data for our research purposes. Customer retention rates for 2022 and 2023, calculated using the formula:

$$[(E-N)/S] \times 100 = CRR$$

Are presented in Table 3, where (S) is the number of customers at the period start, (E) is the number of customers at period end, and (N) is the number of customers added over the period.

**Table 3.** Customer retention data

Period	No. of customers at start of period	No. of customers added during period	No. of customers at end of period
2022	11	6	17
2023	17	8	25

**Source:** Own calculations

As can be noticed from the table showcasing company client data, there is no customer lost in either of the years that are the focus of this research. Hence, the retention rates amount to 100% in both of the reviewed periods.

### 4.2.4. Summary on Employee Satisfaction's Impact on Customer Retention

The findings support the Service-Profit Chain model (Heskett et al., 1994), which links employee satisfaction to service quality and ultimately customer loyalty. The high internal consistency in Professional Growth ( $\alpha \approx 0.942$ ), Management Relationship ( $\alpha \approx 0.928$ ), and Company Culture ( $\alpha \approx 0.904$ ) suggests employees feel valued and aligned with organizational goals—crucial predictors of service quality and customer satisfaction (Harter et al., 2002; Maslach et al., 2001).

The regression model emphasized management practices as the most critical driver of satisfaction, consistent with Bolino and Turnley's (2003) claim that feeling appreciated boosts employee engagement and customer care quality. The 100% customer retention rate provides circumstantial evidence supporting the theory that engaged, satisfied employees contribute to lasting customer relationships (Koys, 2001).

## 5. CONCLUSION (DISCUSSION AND RECOMMENDATIONS FOR FURTHER RESEARCH)

The research presented in this paper reaffirms the substantial body of literature suggesting a strong correlation between employee satisfaction and customer retention. As observed in earlier studies by Bernhardt et al. (2000), Harter et al. (2002), Koys (2001), and Wangenheim and Bayón (2007), there is consistent evidence that satisfied employees positively influence customer satisfaction. Our findings support this notion and provide further empirical grounding. The company in focus successfully maintained high levels of employee satisfaction, which corresponded with exceptional customer retention rates during 2022 and 2023. These outcomes lend credibility to the assertion that internal workplace satisfaction is intrinsically linked to customer loyalty and organizational success.

The results strongly align with the arguments made by [Brown and Lam \(2008\)](#), who emphasize that front-line employee satisfaction directly affects customer experience. Employees who are content and motivated are more inclined to provide high-quality service, which in turn enhances customer satisfaction and encourages loyalty. This claim is further supported by [Hartline and Ferrell \(1996\)](#) and by [Alshurideh et al. \(2012\)](#), whose work underscores the importance of employee motivation and engagement in delivering consistent, customer-centered service.

The dual benefit of employee satisfaction is clearly reflected in this research. As outlined by [Evanschitzky et al. \(2011\)](#), improving employee satisfaction not only elevates productivity and organizational performance, but it also creates a more favorable experience for the customer. This duality has been highlighted in the work of [Matzler and Renzl \(2007\)](#), as well as [Alshurideh et al. \(2015\)](#), where a satisfied workforce serves as both a performance driver and a foundational component of client satisfaction. Furthermore, the environmental factors that influence satisfaction, particularly those discussed by [Spector \(2008\)](#) and [Lambert et al. \(2001\)](#) such as the company's management climate, compensation, advancement opportunities, and interpersonal dynamics are clearly shown to play a vital role in shaping employee attitudes and engagement levels.

The study is closely aligned with the Service-Profit Chain model proposed by [Heskett et al. \(1994\)](#), which highlights a direct pathway from employee satisfaction to service quality, and finally, to customer loyalty. In the company analyzed, areas such as Company Culture, Professional Growth, and Management Relationship were especially prominent in contributing to overall job satisfaction. The statistical analysis confirmed that Management Relationship was a significant predictor of job satisfaction, reaffirming the idea that leadership practices rooted in feedback, appreciation, and support are crucial in fostering a productive and committed workforce. As this research shows, a positive internal climate and strong management-employee relationships not only improve the work environment but also equip employees to deliver better service, thereby nurturing stronger, more loyal customer relationships.

However, despite the strength of the correlation observed in this research, it is essential to acknowledge the inherent limitations of asserting causality. The cross-sectional survey design and linear regression analysis provide meaningful insights into relationships but cannot definitively establish a cause-and-effect dynamic. Although our findings suggest that employee satisfaction plays a significant role in influencing customer retention, they do not isolate it as the sole determinant. Customer loyalty is shaped by numerous other factors, such as product quality, pricing, customer support infrastructure, and broader market dynamics. While the research supports the theory that satisfied employees contribute positively to customer relationships, the influence of these additional variables should not be overlooked.

Several further limitations emerge from the design of the study. First, the research focuses on a single company, which necessarily limits the ability to generalize the findings. Second, the sample itself is relatively small and drawn exclusively from front-line employees - those in direct contact with customers. While this decision was made to ensure the sample's relevance to the research question, it excludes back-office and support roles that also contribute to overall employee experience and organizational culture. This limitation is particularly relevant considering organizational theories suggesting that all employee groups shape the workplace environment and, by extension, the customer experience. Lastly, even though the customer retention rates in both years were remarkable, these outcomes may also reflect additional factors unrelated to employee satisfaction, further complicating the attribution of causality.

Nonetheless, the results presented here make a meaningful contribution to the discussion around employee experience and its influence on business outcomes. As this paper focuses on the SaaS sector, a field characterized by ongoing client relationships due to its subscription-based model, it offers a unique perspective on how employee satisfaction can influence long-term client engagement. The decision

to use a company that operates in the HR technology space and partners with leading international clients provided a particularly relevant case study for this investigation.

Looking ahead, the findings of this paper suggest that further research could yield valuable insights. A promising direction would be to expand the scope of the study to include other companies within the national or regional SaaS industry, to assess whether the patterns observed here are consistent across a broader population. Additionally, future research could benefit from incorporating longitudinal data or a multi-method approach that explores not only employee feedback but also direct customer experience data. By doing so, researchers can move closer to identifying causal links and better understanding the interplay between internal employee metrics and external business performance. The specific characteristics of the SaaS sector, with its emphasis on sustained customer relationships, make it a fertile ground for this kind of continued investigation.

In summary, this research confirms a strong and consistent correlation between employee satisfaction and customer retention, framed within both theoretical models and practical business realities. While limited in its generalizability, the study contributes meaningful insights to a growing conversation and sets the foundation for further exploration into the impact of employee experience on organizational outcomes.

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# Psychological Safety in Organizations: A Systematic Review of Its Antecedents, Outcomes, and Moderators

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**Abstract:** *Psychological Safety (PS) has become a decisive factor in organizational success in an increasingly complex and dynamic work environment. As a construct that fosters trust, open communication, and collaboration, PS plays a crucial role in enabling employees and organizations to express ideas, take risks, and innovate. This study provides a systematic literature review to examine the antecedents, outcomes, and moderators of PS in an organizational context. By analyzing existing research, this study identifies the key factors that promote PS and explores its impact on innovation and organizational performance. This study addresses significant gaps by synthesizing fragmented findings in this area and offering a holistic understanding of how PS functions at the team and organizational levels. At the same time, this study points to potential directions for future work. Organizations that develop and integrate PS are better equipped to navigate crises and recover from disruptions. The findings indicate that fostering PS is vital for organizations aiming to foster innovation, adaptability, and the well-being of the workforce. This work offers guidance to practitioners and researchers by providing an overview of how PS develops and influences work outcomes at various levels of analysis.*

## 1. INTRODUCTION

In today's business world, organizations increasingly expect their workforce to contribute actively to the continuous enhancement of organizational processes and practices. This can be achieved through behaviors which foster learning, such as proposing new ideas, collaborating with colleagues, and experimenting with new approaches (Edmondson & Bransby, 2023, p. 56). While these activities can be beneficial for organizations, they also entail certain risks to their staff. Voicing innovative ideas may challenge established norms and conflict with the interests of other organizational members (Johnson & Avolio, 2019, p. 846). Additionally, experimenting with new methods in the workplace may lead to failure, potentially resulting in negative perceptions of the involved persons (Andersson et al., 2020, pp. 1–2). Research indicates that such risks can discourage entire organizations from participating in learning processes (Cauwelier et al., 2019, pp. 1157–1158).

One way to mitigate these risks is by fostering a psychologically safe work environment, in which all employees feel secure in expressing ideas, seeking and providing open feedback, collaborating, and taking risks without fear of negative consequences (Andersson et al., 2020, pp. 3–6). PS is especially crucial in industries where workforce and customer safety are vital, such as healthcare and aviation, as it has been shown to reduce errors and to improve overall safety (Leroy et al., 2012, pp. 1271–1272). Additionally, PS has been linked to enhanced learning behaviors across organizational boundaries (Liu et al., 2014, p. 283; Ortega et al., 2014, pp. 311–314).

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While various definitions of PS exist, most of the research aligns with the conceptualization of Edmondson (1999, p. 354), which characterizes it as a collectively held belief regarding the extent to which interpersonal risk-taking is safe within the workplace settings (Edmondson et al., 2007, p. 208; Edmondson & Lei, 2014, p. 24). A psychologically safe work environment fosters a sense among the workforce that they will not be dismissed or judged negatively for expressing thoughts, that competencies are acknowledged and respected, and that colleagues demonstrate genuine interest in one another as individuals. Additionally, such an environment is characterized by positive interpersonal intentions, the willingness to engage in constructive conflicts, and a sense of security in taking risks (Edmondson, 1999, pp. 354–355; Kahn, 1990, pp. 708–709). From a behavioral perspective, PS encourages the workforce to communicate openly, voice concerns, and actively seek open feedback – behaviors that inherently involve interpersonal risk (Agarwal & Farndale, 2017, pp. 440–442; Pearsall & Ellis, 2011, pp. 402–403). Consequently, PS has been shown to influence various workplace outcomes, including learning and performance across different levels of analysis (Edmondson & Lei, 2014, pp. 28–31).

The hidden and unconscious roles that individuals assume in groups strongly influence PS. Group dynamics can be understood through narratives that shape how organizations function. Social systems have a shared mindset that transcends individual perspectives and connects members through unspoken agreements and unconscious ties. In work groups, people assume roles to reduce conscious and unconscious fears. These roles often revolve around authority, competition, or relationships, causing individuals to take informal roles within organizations (Livingstone, 2023, pp. 2–3).

These foundational studies from distinct academic domains and different levels of analysis should not be regarded as conflicting perspectives but as complementary interpretations of the same construct. The conceptualizations of PS converge on a core principle: the necessity of fostering a work environment that reduces perceived interpersonal risk. As emphasized by Edmondson and Lei (2014, pp. 25–35), a consistent theme across PS research is its role in enabling individuals, teams, and organizations to willingly contribute their ideas and efforts to collective endeavors.

Empirical studies have reinforced the link between leadership, PS, and learning behavior. As this field has matured, research has gained greater conceptual and empirical depth. PS has been widely studied, with studies exploring its antecedents, outcomes, and influencing factors across various levels of analysis. Given the growing body of empirical evidence, a systematic literature review is both timely and necessary. This study synthesizes research, identifies gaps in the literature, and outlines future research directions. It also highlights the need for integrating key theoretical perspectives to better understand how PS influences workplace outcomes.

## 2. RESEARCH METHODOLOGY

The study follows the systematic literature review approach outlined by Tranfield et al. (2003, pp. 217–219) that defines key principles for management research. Tranfield et al. (2003, p. 209) argue that such reviews increase the rigour of review processes by ensuring a structured approach to identify scientific contributions within specific research areas or in response to given research questions (Becheikh et al., 2006, p. 645). This methodology is widely regarded as robust and suitable for analyzing academic publications (Supriharyanti & Sukoco, 2023, p. 48). Key steps include formulating research questions, defining the search strategy, assessing study quality, verifying results, and finally extracting data. The research protocol of this study is shown in Table 1.

**Table 1.** Research protocol

<b>Step 1: Formulating research questions</b>
<ol style="list-style-type: none"> <li>1. Which team-related and organizational factors contribute to the development of PS in organizations?</li> <li>2. Which outcomes of PS have been developed in research since 2014?</li> <li>3. What variables moderate the relationship between PS and its outcomes?</li> </ol>
<b>Step 2: Defining search strategy</b>
<ol style="list-style-type: none"> <li>1. Database: Scopus</li> <li>2. Period: 01/01/2014 – 02/28/2025</li> <li>3. Subject areas: Business, Management and Accounting (BUSI), Psychology (PSYCH)</li> <li>4. Keyword: "psychological safety"</li> </ol>
<b>Step 3: Defining exclusion criteria</b>
<ol style="list-style-type: none"> <li>1. Papers that mention PS as side concept or on individual level</li> <li>2. Non-academic journals available in languages other than English</li> <li>3. Types of publications: book chapter, book, conference paper</li> <li>4. All fields of study outside of BUSI and PSYCH</li> </ol>
<b>Step 4: Defining inclusion criteria</b>
<ol style="list-style-type: none"> <li>1. Empirical, conceptual and theoretically oriented publications about PS</li> <li>2. Research articles in English</li> <li>3. Subject area: BUSI and PSYCH</li> <li>4. Focus: PS on team-related and organizational levels</li> </ol>

**Source:** Own processing

### Step 1: Defining research questions

This study analyzes the development of PS in organizations by addressing three key research questions. First, it analyzes team-related and organizational factors that contribute to PS in the workplace, identifying key determinants that foster or hinder its development. Second, it explores the outcomes of PS, which have been developed since 2014 to provide an understanding of its impact on workplace dynamics, innovation, and overall effectiveness. Lastly, this study examines the variables that moderate the relationship between PS and its outcomes, offering insights into contextual and situational factors that may strengthen or weaken these effects. These research questions contribute to understanding the central mechanisms underlying PS and its role in organizational functioning. These insights are intended to provide both theoretical advancements and practical implications, supporting organizations in designing strategies to foster PS and improve overall workplace resilience.

### Step 2: Defining search strategy

Peer-viewed articles with a focus on PS were identified through a literature search in Scopus. This database was selected for its comprehensive coverage and effective search capabilities (Pascucci et al., 2018, p. 632). The search strategy was defined to maximize the results of appropriate articles. The search focused on studies published between 2014 and 2025 with a mapping to the subject areas BUSI and PSYCH. The query string was submitted as follows:

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SUBJAREA (BUSI) OR SUBJAREA (PSYC) AND TITLE-ABS-KEY ("psychological safety") AND PUBYEAR > 2013 AND PUBYEAR < 2025 AND (LIMIT-TO (SRCTYPE,"j")) AND (LIMIT-TO (DOCTYPE,"ar")) AND (LIMIT-TO (SUBJAREA,"BUSI") OR LIMIT-TO (SUBJAREA,"PSYC")) AND (LIMIT-TO(LANGUAGE,"English"))
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The keyword search was conducted twice to enhance the study's reliability and yielded a total of 985 articles.

### Steps 3 and 4: Evaluating the quality of the studies

In alignment with the guidelines of [Tranfield et al. \(2003, pp. 217–219\)](#), all selected articles met the following criteria: publication in peer-reviewed journals, a focus on PS, and written in English. Relevance was assessed by reviewing the title, abstract, and full text of each article. To ensure a holistic review, the reference lists of all retrieved papers were analyzed for additional relevant studies on PS. As a result, 45 articles were identified for inclusion in this review.

## 3. ANTECEDENTS OF PS

The literature review identified 45 empirical studies that explored the factors influencing PS. These studies positioned PS as a key construct, elucidating how supportive the components “Collaboration, Networks & Trust”, “Authority & Leadership Behavior”, and “Diversity & Inclusion” affect workplace outcomes at team and organizational levels by fostering PS. The following is a detailed explanation of the aforementioned components.

### 3.1. Collaboration, Networks and Trust

A significant body of research examines the role of PS in addressing challenges to team performance, particularly those stemming from hierarchical structures, functional diversity, and professional divisions ([Chen et al., 2017, pp. 933–944](#); [De Hoogh et al., 2015, pp. 688–696](#); [Malhotra et al., 2017, pp. 41–62](#)). [Chen et al. \(2017, pp. 941–944\)](#) demonstrated that PS mitigates the adverse effects of faultlines on team performance. Similarly, [Malhotra et al. \(2017, pp. 57–60\)](#) found that a psychologically safe climate reduced the detrimental influence of functional dominance on group effectiveness in cross-functional teams. These findings suggest that PS facilitates team performance by alleviating barriers to collaboration.

Qualitative research further underscores PS as a critical factor in overcoming obstacles to team performance. [Singer et al. \(2015, pp. 6–11\)](#) stated that high-performing teams emphasized collective learning and actively invested time in fostering a learning-oriented environment. The teams prioritized mutual respect, support, and PS, enabling them to transcend hierarchical and status-related barriers that hindered open discussion in lower-performing groups. [True et al. \(2014, pp. 634–638\)](#) identified that established and transparent communication practices rooted in PS and facilitated collaboration across hierarchical and professional boundaries – an essential characteristic of highly effective and engaged primary healthcare teams.

Most group-level research on PS has been conducted within teams; the study of [Bienefeld and Grote \(2014, pp. 930–945\)](#) represents an exception. Investigating status, inclusive leadership, and voice behavior among approximately 1,500 airline crews in Europe, these two researchers examined an ad hoc multi-team system and highlighted differences in how PS operates within and across teams. Their findings revealed that while crew members’ perceptions of PS mediated the link between status and speaking up within their own teams, this effect was absent at the inter-team level. Instead, the PS of roles such as pursers, who manage cabin operations, partially mediated the relationship between status and voice behavior in external interactions. This suggests that the sense of PS within a team plays a crucial role in boundary-spanning tasks. The authors further attributed the variance in voice behavior mechanisms within and between teams to structural differences across teams and disparities in leadership effectiveness, which influenced PS climate.

Other group-level studies have explored the dynamics of PS. [Koopmann et al. \(2016, pp. 940–957\)](#) challenged the assumption of linear correlation between team tenure and PS. Examining task

performance in 115 research and development teams, a curvilinear relationship between team tenure and both PS climate and its strength was identified. These findings indicated that PS levels were highest in newly formed and long-established teams, while moderate-tenure teams showed lower levels. The study also showed an indirect curvilinear link between team tenure and creative performance, moderated by PS. Additionally, task performance improved with greater tenure when teams maintained a strong PS climate. These insights indicate that the PS dynamics in teams are more nuanced than traditionally depicted in the literature.

### 3.2. Authority and Leadership Behavior

Research on PS has consistently highlighted the pivotal role of leadership and supervision. At team level, leadership research has emphasized the mediating function of PS. Several studies have analyzed the impact of leadership styles such as servant, ethical, and transformational on team-level outcomes, including team creativity (Tu et al., 2019, pp. 553–561), team learning (Liu et al., 2014, pp. 284–292), and team performance (Miao et al., 2019, pp. 1121–1130).

Several studies have explored specific leadership attributes which influence the development of a PS climate. Findings indicate that leaders who actively listened and showed competence and transparency played a key role in strengthening PS in teams (Mao et al., 2019, pp. 54–64). Self-serving leadership behaviors, where leaders prioritize personal interests over those of their team or organization, were found to diminish PS (Mao et al., 2019, pp. 54–64; Peng et al., 2019, pp. 419–428). The findings emphasize the key role of supervisors in setting up and sustaining psychologically safe work environments.

Recent research on PS increasingly focuses on feedback dynamics as a means to foster a safe workplace climate. Feedback seeking and feedback sharing have emerged as key strategies for strengthening PS. In a multimethod study of leaders across various organizational contexts, *Coutifaris and Grant (2022, pp. 1575–1593)* found that while leaders' willingness to share feedback had a lasting positive effect on PS, while feedback seeking did not. Their findings suggest that feedback-sharing leaders helped normalize vulnerability, fostering a culture of openness that sustained PS. *De Stobbeleir et al. (2020, pp. 305–317)* identified PS as a moderator between task interdependence and peer feedback-seeking. Workforces perceiving high PS were more likely to seek feedback and were rated as high performers by supervisors.

A related line of research explores the interplay between PS, power distance, and leadership. Power distance – how strongly workforces perceive power as unequally distributed – shapes how hierarchy is experienced. Empirical findings suggest that higher levels of power distance are generally linked to lower PS at team and organizational levels (Hu et al., 2018, pp. 2–6). However, *De Hoogh et al. (2015, pp. 688–696)* offered a more nuanced perspective, arguing that power disparities do not necessarily undermine PS and that when team members accept hierarchy, autocratic leadership was positively associated with PS, and vice versa.

### 3.3. Diversity and Inclusion

A number of quantitative studies have demonstrated that PS serves as a mediating factor in the relationship between different antecedent conditions and outcomes such as job engagement (*Rabbane et al., 2019, pp. 612–625*) and job satisfaction (*Ahmad & Umrani, 2019, pp. 536–543*). *Johnson and Avolio (2019, pp. 844–862)* explored how initial perceptions of PS shape team identification and how it influences satisfaction. The researchers found that team identification was

influenced by the interaction between initial PS perceptions and subsequent relationship conflict. Teams that perceived high PS but later faced growing relationship conflict reported lower team identification over time. This decline had a negative indirect effect on satisfaction, mediated by the strength of identification. For those teams who initially reported low PS, increasing conflict had no significant impact on team identification. These findings suggest that consistency between early PS perceptions and later interpersonal experiences plays a key role in shaping team dynamics.

Research has identified PS as a critical factor in fostering an inclusive and supportive diversity climate (Gonzalez et al., 2020, pp. 1444–1458). Ulusoy et al. (2016, pp. 627–638) found that PS positively influenced immigrant employees' attitudes towards work, as they perceived it as an indicator of social belonging. Guchait et al. (2016, pp. 450–460) demonstrated that PS acts as a mediating variable in the relationship between diversity climate and group learning. PS was found to promote a more balanced perception of creative capabilities between men and women (Hora et al., 2021, pp. 298–307). In addition, PS was shown to buffer against potential challenges associated with age diversity, helping to maintain cohesion and collaboration in age-diverse teams (Gerpott et al., 2021, pp. 3780–3792).

#### 4. OUTCOMES OF PS

Initially rooted in literature on Organizational Learning (OL), PS research primarily focused on its connections to learning and performance outcomes (Edmondson, 1999, pp. 353–357). Over time, PS evolved as a critical driver of knowledge management, learning behavior, and organizational adaptability, facilitating innovation, agility, and performance. These outcomes are particularly relevant in dynamic and complex environments, where continuous learning and collective responsiveness are essential for long-term success. In the following section, an analysis of these contributing components is provided.

##### 4.1. Knowledge Management and Learning Behavior

Several studies highlight the role of PS as key mechanism supporting learning and knowledge transfer across team and organizational levels and underlines its function as both a mediator (Cajiao & Burke, 2016, pp. 508–510; Harvey et al., 2019, pp. 3–7) and moderator (Gerpott et al., 2021, pp. 3790–3792; Najafi-Tavani et al., 2018, pp. 485–489). A recurring topic in the literature is its capacity to mitigate learning barriers, particularly in diverse teams (Creon & Schermuly, 2019, pp. 585–596; Guchait et al., 2016, pp. 459–462). Qualitative research also emphasizes a strong link between PS and learning behavior. Lyman et al. (2020, pp. 831–837) underscore its importance in the structured transition of novice nurses into professional roles and described psychologically safe relationships as an essential basis for effective organizational learning and continuous development. Similarly, Cauwelier et al. (2019, p. 1165) observed that teams with high PS showed more frequent learning and knowledge creation. Furthermore, additional studies investigated cross-level dynamics (Liu et al., 2014, pp. 282–295; Wang et al., 2020, pp. 2635–2655).

Wilhelm et al. (2019, p. 696–697) found that employees in psychologically safe teams were more likely to learn from failure, especially when supported by a strong Transactive Memory System (TMS) – a collective cognitive framework for knowledge sharing. Research linked PS to TMS, showing it mediated the impact of negative affectivity and moderated the relation between TMS, knowledge integration, and team performance (Huang & Chen, 2018, pp. 103–106). Some studies have identified potential drawbacks of PS for learning. Deng et al. (2019, pp. 1117–1123) proposed a dual-pathway model in which PS both reduced fear of failure and motivation. The dominant pathway depended on team norms: collectivistic teams benefited from reduced fear, while individualistic

teams were more vulnerable to decreased motivation. Quantitative research stresses PS's role in knowledge sharing, especially when interpersonal risks are involved (Liu et al., 2021, pp. 500–506; Rivera et al., 2021, pp. 1175–1183).

#### 4.2. Innovation, Divergent Thinking and Performance

Innovation and divergent thinking remain key themes in PS research, particularly given their importance for knowledge-intensive work. Numerous studies have examined how leadership behavior, such as transparency and active listening (Yi et al., 2017, pp. 336–341), fosters these outcomes by cultivating a psychologically safe climate. PS is shown to unlock cognitive and emotional resources, allowing organizations and their employees to channel their energy into innovative behaviors (Iqbal et al., 2020, pp. 814–818).

At both group and organizational levels, research highlights PS as a facilitator of team-based ideation and innovation in diverse and dynamic environments (Agarwal & Farndale, 2017, pp. 444–446; Liu et al., 2021, pp. 502–505). Furthermore, it is also linked to risk-taking behavior, which is key for continuous improvement and adaptive performance in a fast-paced context (Andersson et al., 2020, pp. 4–6).

Research aimed at improving organizational performance explored the moderating role of PS, particularly within small and medium-sized organizations. Findings indicate that PS is able to stabilize organizations facing internal and external pressures. Yoon and Solomon (2017, pp. 1148–1150) identified a curvilinear link between entrepreneurial orientation and organizational performance, showing that PS buffered extreme effects on financial outcomes.

Andersson et al. (2020, pp. 8–11) reported a positive link between PS in organizations and innovation performance, moderated by environmental dynamism. Van den Berg et al. (2022, pp. 1433–1435) found that structural empowerment fosters organizational resilience, but only when supported by PS and with consistent management commitment. The studies suggest that PS enables organizations to leverage diversity for better outcomes across hierarchical levels.

### 5. FACTORS MODERATING PS ANTECEDENTS AND OUTCOMES

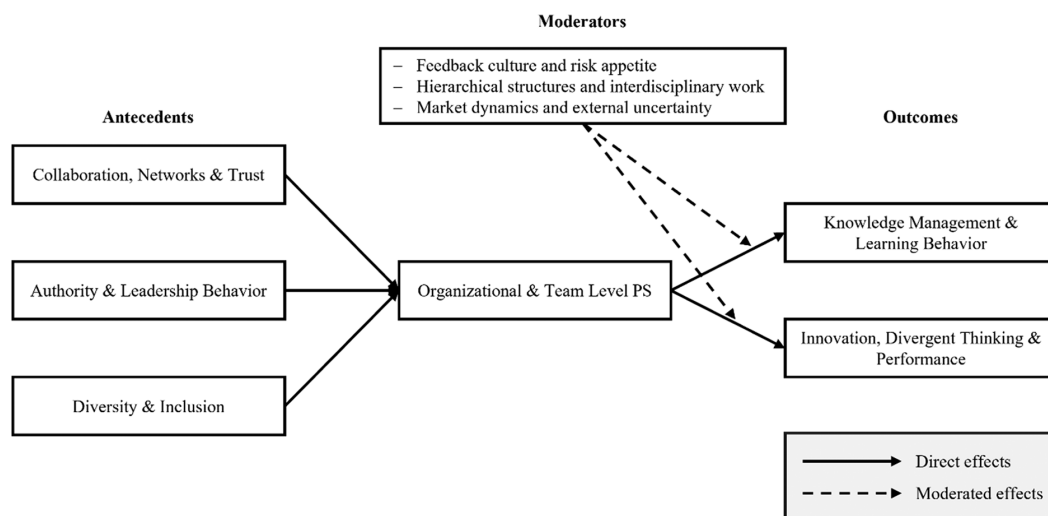
The relationship between PS and key organizational outcomes is shaped by several contextual moderators. One main moderator is a feedback culture marked by openness and risk appetite. Leaders who communicate transparently and proactively share feedback create environments where employees feel safe to express ideas and learn from mistakes, thus enhancing learning behavior. A robust feedback culture and openness to risk-taking are central to how PS affects teams. According to Coutifaris and Grant (2022, pp. 1578–1582), leader feedback-sharing plays a key role in building lasting PS. In environments that encourage risk-taking and emphasize shared over solicited feedback, PS is more likely to endure and promote knowledge sharing, innovation, and improvement.

In the context of hierarchical structures and interdisciplinary work, the findings of Duan et al. (2023, pp. 1281–1291) provide a valuable basis to understand how knowledge complexity can act as a challenge demand that enhances team-level information processing. The authors show that if task knowledge is complex and spans multiple domains, structured team environments can still facilitate effective information flow – provided that PS and a learning-focused team climate are present. Therefore, hierarchical and interdisciplinary team settings benefit from knowledge complexity when environments encourage collective learning and communication.

Market dynamics and external uncertainty increase the value of PS in fostering innovation and adaptability. Under high volatility, PS fosters risk-taking and exploratory behavior, enhancing the ability to innovate and respond. In highly dynamic and uncertain market environments, PS becomes a key factor for organizational adaptability and innovative strength. [Andersson et al. \(2020, pp. 9–12\)](#) show that an organizational climate for PS significantly enhances disruptive innovation capabilities, especially under dynamic conditions. Experimentation, risk-taking, and learning from failure are essential to innovation but involve higher interpersonal and strategic risks. PS reduces these perceived threats, enabling exploratory learning behaviors that are crucial for addressing complex, shifting demands. [Sullivan and Wamba \(2024, pp. 5–12\)](#) emphasize that an organization’s adaptability depends on external conditions. AI-powered analytics and relational capabilities are especially effective for improving an organization’s responsiveness, innovation, and performance in highly dynamic environments.

## 6. NETWORK OF KEY VARIABLES RELATED TO PS

This review underscores the necessity of understanding how organizational and team-level PS emerges from key antecedents and contributes to positive organizational outcomes. Drawing on Conservation of Resources (COR) theory ([Hobfoll, 1989](#)), PS works as core psychological resource, which functions at both team and organizational levels and mediates the relationship between social-structural factors and organizational performance. COR theory postulates that individuals and groups strive to acquire, maintain, and protect resources to mitigate stress and enhance performance. Within this context, a climate of PS provides a protective buffer against resource loss (e.g., fear of failure, interpersonal risk) and eases the investment of existing resources (e.g., knowledge, effort, and collaboration) to achieve additional resource gains. This process aligns with COR’s core tenets, which argue that psychologically safe environments not only foster individual well-being but also promote resilient and adaptive behavior within teams and across organizational systems ([Hobfoll, 1989, pp. 516–520](#)).



**Figure 1.** Network of key components related to PS

Source: Own processing

Figure 1 shows that factors such as collaboration, trust-based networks, inclusive leadership behavior, and diversity foster a climate where teams and organizations feel safe to engage, share knowledge, and take interpersonal risks. According to COR theory, these factors serve as basic resources that protect teams and organizations from stress, enable further investment in pro-social

and task-related behavior, and activate resource-rich behaviors such as learning, communication, and innovation (Halbesleben et al., 2014, pp. 1335–1353).

This network also recognizes the role of contextual moderators. Feedback culture, role clarity, and external volatility can either strengthen or weaken PS's positive impact on outcomes like knowledge management, divergent thinking, and team performance. This reflects COR's third principle: working in stable, resource-rich settings can more readily convert psychological resources into tangible outcomes. This framework shows both direct and moderated pathways through which PS links structural antecedents to adaptive outcomes. PS not only reduces stress and conflict but also motivates effort toward collective learning and performance.

## 7. FUTURE RESEARCH DIRECTIONS

Despite extensive research on PS and its connections to leadership, performance, and learning behavior, questions remain open. One major gap concerns how PS can be actively fostered in teams and organizations. While leadership is frequently emphasized, more work is needed on specific interventions and the role of team members in creating a climate where speaking up and taking interpersonal risks feels acceptable. Field experiments testing such interventions could deepen the understanding of the mechanisms involved. Another underexplored area is the dynamic nature of PS. Longitudinal field studies remain scarce due to methodological challenges, yet are essential to understanding how PS emerges, fluctuates, or breaks down over time – especially in fast-paced or project-based environments. Insights into how interpersonal climates evolve across a team's life cycle would significantly advance the field.

Although PS has been explored as both predictor and moderator, more precise frameworks are needed to clarify the conditions under which it has the strongest impact, like in knowledge-intensive settings. Emerging research suggests factors like task complexity and team structure may moderate its effectiveness. Research on PS has yet to fully address modern work realities such as hybrid teams, remote collaboration, and fluid team structures. These evolving contexts pose both practical and conceptual challenges, calling for new qualitative approaches and methodological innovation.

## 8. CONCLUSION

This research supports that PS is a vital cognitive state enabling collaboration, learning, and enhanced outcomes across team and organizational levels. It has become key for thriving in increasingly complex and interdependent work environments, especially amid global uncertainty and changing workplace dynamics. The findings highlight the value of supportive leadership, strong interpersonal bonds, and enabling organizational practices in fostering PS. By offering theoretical insights and future research directions, this review encourages scholars and practitioners to further explore how PS can shape resilient, innovative, and inclusive organizations moving forward.

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# The Impact of Instagram Content on Generation Z's Purchase Intentions and Impulsive Buying Behaviour

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**Abstract:** *Generation Z has never known a world without social media, and Instagram serves as their preferred search engine for product discovery. This study examines the relationship between Instagram content, purchase intention, and impulsive buying behaviour among Generation Z users. A total of 311 Instagram users between the ages of 18 and 29 took part in the study, with data collected between April and June 2024. The study aims to examine the differences in Instagram usage patterns, users' attitudes towards content and their subsequent purchasing behaviour. The results show significant differences between the motivational and functional factors in terms of purchase intention and impulsivity. However, no significant relationship was found between the emotionality factor and purchasing behaviour. In addition, users' attitudes towards Instagram content differed significantly across all three factors examined. These findings contribute to a deeper understanding of how Instagram influences the consumer behaviour of Generation Z.*

## 1. INTRODUCTION

The internet has made it possible for online platforms to facilitate interaction and communication between consumers and companies, especially for Generation Z, who know no other form of communication. Generation Z, often referred to as 'digital natives', is the first generation to have grown up with digital communication (Adeola et al., 2020). Instagram is the most popular social media for Generation Z, and serves as their preferred search engine for communication and product discovery. This target group consumes more content than any other age group. Generation Z communicates with images and is considered the most materialistic, desiring instant results and appreciating brand communication on social media, especially via micro-celebrities, as they consider them more authentic. These characteristics make it potentially attractive to study the impulse buying behaviour of this generation (Djafarova & Bowes, 2021). Generation Z has its own characteristics due to the environment in which it was born and raised, and tries to personalize the communication and content it receives; moreover, it does not separate itself from virtuality. Both situations have a significant impact on their behaviour and choices. It is important to point out that Generation Z has come of age during a time characterized by crises and, as a result, increasing inequality and job insecurity, as well as the rise of social media in the technological field (Robinson & Schänzel, 2019). According to Muhammad et al. (2024), positive emotional reactions caused by aesthetic appeal and reduced prices drive the purchasing behaviour of Generation Z. This paper aims to examine the relationship between Instagram usage and Generation Z's purchase intentions and impulsive buying behaviour in response to different types of Instagram content. The paper also aims to investigate how different types of Instagram content influence users' attitudes towards posts and their purchasing behaviour on the platform.

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## 2. THEORETICAL BACKGROUND

Social media can refer to many things, but are largely a functional environments that encourage the creation and sharing of user-generated content (Kaye, 2021). They offer users the opportunity to share emotions, thoughts, and life experiences through various means such as text, images, and videos on the internet. Social media has multiple functions, from communication and entertainment to education and shopping (Elkatmış, 2024). According to statistics, Instagram is the second most popular online platform in the world (Olejniczak, 2022), which is based on creative visual content. Users of social networks such as Instagram follow celebrities and influencers who recommend various products and share promotional content in their posts. They follow them because they find their posts entertaining and useful, especially Generation Z. As Generation Z has grown up with the internet, engagement on social media platforms is a norm for them to seek inspiration (Brewis, 2020). Nowadays, it is a generation of university students, but soon they will be the leading workforce. However, it is a generation that has made media its distinctive feature because it was born at a time when it became an indispensable reality and an important environment for building identities, almost equivalent to face-to-face interaction (Tirocchi, 2024). Generation Z is the largest generation, accounting for approximately 32% of the global population (Miller & Lu, 2018), and is expected to have a significant impact on the world's consumer sales. Ham et al. (2024) pointed out that the perceived emotional intelligence, anthropomorphism, and authenticity of the virtual influencer are significant and serial mediators of the relationship between the virtual influencer's display of emotions in the social media posts and users' attitudes towards the virtual influencer.

Generation Z bases their purchase intention or interest in a particular brand on information they have gathered about products or services on social media platforms, especially Instagram, the most widely used online platform (Sesar et al., 2023). Based on the idea that positive attitudes trigger positive intentions, positive attitudes towards an Instagram post increase purchase intention (Chang et al., 2020). The use of Instagram acts as an incentive for impulse purchases. In their study, Herrando & Martin-De Hoyos (2022) demonstrated positive direct effects of advertising value on consumers' attitudes towards product purchase intentions and found that the effect was similar regardless of the degree of product presence in the published ad. Generation Z is more likely to perceive Instagram influencers as credible and have a stronger desire to shop or make impulsive purchase decisions (Shahid & Ikram, 2024). Maghraoui and Khrouf (2025) emphasised the importance of using Instagram Live for certain brands and products, especially for the target group of Gen Z. Hood et al. (2024) found that purchase and post-purchase behaviour on Instagram differs significantly depending on whether or not a consumer trusts Instagram and the content there.

## 3. METHODOLOGY

For this study, quantitative research was conducted using primary data from surveys. The survey sample included 311 Generation Z Instagram users (aged between 18 and 29), and data collection lasted from April to June 2024. The survey questionnaire consisted of three sections. The first section of the questionnaire related to the demographic profile of the respondents, such as gender and age, as well as questions about the frequency of use of the social media, Instagram. The second section contained statements that determine Generation Z's motives for using Instagram. The authors used existing literature to develop the measurement scale. Three items for utilitarian content and two items for hedonistic content were adapted from Wang (2017), for hedonistic content and openness from Wang (2017), Khoi et al. (2020) and Böttger et al. (2017). In addition, this section of the questionnaire contains a variable for openness, which was measured with three items adapted from Khoi et al. (2020). Customer inspiration is measured by the variables inspired-by and

inspired-to, both adapted from Böttger et al. (2017). The last section includes variables created to explain users' purchase behaviour, such as attitude towards content on Instagram, with the item "I love the content provided to me on Instagram" and purchase behaviour with the item (I buy products advertised on Instagram) and purchase intention (I intend to buy products advertised on Instagram in the future). Four items were used for impulse buying intention (I find that when I use Instagram, I have an unexpected urge to buy, I tend to buy when exploring Instagram, regardless of whether the products are on my planned shopping list, I usually have the urge to buy impulsively, I have made more impulse purchases than I had planned). The mean value was calculated for the variables that determine impulsive buying intentions. The items were taken from previous literature and modified for the context of this study. All variables were rated on a five-point Likert scale from "strongly disagree" (1) to "strongly agree" (5).

#### 4. RESEARCH RESULTS

The demographic profile of the 311 respondents shows that 51.8% of respondents are female and 48.2% are male. The majority of the respondents are in the age group of 18–24 years (56.6%) and 25–29 years (43.4%). To achieve the objective of this study, the reliability of the measurement scale was tested using Cronbach's alpha. Table 1 shows the Cronbach's alpha coefficient for the measurement scale of content usage on Instagram.

**Table 1.** Reliability of the measurement scale of Instagram content usage

Number of variables	Cronbach's Alpha
13	.892

**Source:** Own research

The results show a high value of the Cronbach's alpha coefficient (0.892), which demonstrates a high reliability of the measurement scale. The Bartlett test of sphericity and the Kaiser-Meyer-Olkin (KMO) test were used to confirm the measurement scale of the research. The results for the statistical tests KMO and Bartlett's test of sphericity are shown in Table 2.

**Table 2.** Kaiser-Meyer-Olkin test and Bartlett's test of sphericity the measurement scale

Kaiser-Meyer-Olkin test		.901
Bartlett's test of sphericity $\chi^2$	Hi-square	1894.56
Degree of freedom df		78
Significance		<.001

**Source:** Own research

The KMO value is 0.901, and Bartlett's test of sphericity was found to be statistically significant ( $\alpha \leq 0.01$ ), indicating that factor analysis is suitable for implementation.

**Table 3.** Total variance explained for the measurement scale of content usage on Instagram

Items	Initial eigenvalues			Rotation Sums of Squared Loadings		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	5.892	45.327	45.327	4.162	32.013	32.013
2	1.390	10.689	56.016	2.413	18.562	50.575
3	1.109	8.528	64.544	1.816	13.969	64.544

Extraction Method: Method Principal Component Analysis

**Source:** Own research

For further examination and grouping of the items in the measurement scale, the discriminant validity of the measurement scale was assessed by a principal component factor analysis (CFA) with varimax rotation. Three components or variables with eigenvalues above 1 were extracted. The results show that three factors explain 63.01% of the total variance. Factor 1 explains 32.01% of the total variance, while 18.56% is explained by factor 2 and factor 3 explains 13.67% of the total variance. Summarising these factors, it can be concluded that Factor 1 contains the elements related to the inspirational and encouraging elements of Instagram content and is referred to as the motivational factor, while Factor 2 contains the elements related to the utility and usefulness of Instagram content and is referred to as the functional factor. Factor 3 contains hedonic elements that relate to the pleasurable and enjoyable elements of Instagram content and is referred to as the emotional factor. The factor analysis has achieved its goal and the interpretation of the factors is satisfactory.

Following the results of the CFA analysis, an analysis of variance (ANOVA) was conducted to determine the significant differences between the extracted factors and the variables related to purchase intention, purchase impulsiveness and attitude towards content on Instagram. The results of the variance between motivational, functionality and emotionality factors and the attitude towards content on Instagram can be found in Table 4.

**Table 4.** Analysis of variance between factors and users' attitudes toward content on Instagram

	Sum of squares	df	Mean square	F	Sig.
Motivational	34.432	4	8.608	9.559	<.001
Functional	85.584	4	21.396	29.174	<.001
Emotional	52.146	4	13.036	15.470	<.001

**Source:** Own research

As shown in Table 4, there are significant differences between the extracted factors and the attitude towards content on Instagram. For the first factor, the analysis of variance shows significant differences between the motivation factor and the attitude towards content on Instagram ( $p < 0.001$ ,  $F=9.559$ ). Content that inspires users, gives them new ideas and encourages them to engage in certain activities has a positive attitude towards this type of content on Instagram. Such content encourages users to follow the content on Instagram and is perceived as an excellent purchase decision aid. Further results in the table show significant differences between the functional factor and attitude towards content on Instagram ( $p<0.001$ ,  $F=29.174$ ). From the results, users who need more useful and genuine Instagram content perceive this content as valuable and helpful for their purchase decision. They are likely to feel that this posted Instagram content is worth following because it is accurate and truthful. The results of the table show that there are significant differences between the emotional factor and attitude towards content on Instagram ( $p<0.001$ ,  $F=15.470$ ). The analysis revealed that users who perceive content on Instagram as emotional and expressive have a positive attitude towards content on Instagram. It is evident that users follow content on social media such as Instagram because they sincerely enjoy it and because they see it as a way to escape from reality. The results of the analysis of variance between factors and buying behaviour are shown in Table 5.

**Table 5.** Analysis of variance between factors and users' purchasing behaviour on Instagram

	Sum of squares	df	Mean square	F	Sig.
Motivational	55.909	4	13.977	16.833	<.001
Functional	24.742	4	6.185	6.635	<.001
Emotional	12.141	4	3.035	3.118	.015

**Source:** Own research

Based on the results of the analysis, it can be determined that there is only a statistical difference between the motivational and functional factors and the purchasing behaviour of Generation Z on Instagram. For the first factor extracted, there is a significant difference in relation to the purchasing behaviour of Generation Z on Instagram ( $p < 0.001$ ,  $F = 16.833$ ). These results show that Generation Z users will buy on Instagram when the motivation factor tends to increase. In other words, if users find the content stimulating and exciting, they will buy the advertised products on Instagram. The analysis of variance shows significant differences between the functional factor and the buying behaviour of users on Instagram ( $p < 0.001$ ,  $F = 6.635$ ). It can be seen that users who shop on Instagram are more inclined to useful and accurate content, i.e., that this content is the trigger for a purchase on Instagram (Table 5). The results of the one-way ANOVA for the emotions in relation to the buying behaviour of Generation Z on Instagram ( $p < 0.015$ ,  $F = 3.118$ ) show significant differences. These users, who prefer emotional content on Instagram, make purchases. This expressive and empathetic content will persuade them to purchase the advertised product, as such content evokes strong emotions or reactions in these users. Table 6 shows the analysis of variance between the factors and the buying intentions of Generation Z on Instagram.

**Table 6.** Analysis of variance between factors and purchase intentions on Instagram

	Sum of squares	df	Mean square	F	Sig.
Motivational	48.798	4	12.199	14.292	<.001
Functionality	33.206	4	8.302	9.178	<.001
Emotionality	7.609	4	1.902	1.925	.106

**Source:** Own research

The results in Table 6 show that there are significant differences between motivation and purchase intentions on Instagram ( $p < 0.001$ ,  $F = 14.292$ ). The analysis of variance revealed that Generation Z users have higher purchase intention if they find the content posted on Instagram highly motivating. These users, who find the content posted on Instagram inspiring and stimulating for activities such as shopping, are more likely to make purchases via Instagram. The analysis also shows that there is a significant relationship between the functionality factor and purchase intention on Instagram ( $p < 0.001$ ,  $F = 9.178$ ). There are differences between Generation Z users, who are more likely to search for informative and helpful content on Instagram. This could explain why these users are most likely to be motivated to buy on Instagram because they perceive Instagram content as very useful for the buying process. The results for the third factor show that there are no significant differences between these factors and purchase intentions ( $p < 0.106$ ,  $F = 1.925$ ). The next table shows the results of the analysis of variance between the factors and the impulse purchase intention on Instagram.

**Table 7.** Analysis of variance between factors and impulse purchase intention on Instagram

	Sum of squares	df	Mean square	F	Sig.
Motivational	140.498	45	3.122	4.881	<.001
Functional	73.729	45	1.638	1.838	.002
Emotional	51.303	45	1.140	1.168	.228

**Source:** Own research

The results of Table 7 show that there are significant differences between the extracted factors and the impulse purchase intention, with the exception of the emotional factor. There is a significant difference between the motivational factor and purchase impulsiveness ( $p < 0.001$ ,  $F = 4.881$ ), as shown in Table 7. The results show that Generation Z users who use Instagram to get new inspiration or ideas for their activities are most likely to use social media and Instagram to make impulsive purchases. Specific content that contains a motivational element can encourage users

to purchase without them thinking about the need for the product. The results of the analysis also show significant differences between the functional factor and the impulse purchase intention ( $p < 0.001$ ,  $F = 1.838$ ). This significant relation suggests that users who need more informative content from companies are also more likely to make impulse purchases on Instagram. However, the purchasing decisions of these users are mainly determined by the informative and useful content on Instagram. In addition, the results for the emotional factor show that there are no significant differences in terms of impulse purchase intention ( $p < 0.228$ ,  $F = 1.168$ ).

The result of the analysis shows that Generation Z users who follow motivational, functional, and emotional content on Instagram have a positive attitude towards the posted content and make purchases on Instagram. However, the results show that Generation Z users who follow content on Instagram because they find it motivational and functional are more inclined to purchase in the future. This type of content also encourages these users to make more impulse purchases on Instagram.

## 5. CONCLUSION

Generation Z individuals have an observing role on their social media profiles and use the Internet and social media as their main sources of information. The results show that content that inspires users, gives them new ideas, and encourages them to do certain activities has a positive attitude towards this type of content on Instagram. In addition, users who need more useful and real Instagram content perceive this content as valuable and helpful for their purchase decision. They are likely to think that this posted Instagram content is worth following because it is accurate and truthful. The analysis showed that users who perceive content on Instagram as emotional and expressive have a positive attitude towards content on Instagram. Nevertheless, Generation Z users make purchases based on the content posted on Instagram. They stated that the content encourages them to purchase if, in their opinion, it contains motivational and informative elements. As far as the emotional factor is concerned, Generation Z users stated that it does not play a major role in purchasing decisions for products from ads on Instagram.

In terms of purchase intentions, users who find the content posted on Instagram inspiring and stimulating for activities such as shopping are more likely to make purchases via Instagram in the future. Similarly, users are most likely to be motivated to purchase on Instagram because they find Instagram content to be very useful in the buying process. The results show that Generation Z users who use Instagram to get new inspiration or ideas for their activities are most likely to use social media and Instagram to make impulsive purchases. This significant difference also suggests that users who need more informative content from businesses are also more likely to make impulse purchases on Instagram. However, the purchasing decisions of these users are mainly determined by the informative and useful content on Instagram.

From the research results, it can be concluded that users who find content on Instagram motivating and useful, and evoke strong emotions when viewing it have a positive attitude towards publishing content on Instagram. Nonetheless, users who find content motivating and highly useful are more likely to purchase products via social media such as Instagram. These users also show an impulsive willingness to buy, as they find this type of content stimulating and encouraging, even if the purchase was not planned. It can therefore be said that unplanned purchases are usually associated with motivating and useful content that persuades users to make a purchase, even if it is not on their shopping list. It is assumed that this type of content has a persuasive function in the purchase decision.

This study provides important practical insights for marketers and brand managers looking to engage Generation Z via Instagram. Considering that motivational and functional content significantly influences both purchase intention and impulsive buying behaviour, brands should prioritise the creation of posts that provide inspiration, utility and practical benefits. Content strategies that focus on clear value propositions, goal achievement and useful information are more effective at driving engagement and purchases among Generation Z users than purely emotional messages. Companies targeting this audience should also invest in optimising product visibility, simple purchase links and direct calls to action in Instagram posts to capitalise on the impulsive buying tendencies triggered by motivational and functional content.

However, several limitations should be taken into account. First, the study was based on self-report, which may be subject to bias due to social desirability or recall inaccuracies. Furthermore, due to the cross-sectional design of this study, it is not possible to observe changes in purchasing behaviour over time. Future longitudinal studies could shed light on how Generation Z's engagement with Instagram marketing evolves over different life stages or as platform dynamics change. In addition, future research could investigate how different Instagram features, such as Stories, Reels, or Sponsored Ads, affect Generation Z's purchase intentions and impulsive buying behaviour.

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# Emotional Experience in Social Media User Behavior

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**Abstract:** *Emotions in social media have a decisive influence on opinion formation, shape attitudes and encourage action, making them powerful tools for building and understanding digital activities. The aim of the study is to determine the impact of endorsement, engagement and attunement as a dimension of emotional experience on Instagram users' satisfaction and loyalty. The research was conducted on a convenience sample using a structured online questionnaire. The research found that endorsement on Instagram is significantly related to satisfaction, while user engagement and attunement on Instagram are insignificant. It was also found that users' satisfaction with Instagram has a positive effect on their loyalty. The results obtained have implications for social media marketers seeking to implement digital marketing strategies to achieve greater user engagement, increase content visibility and promote emotional engagement with the brand.*

## 1. INTRODUCTION

The digital environment emphasizes the need for mutual connection, self-expression and information. Social networks are used as a place to communicate and share experiences and evoke different emotions in each individual, which can be triggered by mutual communication between users or by a particular company. With the significant increase in the use of the Internet and social networks, the opportunities and needs for connection and support have become more generous. Emotions can be described as an inner experience associated with behavior and physiological reactions. They occur in response to internal and external stimuli and are expressed differently by each person. *Emotions are functional states that are usually triggered by sensory inputs, that lead to behavioral outputs, and that can also cause change and be evoked by other mental states such as perception, memory, attention, and the like* (Adolphs & Anderson, 2018, p. 41). Emotional processes are an integral part of how consumers make decisions and behave, whether they arise after the purchase or are the result of a communication message that consumers received as a stimulus before the purchase (Dlačić et al., 2016). Emotional responses have become a key element of marketing campaigns and advertising to attract consumer attention. Such advertising can influence the emotions of the target audience and make them buy a product even though they had no intention of doing so (Chen et al., 2023).

Previous research has shown that emotional stimuli in the form of words and emotional framing of the message can trigger extensive cognitive processes (Graciyal & Viswam, 2021; Nikolinakou & King, 2018; Nusair et al., 2013; Stieglitz & Dang-Xuan, 2013). Brands are increasingly recognizing the importance of reaching their audience on an emotional level. Creating a strong emotional connection with the audience is the key to success in the digital environment. With ads that go viral, brands have the opportunity to connect with audiences on a deeper emotional level and create a powerful impact (Nikolinakou & King, 2018).

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Given the increasing importance of social media in modern consumer society, the purpose of this paper is to examine the main determinants of emotional experience in social networks. This study aims to determine the relationship between user endorsement, engagement, and attunement as well as user satisfaction with the social network Instagram. It also aims to determine the extent to which Instagram users' satisfaction determines their loyalty to Instagram.

## 2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The digital environment is becoming a popular space for the dissemination of emotions, and these are at the heart of social media exchanges (Botha & Reyneke, 2013). Virtual relationships enable feelings of joy and happiness, especially through textual and visual communication. In particular, graphic elements, colors, and links influence customers' emotions such as joy and excitement, and these feelings have further effects on a specific intention (Koo & Ju, 2010). The use of emoticons and filters for photos and videos makes it easier to express emotions and influence the perception of social interactions. For example, the "Like" button indicates a positive attitude to prevent users from spreading negative associations (Serrano-Puche, 2016). Previous studies on viral advertising have proven that awe and affection promote emotional altruism and affiliation by sharing positive emotions and motivating others (Nikolinakou & King, 2018). Stieglitz and Dang-Xuan (2013) confirmed the importance of feelings in social networks and how content in social networks is positively correlated with the dissemination of information. Forums and online portals have shown that the affective dimensions of messages (positive and negative) can promote greater cognitive engagement in the form of attention, feedback and sharing on social networks.

Research on the use of appeals in advertising has shown that an emotional appeal is more effective than a rational appeal in making a connection to an ad and has a long-lasting effect (Sriram et al., 2021). Incorporating emotional content into advertising can successfully build a strong bond with a person (Chen et al., 2023). In addition, ads with emotionally appealing content have also been shown to generate more word of mouth. Prikhodko et al. (2020) note that communication on social networks is increasingly taking on an emotional character and going beyond its purely functional purpose. Research by Graciyal and Viswam (2021), based on the Emotional State Theory of Happiness, have shown that emotional experience has three dimensions: (1) endorsement, which refers to social media communication that brings great joy to users when they receive feedback in the form of likes, shares, and comments; (2) engagement refers to the level of user participation that social media encourages through feelings of excitement and connectedness among users; and (3) attunement refers to users' sensitivity to social media interactions, which can include negative emotions such as anxiety or fear of missing out. Nusair et al. (2013) found that affective engagement of Generation Y members is positively associated with loyalty to travel-related online social networks. In addition, Alkilani et al. (2013) emphasized that customers' satisfaction with social networks is an important predictor of their commitment. Based on the above, the following hypotheses were set:

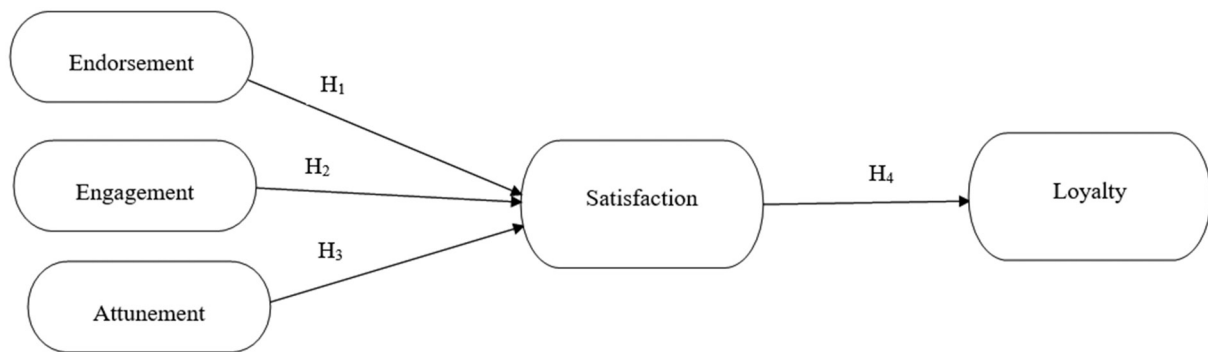
**H1:** Endorsement significantly influences user satisfaction.

**H2:** Engagement significantly influences user satisfaction.

**H3:** Attunement significantly influences user satisfaction.

**H4:** User satisfaction significantly influences loyalty.

Further to the above hypotheses, we propose a conceptual model as seen in Figure 1.



**Figure 1.** The conceptual model

Source: Own research

### 3. METHODOLOGY

The research was conducted using the survey method on a convenient sample of respondents, citizens of the Republic of Croatia, in July 2023. A structured online questionnaire was used for data collection. At the beginning of the survey, a selection question was asked that identified only respondents who use Instagram. This question is justified by the fact that Instagram is a visually-oriented social network where images, videos and interactive elements have a strong influence on users' emotions and users are highly engaged (Au & Chew, 2017). The first group of questions related to the reasons for using Instagram, and these questions aimed to explore the perception of emotions in the digital environment. In the second group of questions, respondents chose the appropriate option for each statement that best described their agreement with the dimensions of emotional experience, satisfaction and loyalty on Instagram. The questions were formulated based on previous research by Graciyal and Viswam (2021), Nusair et al. (2013) and Alkilani et al. (2013). Respondents rated their agreement with the statements on a five-point Likert scale ranging from 1 – “strongly disagree” to 5 – “strongly agree”. The last group of questions related to the socio-demographic data of the respondents. 171 fully and correctly completed questionnaires were collected.

### 4. RESEARCH RESULTS

The sample consisted of 58.50% female respondents and 41.50% male respondents. Regarding the age of the respondents, the largest proportion consisted of people aged 25 to 34 years (48.50%), followed by people aged 18 to 24 years (44.40%). In terms of the level of education, the largest number of respondents had completed graduate studies (38.00%), followed by respondents with an undergraduate degree (32.60%). A slightly smaller number of respondents had completed high school (22.20%). The sample consisted of employed respondents (56.10%), followed by students (33.30%), while a slightly smaller number of respondents were unemployed (9.90%). In terms of average monthly income, most respondents earned on average up to €700.00 per month (28.10%) and between €901.00 and €1,200.00 (28.10%). This was followed by respondents who earned on average between €701.00 and €900.00 (20.50%), while a slightly smaller number of respondents earned between €1,201.00 and €2,000.00 (19.30%).

The majority of respondents use Instagram for fun (89.50%) and to maintain communication with friends (64.30%), while a slightly smaller number of respondents use this social network to share moments from their private life (45.60%), for networking (31.60%) and for business purposes (29.20%). In terms of the perception of emotions in the digital environment, most respondents believe that it

is about sharing positive and negative moments from their private life (75.40%) and see emotions on the internet as mutual support between users (52.60%). A slightly lower number of respondents see emotions in the digital environment as a way to draw the attention of potential customers to the brand (49.70%) and to share content related to successes or special moments (39.80%).

The results of the descriptive analysis and the reliability analysis of the constructs used for the hypothesis test are presented below.

**Table 1.** Results of the descriptive statistics and reliability analysis (N=171)

VARIABLE	Mean	SD	Cronbach alpha
<b>ENDORSEMENT</b>			0.868
Instagram friendships make me happy.	2.89	1.17	
Instagram friendships make me feel appreciated.	2.42	1.09	
If a friend doesn't send me a message, I'm sad.	2.68	1.20	
Communicating via Instagram is useful.	3.64	1.06	
Every time I communicate via Instagram, I feel joyful.	2.81	1.03	
I feel joy and elation when I receive attention from my virtual friends.	2.94	1.32	
When I am happy, I use more emojis.	3.44	1.26	
<b>ENGAGEMENT</b>			0.848
I don't feel particularly happy with who I am, and that makes me want to use Instagram more.	1.95	1.20	
If I don't have good communication on Instagram during the day, I wake up feeling restless or incomplete.	1.88	1.24	
I find it interesting to find friends on Instagram.	2.96	1.20	
Instagram notifications have a positive impact on me.	2.96	1.17	
Every reply from a friend makes me emotionally alert and excited.	2.92	1.10	
When friends block me on Instagram, I feel rejected.	2.46	1.28	
<b>ATTUNEMENT</b>			0.811
I'm happy with my life on Instagram.	3.71	1.11	
When my friend is online but doesn't reply to messages, I feel anxious.	2.57	1.30	
I get anxious after an update on Instagram.	1.98	1.19	
I use Instagram to forget about personal problems.	2.51	1.34	
When a friend stops following me on Instagram, I feel lonely.	2.16	1.20	
<b>SATISFACTION</b>			0.925
I am happy with my decision to use Instagram.	3.47	1.12	
The decision to use Instagram was a wise one.	3.17	1.05	
I feel good about my decision to use Instagram.	3.33	1.09	
I think I did the right thing by using Instagram as a social network.	3.36	1.09	
I am happy to use Instagram.	3.46	1.13	
I feel committed to Instagram.	2.60	1.29	
I am proud to be part of the Instagram community.	2.63	1.24	
<b>LOYALTY</b>			0.872
I rarely think about switching to another social network.	3.08	1.13	
As long as Instagram exists as a social network, I doubt I would switch to another social network.	3.06	1.16	
I use Instagram as a social network when I want to connect with my friends.	3.18	1.23	
If I want to connect with my friends, Instagram is my first choice.	2.75	1.35	
I like to use Instagram as a social network.	3.85	1.12	
For me, Instagram is the best place for social networking.	2.89	1.20	
I believe Instagram is my favorite place for social networking.	2.94	1.25	

Source: Own research

The average values of the variables range from 1.88 to 3.85. The respondents gave the highest average values for the construct "satisfaction" (M = 3.15; SD = 0.95) and the construct "loyalty" (M = 3.11; SD = 0.91). The values of the Cronbach alpha coefficients are acceptable for all constructs

and range from 0.811 to 0.925. All values are greater than 0.7 and indicate a high reliability of the measurement instrument (Hair et al., 2006).

A correlation analysis was also conducted to determine any multicollinearity between the observed variables. The results of the correlation analysis are presented in Table 2.

**Table 2.** Correlation matrix

	ENDORSEMENT	ENGAGEMENT	ATTUNEMENT	SATISFACTION
ENDORSEMENT	1			
ENGAGEMENT	0.746	1		
ATTUNEMENT	0.715	0.816	1	
SATISFACTION	0.589	0.444	0.469	1

**Source:** Own research

The calculated correlation coefficients show that there is a positive, statistically moderate to strong correlation between the observed variables. The values of the correlation coefficients are below 0.80, which indicates that there is no multicollinearity problem (Bryman & Cramer, 2009), except between the variables: “attunement” and “engagement”, for which a threshold value was set. In addition, the values of the variance inflation factor (VIF) were examined, which ranged from 2.439 to 3.569. As the values are below 5 (Hair et al., 2006), it can be concluded that there is no multicollinearity problem.

The following table shows the results of the multiple regression analysis for the variables that predict “user satisfaction”.

**Table 3.** Multiple regression analysis for variables predicting „user satisfaction”

<b>Indicators</b>				
<b>Multiple correlation coefficient R</b>	0.595			
<b>Coefficient of determination R<sup>2</sup></b>	0.354			
<b>Adjusted R<sup>2</sup></b>	0.342			
<b>Standard error</b>	5.413			
<b>F ratio</b>	30.479			
<b>Significance</b>	0.000			
<b>Independent variables</b>	<b>b</b>	<b>Beta</b>	<b>t</b>	<b>Sig.</b>
<b>Constant</b>	8.387			
<b>ENDORSEMENT</b>	0.599	0.547	5.635	0.000*
<b>ENGAGEMENT</b>	-0.103	-0.084	-0.714	0.476
<b>ATTUNEMENT</b>	0.210	0.146	1.305	0.194

Note: dependent variable – user satisfaction; B – unstandardized coefficient; Beta – standardised coefficient; \* - significant at the level  $p < 0.001$

**Source:** Own research

In the observed regression model, only one independent variable was found to statistically significantly predict the dependent variable ( $F = 30.48$ ,  $p < 0.01$ ). The variable „endorsement” ( $\beta = 0.599$ ,  $p < 0.01$ ) explains 35.4% of the variation in the dependent variable „user satisfaction”. Other variables: „engagement” ( $\beta = -0.103$ ,  $p > 0.01$ ) and „attunement” ( $\beta = 0.210$ ,  $p > 0.01$ ) have a very small individual impact on „user satisfaction” and are not statistically significant. Based on the previous results, hypothesis H1 was confirmed, while hypotheses H2 and H3 were rejected.

A simple regression analysis was performed to show the relationship between „user satisfaction” and respondents’ loyalty to this social network. The results are shown in Table 4.

**Table 4.** Simple regression analysis for variable predicting „loyalty”

<b>Indicators</b>				
<b>Multiple correlation coefficient R</b>	0.658			
<b>Coefficient of determination R<sup>2</sup></b>	0.433			
<b>Adjusted R<sup>2</sup></b>	0.429			
<b>Standard error</b>	4.806			
<b>F ratio</b>	128.797			
<b>Significance</b>	0.000			
<b>Independent variable</b>	<b>b</b>	<b>Beta</b>	<b>t</b>	<b>Sig.</b>
<b>Constant</b>	7.960		6.266	
<b>USER SATISFACTION</b>	0.627	0.658	11.349	0.000*

Note: dependent variable – loyalty; B – unstandardized coefficient;  
 Beta – standardised coefficient; \* - significant at the level  $p < 0.001$

**Source:** Own research

The previous table shows that the results are statistically significant ( $F=128.797$ ;  $p < 0.001$ ). Instagram users’ „satisfaction” has a strong and positive influence on „loyalty” ( $\beta = 0.658$ ,  $p < 0.01$ ). In addition, „user satisfaction” explains about 43% of the variance of „loyalty” ( $R^2 = 0.433$ ). This leads to the conclusion that hypothesis H4 is accepted.

## 5. CONCLUSION

This study contributes to the theory of consumer behavior, with a focus on consumer behavior in the digital environment. The results of this study provide insights into the relationships between the individual determinants of emotional experience, satisfaction and loyalty of social network users and may provide a suitable starting point for future research, especially in the context of the Republic of Croatia, where there is an apparent lack of such research. This research can provide useful implications for academics and marketers to better understand the determinants of consumer behavior in the digital environment.

The results of the empirical study conducted indicate a significant relationship between endorsement and satisfaction among Instagram users. According to the conclusions of the [Graciyal and Viswam \(2021\)](#), endorsement in the form of a positive emotional experience that users receive as feedback from social networks can be a significant predictor of their satisfaction. In addition, a significant and positive relationship was demonstrated between Instagram users’ satisfaction and their loyalty, which is consistent with the research findings of [Alkilani et al. \(2013\)](#) and [Nusair et al. \(2013\)](#). Furthermore, this study found no significant relationship between user engagement, attunement and satisfaction with Instagram. Possible reasons for this can be that while users of this social network can be highly engaged (in terms of posting, sharing and commenting), this does not necessarily correlate with their satisfaction. Similarly, users can be passive consumers of content, which can affect the assumed relationship between engagement and satisfaction. In the context of the user’s attunement, which in this study is determined by the user’s sensitivity to the interactions in a social network, the user may develop negative emotions, which can consequently affect the results obtained.

The results of this study show implications for social media marketers. It is necessary to monitor changes in user behavior in order to continuously maintain satisfaction and promote loyalty. To

ensure continuous user support and engagement, it is extremely important to communicate strategically with the audience to increase the emotional connection between the user and the company. Through authentic and two-way communication, interactive content and personalized responses, it is possible to increase user engagement and thus their satisfaction.

Based on the research results, limitations and recommendations for future research were identified. Since the data was obtained through purposive sampling, the results of this study cannot be generalized and should be considered indicative. Furthermore, the study was conducted among citizens of the Republic of Croatia. In future studies, foreign respondents should also be included in order to obtain a broader picture of attitudes towards emotional experiences in social networks. In addition, the survey method used in this study was a structured questionnaire. In future studies, other methods can also be used to gain a deeper insight into the cause-effect relationship between the variables studied.

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# Beyond Authenticity: Influence, Persuasion, and Platform Power on Social Media

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Platform-Driven Visibility;  
Audience Trust



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**Abstract:** *Digital influence is no longer just about personal branding and audience trust—it is increasingly shaped by platform mechanics, algorithmic amplification, and AI-driven engagement strategies. While authenticity has long been positioned as the currency of influencer success, emerging trends suggest that credibility is now engineered as much by platforms as by creators themselves. This paper explores how influence operates beyond the individual, analyzing how social media ecosystems mediate visibility, shape persuasion techniques, and redefine digital authority. Through an examination of algorithm-driven influence, content amplification strategies, and shifting audience perceptions, this study reassesses what it means to be “influential” in a media landscape where personal authenticity competes with systemic curation. The findings offer insights into the evolving power structures of digital influence, shedding light on the blurred lines between organic reach, strategic persuasion, and platform-controlled visibility.*

## 1. INTRODUCTION

Influencers are generally portrayed as the epitome of digital authenticity — individuals who communicate directly, informally and “without filters” with audiences, building a relationship of trust outside of traditional media frameworks. However, in the modern digital environment, that relationship is increasingly conditioned by the architecture of the platforms that decide what will be visible, for how long, and to whom. Authenticity no longer depends only on the expression, but also on whether it is algorithmically recognized as relevant (Marwick, 2015).

Contemporary models of visibility and engagement do not come from spontaneity, but from optimization — content is planned according to metrics, audiences are segmented, and “proximity” becomes part of the strategy. Mechanisms of platform capitalism (Srnicek, 2017), attention economy (Wu, 2016), and the hidden labor dynamics within digital platforms (Duffy & Sawey, 2022) are reshaping the way authority is built: what was previously associated with experience, expertise, or integrity, now depends on system recommendations, data insights, and algorithmic adaptability. In this context, it is increasingly difficult to separate personal communication from the market function. Influencer narratives, often shaped through personal stories and intimate confessions, actually function as carefully structured models of persuasion—visually coded, tonally tailored, and rhythmically formatted for maximum reach. These patterns can be recognized and analyzed through different genres of content, from vlogs to sponsored posts, where the boundaries between private and promotional are becoming less noticeable (Cotter, 2023). Such a transformation is not only a matter of stylistic shifts, but also requires a new analytical perspective: how to analyze influence in a space where the creator is not the only author of the message? How are patterns of persuasion shaped when they are defined by technical parameters and not solely by communicative intentions? And how is audience trust built—or lost—in an environment that privileges frequency and format over content? These questions become especially

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important at a time when research increasingly points to a tension between audience expectations and the system in which influencers operate. Understanding that relationship requires an analysis that goes beyond individual cases and focuses on systemic logic — on amplification mechanisms, narrative structures, and the positioning of credibility within the framework of digital infrastructure.

This paper offers a wider perspective on how influencer communication works today, emphasizing that digital authority is increasingly built through a combination of personal efforts and the underlying logic of social media platforms.

## **2. THEORETICAL FRAMEWORK: AUTHENTICITY, THE ALGORITHMIC ECONOMICS OF VISIBILITY, AND THE MARKET VALUE OF AUDIENCES**

Understanding the position of influencers in contemporary digital ecosystems requires the analysis of three interrelated dimensions: the construction of authenticity, the infrastructural logics of platforms and the transformation of attention into a market resource. Together, these dimensions shape the specific patterns of communication, visibility, and persuasion that characterize social media influence today.

### **2.1. Authenticity as a Construct**

Authenticity in the digital space is not a stable characteristic, but a performance that depends on the context and the audience's perception, as emphasized in the classical analysis of social roles (Goffman, 1959). In social networks, this logic becomes more complex due to technical mediation and algorithmic content filtering (Abidin, 2016; Marwick, 2013). In contemporary communication, authenticity is constructed through recognizable stylistic and discursive patterns, whereby “sincerity”, “vulnerability”, and “spontaneity” function as codes of success (Hollenbaugh, 2021; Marwick, 2013). This aestheticization of spontaneity is particularly visible in the luxury selfie phenomenon, where users create images that simultaneously signal availability and exclusivity (Marwick, 2015).

Research shows that users, especially from Generation Z, perceive authenticity as an aesthetic choice and a tactical decision, in accordance with algorithmically desirable patterns (Neufeld-Wall, 2023). In digital influencer narratives, emotional storytelling and everyday moments become part of the professional repertoire, shaped according to the expectations of the audience and partners (Audrezet et al., 2020; Hund, 2023).

Analysis of influencer communication in the fashion sector indicates that values such as transparency and “naturalness” are carefully positioned within promotional narratives, thus supporting the market function of “natural expression” (Ercegovac & Tankosić, 2023). Similar patterns have been observed among creators who present themselves as digital entrepreneurs, where authenticity is combined with narratives of professional efficiency (Ercegovac et al., 2023).

### **2.2. The Algorithmic Economy of Visibility**

Visibility on social networks increasingly depends on the rules set by the platforms, which subordinates the communication of creators to technical systems of ranking and distributing content (Srnicsek, 2017; Wu, 2016). Influencers are thus part of an infrastructural process in which attention becomes a capitalized resource, and distribution depends on fitting engagement metrics (Jago, 2019).

Within this framework, creators develop strategies that include timing of posts, choice of format, and tonal adjustment of content (Cotter, 2018). The dynamics of the “visibility game” require creators to

continuously adapt to changing algorithmic preferences, where even the perception of authenticity becomes part of the optimization (Cotter, 2023). Algorithms do not value content by its content value, but by the performative signals it generates - frequency, retention of attention, interaction. Influencers internalize this through what has been labeled the “influencer imaginary” - a set of assumptions and expectations about how to communicate in order to remain relevant (Arriagada & Bishop, 2021; Nistor et al., 2024). Platforms such as Instagram, YouTube, and TikTok continuously alter the criteria of visibility through algorithmic filtering and prioritization. Influencers actively adapt to these shifts by aligning their content with platform-specific engagement signals and technical requirements, navigating a visibility landscape driven more by system compatibility than by expressive value (Sule & Wani, 2024). This constant platform-driven recalibration of content extends beyond individual strategy, manifesting through technical infrastructures that algorithmically define what—and who—is considered visible or valuable.

Although presented as neutral tools of analysis, algorithmic influencer management tools actively participate in the selection and shaping of visibility and commercial engagement opportunities. In some cases, the so-called influencer management tools use biased metrics like “brand safety” to categorize and rank influencers, often according to criteria that reflect racial, gender, and class inequalities (Bishop, 2021). Empirical findings indicate that even content structures, such as narrative twists in vlogs, are aligned with algorithmic logics—to ensure optimal distribution and engagement (Vlahović et al., 2023). Changes in the ways of construction and evaluation of influence also indicate a wider shift in communication patterns, whereby the author’s identity is replaced by the engineering of presence — shaped through interaction with software logic (Ercegovac et al., 2024). This ongoing recalibration of content in accordance with algorithmic priorities suggests the idea of digital reputation which is increasingly shaped not by the content itself, but by how well it conforms to platform-specific visibility standards. In this context, digital reputation can be understood as a performative outcome of engagement metrics and technical compatibility, rather than intrinsic message value (Bishop, 2021; Cotter, 2018).

### 2.3. Audience Transformation and Market Value

Audiences no longer function as passive recipients of messages, but as part of the technical and market infrastructure of attention distribution (Davenport & Beck, 2001). In addition to the construction of content and influencer presence, the audience emerges as a dynamic and constructed entity. Rather than a unified mass, audiences are increasingly segmented into functional communities — from passive spectators to engaged contributors (Jenkins, 2006; Livingstone, 2005). Influencers adapt their content based on anticipated reactions of micro-audiences, effectively treating the audience as a cognitive model within their creative strategy. This “presented audience” (Marwick & Boyd, 2010) is a product of algorithmic mediation, where interaction is no longer shaped by direct relationships, but by assumed behavioral patterns inferred from platform dynamics.

Influencers produce content that is both aimed at attracting micro-audiences and meeting the engagement criteria imposed by the platform. One of the aspects that contributes to this change is the fragmentation of communities, encouraged by the algorithmic logic of personalization, which leads to the segregation of users into discursive bubbles (Ercegovac & Tankosić, 2024). In these environments, influencers act as authorities within closed systems of norms, values, and communication styles. This logic of audience transformation into a market entity is also reflected in narrative branding strategies, which serve not only to connect with followers but also to position themselves in front of potential commercial partners (Ercegovac et al., 2023). The audience thus becomes both a target and a proof of market value.

### **3. METHODOLOGY: CONTENT ANALYSIS OF INFLUENCERS THROUGH THEMATIC CODING AND ALGORITHMIC CONTEXT**

This research relies on a qualitative approach, focused on understanding how influencers shape communication strategies within algorithmically mediated digital spaces. The analysis is focused on the interpretation of narratives and communication patterns that reflect the tension between authenticity, commercial goals, and platform limitations.

#### **3.1. A Sample**

The research sample consists of four influencers with a high degree of visibility on social networks (Instagram and YouTube), from different genre spheres: lifestyle, education, fashion, and entrepreneurship. The selected influencers have over 2 million followers, thus providing content analysis that has both organic reach and commercial aspects. The criteria for sample selection included continuous activity on social media over the past year, a clearly articulated branding strategy built around authentic narratives, evident participation in sponsored posts or commercial partnerships, and a recognizable use of emotional and visual codes in communication.

#### **3.2. Method**

A qualitative content analysis was conducted, with particular focus on the structure of narratives in influencer announcements, including topics, tone, and modes of audience address; visible patterns of authenticity and emotional expression; the presence of strategic self-presentation aligned with commercial objectives; and elements reflecting adaptation to algorithmic requirements, such as posting frequency, content formatting, and calls to action. The last 30 posts of each influencer on the relevant platforms were analyzed. For Instagram, posts, story formats, and reels are included; vlogs and sponsored segments were analyzed for YouTube.

#### **3.3. Analytical Procedure**

Data analysis was conducted through a combination of open coding and thematic analysis. Open coding principles were applied in accordance with the approach of qualitative data analysis (Strauss & Corbin, 1990), with systematic thematic grouping of identified patterns according to thematic analysis guidelines (Braun & Clarke, 2006).

The analytical procedure was organized in three phases. The first involved open coding of the content to identify initial categories of narratives and communication strategies. In the second phase, codes were thematically linked to explore how influencers negotiate the balance between authenticity and commercial expression. The third phase focused on analyzing how content is adapted to algorithmic patterns, with particular attention to technical and communicative adjustments used to shape digital visibility.

Content coding identified recurring patterns among the analyzed influencers, with variations reflecting platform-specific and niche-related dynamics. In Ali Abdaal's content, the code "productive vulnerability" emerged, combining emotional openness with an advisory tone. The analysis highlighted "visual elegance" as a recurrent code in Tamara Kalinić's content, associated with a luxurious aesthetic and selective self-presentation. In Lil Miquela's posts, the codes "virtual intimacy" and "aesthetic control" emerged as particularly salient, while MrBeast's content was characterized by "hyperdramatization of challenges", typical of high-intensity and competitive

video formats. These codes were subsequently organized into broader thematic categories, which underpin the structure and interpretation of the Results chapter. The coding process was conducted independently by two researchers.

Initial open codes were generated separately, followed by a comparison phase during which overlapping categories were identified and refined. Discrepancies were resolved through discussion until consensus was reached. This process ensured intersubjective verification and strengthened the reliability of thematic patterns, in line with established qualitative research practices (Braun & Clarke, 2006; Strauss & Corbin, 1990).

#### **4. RESULTS: DIGITAL INFLUENCE STRATEGIES THROUGH FOUR PLATFORM EXAMPLES**

Although the influence of influencers is often measured by numbers, the differences in their strategies, communication tones, and relationships with the audience are much more subtle and rich in content. This analysis includes four influencers from different platforms and from different content spheres — from education and luxury lifestyle to virtual identity and extreme entertainment. Their basic characteristics — including the number of followers, publication dynamics, and the presence of sponsorships — are shown in Table 1, which serves as a landmark for understanding the context from which the analyzed patterns emerge.

##### **4.1. Dominant Communication Patterns**

All analyzed influencers show pronounced narrative consistency, but in different forms. Tamara Kalinić and Ali Abdaal use clearly structured personal narratives that connect professional development and everyday challenges. MrBeast relies on spectacular, themed video formats, while Lil Miquela operates through a carefully crafted post-digital persona. Thematic patterns indicate the pronounced presence of authentic narratives and emotional expression in Abdaal and Kalinić, while in Miquela there is a digital construction of emotional closeness (see Table 2). MrBeast, as a creator with over 380 million subscribers, uses narrative simplicity and dramatization as a function of mass engagement.

##### **4.2. Strategies for Optimizing Visibility**

All influencers demonstrate clear patterns of algorithmic optimization (Table 3), but in accordance with the logic of the platform and the audience. MrBeast, although with a relatively small number of posts per year (~25–30), achieves extreme reach through content precisely tailored to viral patterns. Lil Miquela uses visual uniformity and aesthetic consistency as a value signal, while Tamara Kalinić combines luxury brand narratives with tonally uniform content. Abdaal uses structured SEO, well-placed headlines, and CTA messages to increase retention and engagement.

##### **4.3. Relationship Between Influencer and Audience**

Influencer relationships with audiences show a high degree of variability (Table 4). With MrBeast, the logic of the spectacle dominates, in which the audience is viewed as an aggregate of numbers, while with Abdaal, active communication is visible — comments, polls and direct reaction to the audience's suggestions. Tamara Kalinić uses interactions to shape future content, where the tone of communication is personalized and often emotional. With Lil Miquela, there is a narrative about community, but with an aesthetically distant tone, which further problematizes the issue of authenticity in the context of virtual identity.

**Table 1. Influencer Characteristics**

Influencer	Platform	Niche	Followers	Activity (posts/year)	Sponsorship Presence
MrBeast	YouTube	Entertainment / Extreme Challenges	389M	~25–30	Occasional / Exclusive
Lil Miquela	Instagram	Virtual Persona / Fashion	2.4M	~120	Regular
Tamara Kalinić	Instagram	Fashion / Luxury Lifestyle	2M	~180	High Frequency
Ali Abdaal	YouTube	Education / Productivity	6.3M	~60	Frequent

Source: Own research

**Table 2. Content Themes**

Theme	MrBeast	Lil Miquela	Tamara Kalinić	Ali Abdaal	Note
Authentic narratives	✓	✓✓	✓✓✓	✓✓✓	Clearly linked to personal stories in Kalinic and Abdaal's content
Emotional tone (vulnerability)	✓	✓	✓✓	✓✓	Often addressed by Abdaal through burnout and mental load topics
Educational content	✗	✗	✗	✓✓✓	Structured tutorials and educational advice
Branded content	✓✓	✓✓✓	✓✓✓	✓	Frequently unlabeled in Miquela's content
Storytelling (narrative structure)	✓✓✓	✓✓	✓✓	✓✓✓	Increasingly used by MrBeast for dramatic build-up

Source: Own research

**Table 3. Algorithmic Strategies**

Parameter	MrBeast	Lil Miquela	Tamara Kalinic	Ali Abdaal	Examples
Posting frequency	medium	high	high	medium	MrBeast publishes rarely but with high viral reach
Use of keywords	high	medium	medium	high	SEO in YouTube titles and use of hashtags
Calls to action (CTAs)	strong	moderate	low	present	e.g., 'subscribe', 'click the link'
Visual consistency	extreme	highly consistent	consistent	moderate	Miquela uses rendered visuals; Kalinic maintains color tone
Content length	long	short	short	medium	MrBeast videos ~20 min; Instagram Reels ~30 sec

Source: Own research

**Table 4. Audience Relationships**

Influencer	Audience as Community	Interaction (Comments/Replies)	Tone of Communication	Content Personalization	Note
MrBeast	low	limited interaction	generic	globally framed	Audience treated as a mass
Lil Miquela	moderate	team-managed strategy	distant	stylized persona	Constructed virtual closeness narrative
Tamara Kalinić	strong	direct and emotional	present	customized to audience	Uses comments to gather feedback
Ali Abdaal	community as network	direct communication	casual, friendly	frequent response	Incorporates polls, comments, newsletters

Source: Own research

## 5. DISCUSSION: REINTERPRETING DIGITAL AUTHENTICITY AND SYSTEMIC POWER OF PLATFORMS

The obtained results confirm that authenticity in the modern digital environment is no longer a trait but a strategic construction that is continuously shaped under the influence of algorithmic priorities and market demands. Influencers like Tamara Kalinić and Ali Abdaal consciously combine personal narratives with commercial messages, balancing the appearance of familiarity with the need for performative success. In accordance with previous theoretical assumptions, here authenticity appears not as the opposite of commerciality, but as its condition (Abidin, 2016; Marwick, 2013).

The role of the algorithm is not only technical — it is infrastructural. As indicated in the analysis of platform capitalism (Cotter, 2018; Srnicek, 2017), platforms dictate the logic of visibility through metrics internalized by users. MrBeast’s approach shows how virality is produced: through optimization of length, pacing, visual drama and title frames, not through organic growth. His content exemplifies an algorithmically ideal construct — maximum engagement with minimal reliance on intimate narrative. This contrast highlights a structural tension between what audiences perceive as authentic and what platforms reward as valuable — a divergence that shapes both content design and influencer-audience relationships. In contrast, with Ali Abdaal, it can be seen how algorithmic discipline can be paired with community building. Its “community as network” approach reflects a new audience — active, segmented, and feedback-involved. Such patterns of narrative adaptation correspond with findings on the structure of successful vlog formats, where storytelling functions as a means of maintaining attention and engagement (Vlahović et al., 2023).

A special case is represented by Lil Miquela, who raises the question of whether authenticity is even related to the existence of a real person. Her persona, although technically “non-existent”, manages to evoke emotional identification from the audience, confirming the claims that authenticity is a perceptual rather than an ontological category (Arriagada & Bishop, 2021; Marwick, 2015).

In this context, the question of whether the influencer is “real” becomes irrelevant in relation to the question: does he successfully communicate effectiveness and engagement? The analysis indicates a clear tendency of audience fragmentation, which is in line with the findings on the segregation of communities on social networks (Ercegovic & Tankosić, 2024). Influencers increasingly shape content for micro-communities with specific preferences and discursive codes, thus recognizing the audience not only as a recipient of a message, but as a market resource with its own communication norms. All the observed examples show that the relationship with the audience moves between three polarities: the audience as a number, the audience as a community and the audience as a market. The role of the audience is being redefined through algorithmically filtered attention — what is not measured practically ceases to exist (Nistor et al., 2024; Wu, 2016). This confirms that authenticity, if it is not algorithmically compatible, remains invisible, regardless of its content quality.

While the comparative analysis of the four selected influencers enables the identification of meaningful communication patterns across genres and platforms, the findings should be interpreted in light of certain limitations. The sample, though strategically selected, focuses on high-visibility influencers with established branding, thus excluding less commercially oriented creators or emerging content formats. As such, the study offers insight into dominant strategies rather than the full spectrum of influencer communication. Future research may benefit from expanding the sample to include less curated forms of digital expression or longitudinally tracking shifts in communication patterns in response to platform changes.

## 6. CONCLUSION: RESHAPING AUTHENTICITY IN THE AGE OF ALGORITHMIC INFLUENCE

Analysis of the influence of influencers in modern digital ecosystems showed that authenticity no longer functions as an opposition to market logic, but as its operating mechanism. Influencers shape narratives that satisfy the needs of audiences and algorithms simultaneously, creating communication patterns in which the boundaries between sincerity and strategic self-presentation become increasingly fluid. Visibility and trust are no longer the result of content quality or personal integrity alone, but the product of dynamic interactions between algorithmic priorities, platform infrastructures, and micro-communities of users. In that process, the audience ceases to be a passive recipient, becoming an active participant, but also a market resource whose engagement is continuously measured and evaluated.

Cases like MrBeast, Lil Miquela, Tamara Kalinić and Ali Abdaal show different models of adaptation, but they all share a common ground: success depends on the ability to recognize and respond to the invisible but powerful demands of the platform environment. The findings indicate that digital reputation operates as a hybrid construct — at once signaling credibility to audiences and algorithmic compatibility to platforms.

Future research should more closely map how new formats of digital reputation are formed through a combination of personalized content, emotional economy, and engineering-optimized distribution mechanisms.

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# The Usability of the Hersey-Blanchard Situational Leadership Model in Theatre Management

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**Abstract:** *This study explores the topic of situational leadership in theatre management. The study fits into the arts management perspective typical of the performing arts. The study was designed as a qualitative study. In-depth, partially standardized, and unstructured interviews were conducted with theatre managers. The study aimed to determine the usefulness of the Hersey-Blanchard situational leadership approach in theatre management practice. The study identified directors' leadership style preferences. It also determined how they perceived the usefulness of the Hersey-Blanchard situational leadership approach in the context of environmental turbulence. Key factors limiting the usefulness of the Hersey-Blanchard situational leadership model were identified, such as: director's excessive responsibility; lack of confidence in employees' competence; turnover in the artistic ensemble composition; problems in assessing employees' maturity; authoritarian behavior; unspecified vision and mission of the institution; limited influence on determining the ensemble composition; specificity of managing artists' autonomy; specificity of managing artists in terms of their talent and social position; the artist-manager dichotomy; influence of the theatre organizer; reliance on habitual behavior and intuition.*

## 1. INTRODUCTION

As a creative organisation, theatre operates in a dynamically changing environment. This requires leaders to be flexible in responding to the changing environment and conditions of theatre functioning, both artistically and managerially. In the context of the challenges faced by theatre managers (budgetary pressures, crises, conflicts, both external and internal to artistic teams, relations with the organizer), the concept of situational leadership developed by Hersey and Blanchard, which involves adapting the leadership style to the level of competence and involvement of the theatre team members at a given moment, may be useful. Situational leadership can be a response to the unpredictability and variability of the conditions in which the theatre operates, including in the era of new generation technology development and the need to adapt to new situations.

## 2. LITERATURE REVIEW

The topic of leadership in performing arts organisations, including theatres, requires ongoing research due to factors specific to the sector. These include the different ways in which the aesthetic contract is constructed compared to other cultural organisations (Anderton & Pick, 1996, p. 16), the artist-manager dichotomy as a generator of conflicting goals, the phenomenon of managerial duos (Bhansing et al., 2012), or the management of actors in the context of their talent and social status. These conditions lead to situations where arts organisation leaders are unwilling to take on leadership roles (Goodwin, 2020), and theatre-specific phenomena develop, such as the phenomenon of romanticisation and idolisation of leaders (Nisbett & Walmsley, 2016, p. 9). All of this

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becomes even more important in light of the increasing challenges posed by the environment in which arts organisations operate. Examples include disruptions resulting from the development of next-generation technologies (Karcz-Ryndak, 2024, pp. 89-101; Pizzo, 2021), as well as disruptions caused by crises (Chuang, 2025; Mirčetić & Čudanov, 2021). This implies the need to increase the adaptive capacity of theatres, which requires, among other things, a rethinking of the existing management arrangements of these institutions and a search for optimal leadership solutions.

One of the most widely used in business practice is the Hersey-Blanchard concept of leadership (Mahapatra & Jain, 2023), which is part of the situational theory stream that draws on the achievements of the behavioural stream and, to a lesser extent, trait theory. In the Hersey-Blanchard model, the situational context in particular shapes the interaction between the leader and the members of the organisation. Used correctly, it can contribute to increased productivity (Hambleton & Gumpert, 1982).

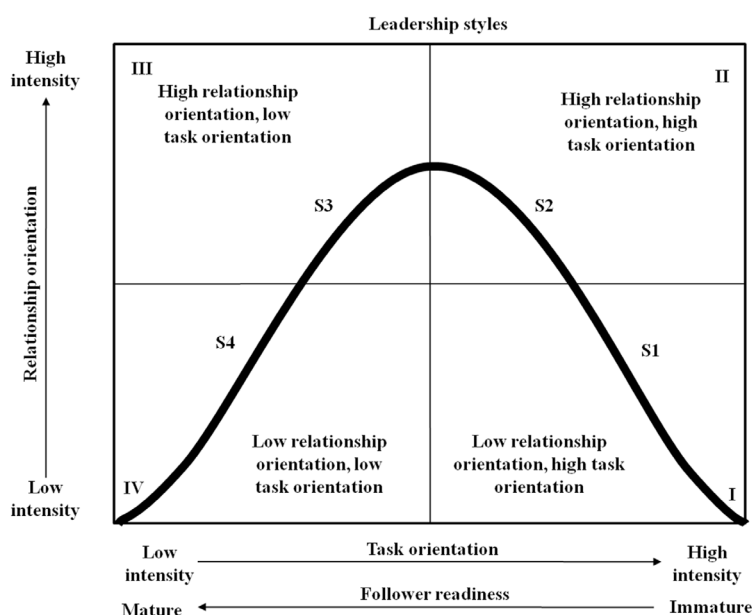
Over the years, the Hersey-Blanchard model has undergone several modifications (Mahapatra & Jain, 2023). The initial evolutionary concept has been transformed into a situational leadership theory (Thompson & Vecchio, 2009) with numerous modifications, which some researchers claim are cosmetic in nature (Graeff, 1997, p. 153). Currently, the most common is the SLII situational leadership model (Blanchard, 2007, p. 77), which assumes that leaders should adapt their leadership style to the developmental stage of their employees.

The creators of the SLII situational leadership model distinguish 4 levels of employee development and corresponding leadership styles (Table 1). The complete SLII model is shown in Figure 1.

**Table 1.** Stages of employee development in the situational leadership model

Employee development level	Competence level	Level of commitment	Leadership style
I (enthusiastic beginner)	Low	High	S1 (directing)
II (disillusioned learner)	Low	Low	S2 (coaching)
III (the capable, but cautious performer)	Medium - high	Changeable	S3 (supporting)
IV (self-reliant achiever)	High	High	S4 (delegating)

Source: Own processing based on Blanchard (2010)



**Figure 1.** Hersey-Blanchard's model of situational leadership

Source: Own processing based on Blanchard (2007, 2010)

The creators of the model emphasised the importance of important attributes of team members (responsibility and emotional maturity, and willingness to take on the authority given by the leader) (Cairns et al., 1998). It is expected that delegation of authority will lead employees to identify more with the organisation's goals, which will contribute significantly to more effective task performance (Minoru, 2025).

The assumptions of the model imply that managers have a wide range of possible leadership styles, but as Podgórska and Detko (2023) point out, there are problems with the appropriate choice of leadership style in the context of specific situations. In this context, follower commitment and follower competence play a special role (Jelača et al., 2022; Rodić & Marić, 2021; Thompson & Glasø, 2018). Meirovich and Gu (2017) point out that employees can have considerable freedom in decision making, be involved and participative, but still need some degree of structuring by managers.

### 3. METHODOLOGY

The study adopted a qualitative perspective. In-depth interviews (Knott et al., 2022) were conducted, which were partly standardised and unstructured. The interview recordings were transcribed, anonymised, coded and analysed with the support of dedicated computer software.

The research sample consisted of 12 public theatre managers of different sizes from 4 countries, allowing universal conclusions to be drawn about the application of the Hersey-Blanchard situational leadership model in theatre management practice. The sample was purposive, with geographical diversity as a criterion. The sampling was guided by the experience and knowledge of the industry of the authors of the study. This approach is dictated by the difficulty of accessing the research sample due to, among other things, the social and political nature of the functions performed by theatre managers, which translates into specific image consequences.

In addition, a condition of participation in the study was a declaration of familiarity with the Hersey-Blanchard concept of situational leadership and its use in practice for at least one year.

The authors set the purpose of the study to determine the usefulness of applying the Hersey-Blanchard situational leadership approach to theatre management practice. To this aim, the following research questions were formulated:

**Research Question One:** How do theatre managers perceive the usability of the Hersey-Blanchard situational leadership model from the perspective of their own preferences?

**Research Question Two:** How do theatre managers perceive the usability of the Hersey-Blanchard situational leadership model in the context of disruptions from the environment?

**Research Question Three:** What limits the usability of the Hersey-Blanchard situational leadership model for theatres?

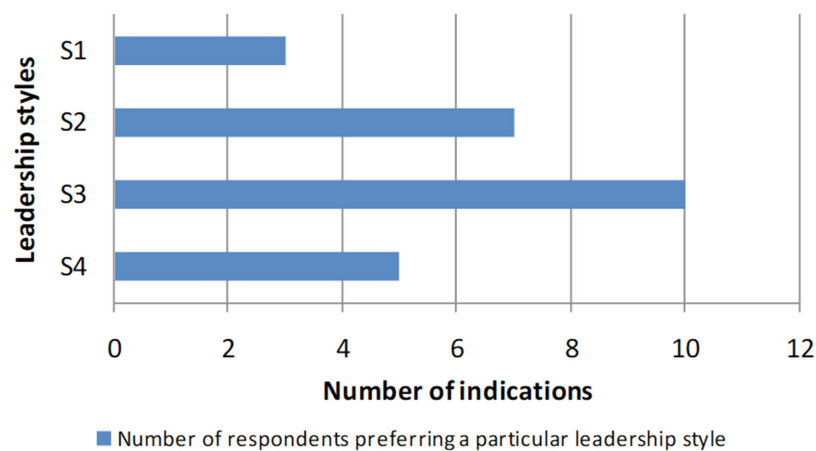
### 4. RESEARCH RESULTS

In response to the first research question, it is important to note that the directors surveyed recognise the benefits of using the Hersey-Blanchard model of situational leadership in theatres - according to the directors surveyed, the compatibility of the concept with the project-based nature of the work of artistic companies, especially those with longer time frames, is a crucial factor:

„Each new spectacle is a new project. You can say (...) from project to project. That’s the way you work in the theatre. Situational leadership works well here, despite my initial resistance to the concept. I think it’s all about its attractiveness in a project setting, especially one with a longer timescale, where all these phases of employee development can actually take place”. [M4 (Manager 4 - authors’ comment)]

„In fact, we work by designing. Our projects have different dynamics, so it’s natural to be able to adapt to a specific situation. On the other hand, it’s very time-consuming to constantly instruct new team members, so the leadership concept we’re talking about is particularly effective when I can work with an experienced team that I already know well (...) or when the scale of the project is so large that instruction doesn’t take up too much time in relation to the whole”. [M7]

In addition, the directors surveyed have a preference for the leadership styles used (Figure 2).



**Figure 2.** Findings - theatre managers’ preferences

**Source:** Own research

Respondents emphasise the use of S3 and S2 styles and avoid S4 and S1 styles. Interestingly, the same trend was found in the authors’ research among business organisations (Karcz & Ryndak, 2016, p. 94). To some extent, the preference may be influenced by previous management experience and the views and habits of the individual manager, as indicated by the following statements:

„It’s fair to say that, despite appearances, this concept isn’t so obvious. Moreover, I sometimes find myself behaving as I did before I was trained and started using this tool (the Hersey-Blanchard model – authors’ comment). I used to manage exclusively in an autocratic way (...), which is common in our industry. It’s hard to change the old habits overnight (...)”. [M10]

„There are elements that I modify in this approach because I believe that it’s necessary to adapt each solution individually to the specific person. Sometimes I find that something works better and sometimes less well, but this makes me more willing to use the whole concept (...). In my case, for example, I try to put the whole team together so that the training phase is as short as possible (...)”. [M2]

On the other hand, with regard to the second research question, it should be pointed out that, according to the respondents, the Hersey-Blanchard model is useful in the context of environmental disruptions, especially when leading relatively permanent and experienced teams:

„In times of crisis, you have to act quickly. In my opinion, it’s better in such conditions to work with an experienced team where there isn’t a lot of staff turnover (...), which often happens in our industry. I think the concept then gains in efficiency (...). It’s all about delegation and support”. [M1]

In addition, the Hersey-Blanchard model can be an alternative to leadership based on intuition and provides opportunities for team members to learn the leader's patterns of behaviour, leading to increased transparency in team relationships:

*„By applying this concept, we stop relying on intuition, which can sometimes be unreliable when there is peer pressure. Interestingly, I feel that my team can predict some of my behaviour in advance, so I don't spend as much time discussing decisions with them (...). This allows for relative transparency in the relationship between me and our team members". [M9]*

At the same time, respondents indicate that the effectiveness of Hersey-Blanchard leadership under conditions of environmental disruption depends on prior experience due to the nuances of the model itself:

*„Environmental disruptions are most often unexpected. Under such conditions, experience in managing the leadership relationship is crucial. With knowledge of the concept we're discussing, my actions are less chaotic, but as I said, experience is key and this requires practice. The model itself seems simple, but the subtleties behind it, are not so obvious". [M12]*

The theatre managers interviewed also point to specific examples of current disruptions where the Hersey-Blanchard model is useful. These include the impact of ongoing technological change on the cultural industries. According to the respondents, the Hersey-Blanchard concept, when applied in practice, offers a way of reducing the resistance factors associated with the implementation of new technologies:

*„An example of such turbulence is what is happening with technologies. The speed with which they develop and the controversies that they generate are a challenge (...) for leadership. It seems to me that the Hersey-Blanchard proposal makes it possible to meet this challenge precisely at the level of leadership (...), it makes it possible to structure the process of introducing change in this area, which translates into a reduction of resistance factors (...), e.g. from employees". [M5]*

In response to the third research question, the factors limiting the usefulness of the Hersey-Blanchard situational leadership model were identified by the theatre managers surveyed, along with the leadership styles they influenced (Table 2).

**Table 2.** Factors limiting the utility of the Hersey-Blanchard situational leadership model in the theatres studied

Limiting factor (number of responses)	Leadership styles			
	S1	S2	S3	S4
Director's excessive responsibility (10)	X			
Lack of confidence in the competence of the staff (3)			X	X
Limited influence on determining the ensemble composition (2)	X			
Turnover in the artistic ensemble composition (8)	X			
Problems in assessing the maturity of the staff member (11)	X	X	X	X
Authoritarian behaviour (6)			X	X
Specificity of managing artists' autonomy (4)	X	X	X	X
Specificity of managing artists in terms of their talent and social position (4)	X	X		
Unspecified vision and mission of the institution (5)	X	X	X	X
The artist-manager dichotomy (9)	X	X	X	X
Influence of the theatre organiser (2)	X	X	X	X
Reliance on habitual behaviour and intuition (3)	X	X	X	X

Source: Own research

Analysing Table 1, it is possible to distinguish a group of factors that have also emerged in studies of business organisations (Karcz & Ryndak, 2016, p. 95). These include: excessive director's responsibility; lack of confidence in the competence of the staff; turnover in the artistic ensemble composition (in the case of business organisations, it is the turnover of employees in general); problems in assessing the maturity of the employee; authoritarian behaviour; an unspecified vision and mission of the institution; limited influence in determining the ensemble composition; reliance on habitual behaviour and intuition.

On the other hand, aspects related to the artist-manager dichotomy, the autonomy and management of artists, and the influence of the organiser should be treated as specific to the theatre industry. It can also be assumed that the factors that emerge will, under certain conditions, apply to arts organisations more generally.

One of the issues raised by respondents is the time involved in training. This is confirmed by Table 1, which shows that 10 of the 12 managers surveyed cited the director's excessive workload as a limiting factor. Limiting factors specific to the S1 style are also the limited influence in determining the composition of ensembles and the rotation of artistic ensemble line-ups. The former is mainly due to inflexible staffing policies. The latter is related, among other things, to substitutions, the use of part-time artists and occasional collaborations on a co-production basis.

It is also possible to identify a group of constraints that have a negative impact on the whole leadership process. Some of these relate directly to categories related to the model itself, e.g. problems in assessing staff maturity. The unspecified vision and mission of the institution is also a general problem.

From the perspective of avoiding the S4 style, additional influences limiting its usefulness are the authoritarian behaviour of the manager and the lack of confidence in the competence of the employees. These factors are to some extent due to the hierarchical organisational structure characteristic of the theatre industry and the individual characteristics of the theatre manager. Lack of confidence in employees' competence can also be related to the phenomenon of the fifth follower (unmotivated and incompetent) (Mirčetić & Čudanov, 2021).

Among the factors specific to the theatre industry, the importance of the artist-manager dichotomy should be highlighted. This paradox is a generator of divergent artistic and business objectives, which can cause problems in setting objectives for the managed team and consequently affect the effectiveness of leadership. In addition, the situation can be complicated by the influence of the theatre organiser, whose actions can limit the autonomy of the organisation and exacerbate the aforementioned dichotomy.

The specificity of the management of artists' autonomy and the issue of their talent and social position are also important. The issue of artists' autonomy concerns, among other things, their own vision of art and the limits of action. In addition, the trade union organisations of the artists in the individual theatres are relevant in this respect. On the other hand, a fundamental problem from the point of view of artistic talent is the relationship between delegated tasks and the development of individual staff members' talents. The management of star artists is also an issue, particularly for managers with little experience and limited recognition in the theatre industry.

## 5. FUTURE RESEARCH DIRECTIONS

The Hersey-Blanchard situational leadership model may be useful in theatre management, but further research is needed. Firstly, it would be beneficial to verify the main findings in a quantitative study with a larger research sample. Confirmation could also be provided by adopting a different research perspective, particularly that of the subordinates. Secondly, it would seem beneficial to explore more deeply theatre-specific issues related to the artist-manager dichotomy, artist autonomy and management, and the influence of the organiser. Comparative research with other arts organisations is also worth considering to formulate more general conclusions. Research designed based on the criterion of the form of ownership may also have added value, allowing the validity of the formulated conclusions to be tested in the context of non-profit and commercial theatres, whose activities are closer to classical business activities.

## 6. CONCLUSION

The results obtained represent a contribution to the research on leadership within the trend of arts management, confronting the model known from business practice with the conditions of the organisation of the performing arts sector. It turns out that the Hersey-Blanchard model can be useful in theatre management under certain conditions. It can be an effective tool for leading a team in the face of uncertainties and disruptions coming from the organisation's environment, as well as the phenomena of romanticisation and idolisation of leaders (Nisbett & Walmsley, 2016, p. 9), or the lack of leadership in artistic institutions (Goodwin, 2020).

The theme of management preference for leadership styles is confirmed. An analogous phenomenon has been observed and described by the authors in the context of business organisations. Individual preferences in this regard are further stimulated by a number of factors that negatively affect the usefulness of the leadership model in question.

The factors identified as limiting the utility of the Hersey-Blanchard model are partly consistent with the findings of research on business organisations (Karcz & Ryndak, 2016). Other factors, i.e. aspects related to the artist-manager dichotomy, artist autonomy and management, and the influence of the organiser, seem to be characteristic of theatres and to some extent generalisable to other cultural organisations. At the same time, it is reasonable to expect that a widening of the research sample and a further deepening of the research will reveal further entity-specific limiting factors. This is a natural consequence of the complexity of the leadership issue with the inherent diversity of the theatre industry.

The results of the research provide useful knowledge for practitioners of management in theatres and the wider cultural sector. Knowledge of the factors limiting the applicability of the model should lead to the development of strategies to mitigate their impact and increase effectiveness. The research may also be useful to cultural organisers and training organisations, providing opportunities to adapt training programmes for the cultural sector.

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