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Foreword

The 4th International Conference on Global Advances in Management and Entrepreneurship – GAME Conference was held in Dubrovnik, Croatia & online, from May 14 to 16, 2026.

We extend our special thanks to our partners, the Dubrovnik-Neretva County Tourist Board and the Dubrovnik Tourist Board, as well as to our sponsors: Hrvatski Telekom d.d. (Croatian Telecom Inc.), Financijska agencija (FINA), KRAŠ prehrambena industrija d.d. (KRAŠ Food Industry Plc), and TIM 360 d.o.o. (SelectBox, SelectCard, and SPay). We are also grateful to Graforad, our technical support partner, for its valuable assistance.

The GAME Conference seeks to establish and expand international academic contacts and cooperation across countries and regions by bringing together researchers, educators, practitioners, and other stakeholders interested in management and entrepreneurship. Its mission is to advance knowledge in management, entrepreneurship, business, economics, and information technology by supporting high-quality research, education, dissemination, and international scholarly exchange.

The main purpose of the conference is to provide scientists and researchers with an encouraging and stimulating environment in which they can present their research findings to the academic community and the wider public. The conference also brings together leading academic scientists, researchers, research scholars, and practitioners to exchange knowledge, experiences, and research results concerning contemporary issues in business, management, and entrepreneurship.

As an interdisciplinary academic platform, the GAME Conference enables participants to present and discuss recent innovations, emerging trends, key concerns, practical challenges, and potential solutions. The papers included in these proceedings reflect the thematic diversity of the conference and provide insights into current developments in entrepreneurship, management, digital transformation, marketing, sustainability, finance, international economics, and related fields. All papers published in this volume underwent a double-blind peer-review process.

Our academic journey continues with the 5th International GAME Conference, which will be held in Vienna, Austria, from November 20 to 22, 2026.

Thank you to all authors, reviewers, participants, partners, sponsors, and committee members for contributing to the success of our fourth conference. We hope that the GAME Conference will remain firmly on your academic map and that you will join us again in Vienna.

***Organizing and Program Committees
of the 4th International GAME Conference***

Editorial Preface

The 4th International Conference on Global Advances in Management and Entrepreneurship – GAME Conference, held in Dubrovnik, Croatia & online from May 14 to 16, 2026, provided an interdisciplinary platform for advancing research primarily in the fields of management and entrepreneurship, while also addressing broader economic, technological, organizational, environmental, and societal transformations.

These conference proceedings present a collection of 28 full papers developed within a diverse international academic community. The **papers** included in this volume **underwent a double-blind peer-review process** and were selected based on their relevance, academic quality, methodological soundness, and potential contribution to their respective fields. The proceedings are organized into five thematic parts that reflect both the core orientation of the GAME Conference and the interdisciplinary nature of the research presented.

The first part, **Entrepreneurship, Entrepreneurial Ecosystems, and Business Development**, positions entrepreneurship as an important driver of innovation, employment, competitiveness, and economic and social development. The papers examine startup ecosystems, women's microentrepreneurship, succession and innovation in family firms, sustainable tourism entrepreneurship, business model innovation in fragile digital economies, and strategic corporate investment. Together, they demonstrate that entrepreneurial activity is shaped by the interaction of individual capabilities, organizational strategies, institutional conditions, market opportunities, and supporting ecosystems.

The second part, **Management, Leadership, and Organizational Practices**, focuses on the human, organizational, and methodological dimensions of contemporary management. Its contributions address professional values and spirituality in the workplace, organizational culture in the age of artificial intelligence, workplace diversity, women's return to work after childbirth, crisis communication, project management methodologies, and analytical approaches to evaluating local economic performance. These studies emphasize the continuing importance of responsible leadership, employee well-being, effective communication, sound management practices, and evidence-based decision-making.

The third part, **Digital Transformation, Marketing, and Customer Experience**, examines how digital technologies are reshaping organizations, markets, business processes, and consumer behaviour. The papers explore sustainable digital transformation, artificial intelligence adoption, satisfaction with mandatory and voluntary information systems, customer experience management in SMEs, relationship quality in hybrid retail environments, hotel website performance, and the influence of algorithmically curated social media content on consumer decisions. Collectively, they show that successful digital transformation requires not only technological adoption but also organizational readiness, digital capabilities, user trust, service quality, and a thorough understanding of customer behaviour.

The fourth part, **Sustainability, Green Transition, and Mobility**, addresses the growing importance of environmental responsibility in strategic, managerial, and economic decision-making. The contributions examine sustainable aviation fuel, micromobility and transport transformation, the reuse of waste in manufacturing, and the relationship between pollution, energy consumption, corruption, and economic growth. Although they focus on different sectors and levels of analysis, these studies share the understanding that sustainability represents both a responsibility and an opportunity for innovation, organizational development, and long-term competitiveness.

The fifth part, **International Economics, Trade, Finance, and Infrastructure**, considers the global economic and institutional forces affecting countries, organizations, and households. The papers analyse strategic infrastructure development and China's growing role in Latin America, the trade effects of the ASEAN–India Free Trade Agreement, behavioural factors influencing household saving, and the digital resilience of financial institutions. These contributions highlight the close interdependence between international trade, infrastructure investment, financial behaviour, regulatory frameworks, technological change, and institutional accountability.

Taken together, the papers included in these proceedings demonstrate the breadth and relevance of contemporary research in management and entrepreneurship. They also show that the challenges faced by modern organizations and economies cannot be adequately understood from a single disciplinary perspective. Digitalization, sustainability, demographic change, geopolitical developments, evolving consumer expectations, and new forms of work require integrated approaches that connect entrepreneurial initiative, managerial competence, technological capabilities, responsible governance, and institutional support.

The Editor wishes to express sincere appreciation to all authors for their research contributions and active participation in the conference. Special thanks are extended to the reviewers, whose expertise and constructive comments contributed to the academic quality and integrity of the published papers. Appreciation is also due to the members of the Editorial, Program, and Organizing Committees for their commitment and contribution to the successful realization of the conference and these proceedings.

By placing management and entrepreneurship at its core while integrating insights from digital transformation, marketing, organizational studies, sustainability, finance, international economics, and public policy, the 4th GAME Conference reflects the evolving landscape of interdisciplinary research and international scholarly cooperation. It is our expectation that these proceedings will serve as a valuable academic resource, encourage further discussion, and stimulate new research initiatives and international collaborations.

Editor

Mladen Turuk, Phd

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PART I: ENTREPRENEURSHIP, ENTREPRENEURIAL ECOSYSTEMS, AND BUSINESS DEVELOPMENT

Entrepreneurship is a key driver of innovation, economic development, employment, and social change. However, entrepreneurial activity does not occur in isolation. Its development depends on the interaction between individual capabilities, access to resources, institutional support, market conditions, business networks, and the wider economic and social environment. Understanding these relationships is particularly important in emerging economies and local communities, where entrepreneurs frequently operate under conditions of limited resources, institutional uncertainty, and restricted access to finance.

The papers in this section examine entrepreneurship from several complementary perspectives. They address the development of startup ecosystems, the success factors of women microentrepreneurs, leadership succession and innovation in family firms, and the transformation of natural resources into entrepreneurial value through sustainable tourism. The section also explores business model innovation in fragile digital economies and the role of strategic corporate investment in business growth and value creation.

Taken together, these contributions demonstrate the diversity of contemporary entrepreneurship research. They emphasize that entrepreneurial success depends not only on individual initiative but also on supportive ecosystems, effective institutions, innovation capabilities, strategic decision-making, and the ability to adapt business models to changing economic, technological, and social conditions.

Startup Ecosystem Enablers in Emerging Economies: Evidence from Albania

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Abstract

This paper discusses the major factors in determining startup ecosystem development in emerging economies, focusing on Albania. This study adopted a mixed-methods approach involving analysis of secondary data and using a structured questionnaire administered to 50 Albanian startups. The analysis is organized around the main pillars of the ecosystem, which encompass innovation, access to finance, institutional support, human capital, infrastructure, and collaboration networks. The results show that the startup ecosystem in Albania is transitional and fragmented with a lot of entrepreneurial potential but lack of access to finance, poor coordination between institutions, and a small domestic market. Innovation is the primary driver for launching, competing, collaborating, and generating new, sustainable startup ventures, but on its own is insufficient without the right institutional, financial, and market support. The findings indicate that digital transformation, strategic partnerships, and human capital play a growing role in improving the resilience and scalability of startups, and that talent retention, regulatory barriers, and market readiness are among the remaining hurdles. The paper helps to add to the literature on entrepreneurial ecosystems in emerging economies and shows how integrated policies to strengthen finance, governance, collaboration, and innovation are essential for sustainable startup growth

Keywords: startup ecosystem, innovation systems, network collaboration, emerging economies

JEL Classification: O31, O32, L26, M13

1. Literature Review

Despite the importance of Innovation as a key driver of entrepreneurship, business and economic growth, competitiveness, and social change, innovation is a complex and interactive process that exists within networks of people and organizations (Schumpeter, 1934; Drucker, 1985). As such, innovation ecosystem is a crucial framework to better understand the dynamics and the interrelated actors in them, such as businesses, academic institutions and government bodies, investors and

business angels (Moore, 1996). Gu (2021) describes innovation ecosystems as interconnects systems that involve participants, actions and relationships, resources and evolutionary processes that promote the generation and spreading of knowledge in society.

While Barney (1991), suggests in his resource-based view (RBV) that startups can create and maintain a competitive edge by effectively leveraging resources that are valuable, rare, and difficult to imitate, especially within emerging economies, startups often cannot depend exclusively on their internal assets. In environment with limited resources, external resources such as networks, partnerships, knowledge, capabilities, and support from the broader ecosystem can play a significant role in startup success. However, according to (Gautam & Gautam, 2024) the dependence on ecosystem participants' changes throughout the startup lifecycle. In initial stages of development research suggests that an important role is played by universities and research institutions while investors, industry collaborators, and customers gain greater significance as startups scale.

There are a variety of enabling factors identified consistently in the literature that impacts that sustainability of a startup ecosystem such as: entrepreneurial culture, human capital and talent development, physical and digital infrastructure, opportunities for market entry and international market penetration, and funding access.

According to (Gompers & Lerner, 2001; World Bank, 2020; Isenberg, 2010) access to funding and mentorship are critical factors on startup survival rates while policy support and networking initiatives strengthen resilience and foster long-term growth. There are several structural challenges that ecosystems in emerging markets face including: limited funding sources, weak institutional frameworks, fragmented networks, and shortages of skilled labor. In order to address such challenges and promote sustainable entrepreneurial growth and increase collaboration within ecosystems' actors integrated policy interventions are necessary.

The rapid technological changes and digitalization transformations, have impacted and altered the functioning of entrepreneurial ecosystems and innovation plays a crucial role in startup scalability and growth (Nambisan et al., 2019; OECD, 2023).

According to Syed et al. (2024), the new innovative technologies including artificial intelligence, blockchain, the Internet of Things (IoT), and cloud computing support startups in following aspects:

- Reduce entry barriers;
- Support scalable business models;
- Promote data-driven decision-making;
- Increase access to international markets.

As a result, startups are utilizing digital platforms for collaboration, funding, and knowledge sharing, resulting in more interconnected ecosystems.

In open and ecosystem research (Chesbrough, 2003; Stam, 2015) collaboration between business and stakeholders is encouraged, as businesses that are involved in such partnerships networks, increase their information circulation and joint resources (Powell, 1996; Feldman & Audretsch, 1999) and as a result tend to innovate more, scale well and emerge into new markets. University and industry collaboration is identifying as a significant driver of technology transfer and catalyst of research output commercialization, placing universities as a consolidating actor in the innovation ecosystem.

In terms of sustainability and growth of startups, apart from innovation, access to financial resources greatly improve their ability to develop, mature, and expand (World Bank, 2020; Block et al., 2017).

Especially in emerging and developing countries, like Albania, as per World Bank (2020), financing constraints are among the most critical obstacles encountered by startups and small and medium-sized enterprises, as limited access to outside capital restricts firms' investment in product development, expansion, and entry into new markets. Michael Block and coauthors (2017) find that startups supported by venture funds tend to produce more innovation and grow faster than non-funded ones, as well as be less likely to fail altogether as with venture capital comes not just capital, but also strategic direction, managerial expertise, and wider networks of contacts that are so essential for scaling innovation up.

According (Stiglitz & Weiss, 1981) financial constraints are often worse in early-stage startups, where pioneering companies often encounter a "financing gap" that hampers their own turn-over from idea to market, as they are perceived high risk, by the traditional financial institutions, especially in emerging markets, because of information asymmetries, where the capital markets are less mature and risk capital is hard to find.

Recent policy-oriented studies illustrate that the key is for an integrated financial ecosystem to be implemented by public funding instruments, private investment vehicles and a hybrid form of financing. The OECD (2021), and European Investment Bank (EIB, 2022) indicate that blended finance, guarantees and innovation grants effectively remove barriers to private sector participation in start-up financing and encourage participation.

The literature continues to reveal that innovation and collaboration are major factors in the entrepreneurial ecosystem as they facilitate the exchange of knowledge, creation of alliances and the development of capabilities (Chesbrough, 2003; Stam, 2015). The baseline of startup ecosystem growth is when collaboration on innovation systems connects with the financial ecosystem development. In addition to innovation and collaboration, there must be sufficient availability of finance that's essential to a start-up survival, growth and, therefore, scalability (World Bank, 2020; Block et al., 2017).

2. Situation in Europe and the Western Balkans (WB6)

European innovation ecosystems are supported by strong institutional frameworks, established research and development (R&D) systems, and effective connections between academia, industry, and government. The European Union (EU) has consistently prioritized innovation as a fundamental driver of economic growth, competitiveness, and social change undertaking key policy initiatives such as Horizon Europe, Startup Europe, and Digital Europe, that illustrate a coordinated governance strategy designed to enhance research excellence, promote entrepreneurship, and accelerate digital transformation across member states (European Commission, 2023). Such initiatives are supported by financial mechanisms and structural funds aimed at lowering barriers to innovation, particularly through assistance for small and medium-sized enterprises (SMEs), startups, and cross-border collaborations. Europe's innovative capacity is rooted in its systemic and networked approach. According to Cooke (2001) the idea of "regional innovation systems," emphasizes the significance of localized knowledge exchange, institutional depth, and collaborative networks in enhancing innovation outcomes. OECD findings (OECD, 2022) indicate that EU countries benefit from dense innovation ecosystems characterized by robust public-private partnerships, sophisticated digital infrastructure, and access to various funding avenues like venture capital, grants, and innovation funds and in the same line Henry Chesbrough (2003) states that European companies are increasingly embracing open innovation models that utilize external knowledge sources and partnerships to boost their competitiveness.

However, a European innovation landscape exhibits significant disparities as there is persistent gap in innovation exists between Western Europe and the Western Balkans (WB6), (Albania, Serbia, Montenegro, North Macedonia, Bosnia and Herzegovina, and Kosovo). According to the World Bank reports (2021) innovation systems in WB6 remain underdeveloped with fragmented institutional structures, limited R&D investments, and weak connections between universities and industries that are compounded by restricted access to financing, particularly early-stage venture capital which is crucial for startups' growth. In addition, companies in WB countries face considerable challenges when seeking financing for innovation-related initiatives due to underdeveloped financial markets coupled with high perceived investment risks (EBRD, 2022) alongside brain drain, as skilled individuals relocate to more developed EU, diminishing local innovation capabilities by reducing knowledge creation and transfer potential (OECD, 2022). structural challenges persist that hinder scalability and sustainability for startups within this region including small domestic markets and regulatory inefficiencies. Successful innovation ecosystems need proactive government engagement to shape markets effectively alongside market driven dynamics (Mariana Mazzucato, 2018). In the context of WB6 this suggests a need for strategic policy interventions aligning national agendas with broader EU frameworks.

Despite such challenges, the Western Balkans show promising signs of growth and there are positive trends within the WB6's innovative environment. According the RCC

2023 there is a growing entrepreneurial spirit among youth alongside increased digital adoption rates leading to a rise in technology startups supported by advancing digital infrastructure along with greater involvement in regional and international networks focused on innovation, growing initiatives promoting regional cooperation, such as cross-border programs for innovation support, enhancing ecosystem connectivity and facilitate knowledge exchange.

While European innovation ecosystems exhibit leadership on global stages regarding structure, funding and collaboration, addressing these disparities specifically in the WB, is vital for unlocking this region's innovative potential while fostering more equitable development throughout Europe and will require focused investments in human resources, enhanced access to financing, stronger institutional structures and deeper integration into EU-led programs. Strengthening these areas.

3. Evidence from Albania startup ecosystem

Albania is an emerging and nascent startup ecosystem within the larger Western Balkans Six (WB6) region, characterized by a relatively early stage of development, rapid digital transformation, and a progressive rise in entrepreneurial culture. But so far, it's still an embryonic system compared to mature European innovation hubs. This is evidence that while elements of the core ecosystem are emerging, they are fragmented and not sufficiently integrated to achieve persistent innovation and scalable growth (European Commission, 2026; EU for Innovation, 2026). This is consistent with large regional analyses from the World Bank (2022), which report Western Balkan innovation systems are still undergoing a transition from factor-based to efficiency and innovation-based economic systems.

One significant positive trend is the growing youth driven entrepreneurship and technology start-ups as they enter the fintech sector (e.g. e-commerce and software development). This is indicative of a greater move towards knowledge-based economy, given to digital adoption that occurs at such a fast pace and to the continuous increase in ICT infrastructure (OECD, 2023). The OECD also emphasizes that, in developing worlds, digitalization and its infrastructure are important accelerators to entrepreneurial innovation and market access.

A significant advantage is the slow emergence of innovation-enhancing institutions, such as university-based incubators, research centers and startup programs. Such architectures encourage early-stage capabilities and improve university to industry connections as some parts of the national innovation systems (Etzkowitz & Leydesdorff, 2000). In Albania, universities are becoming increasingly focused on entrepreneurship education, in particular ICT and business studies to support the development of innovation-driven human capital.

Another strategic asset is the diaspora participation. According to World Bank (2021) diaspora networks provide "external innovation bridges" for developing economies to help knowledge transfer, mentorship and facilitate access to global

investment ecosystems and such Albanian diaspora ties add visibility and also, indirectly, enable integration with European and global value chains.

While these are developing strengths, Albania's startup ecosystem is limited by a set of structural vulnerabilities. First, limited access to finance, where venture capital markets remain immature and traditional banking structures still don't take chances for innovation-driven projects is one of the barriers, especially in the initial stages of investment (European Bank for Reconstruction and Development, 2023).

Second, fragmented governance structures seriously weaken national innovation performance by not facilitating the formation of integrated innovation ecosystems (OECD, 2022) as without good coordination between government institutions, universities, private sector actors, and innovation intermediaries, system efficiency suffers and knowledge spillovers are limited.

This adds to the transaction costs for startups due to regulatory inefficiencies and administrative burdens. Doing Business analyses (precedent analytical framework) of the World Bank (2023) identified the complexity of bureaucracy as a major constraint for Western Balkan economies that inhibited formal entrepreneurship and scaling up of innovation.

Thirdly, are still substantial human capital constraints. The significant brain drain in Albania is still prominent, especially for ICT and engineering professionals who leave to the EU labour market migration. This in turn lowers domestic innovation potential while undermining the talent pipeline needed to scale a startup (OECD, 2023).

Fourthly, low trust levels in industry and market trust affect the penetration of innovative digital solutions. When it comes to new digital services, both consumers and companies have a reluctance to adopt them, which is slow in reaching new markets, but not in getting diffusion rates going and low to reach new consumers as startups.

Nonetheless, Albania has significant potential for startup ecosystem development in an untapped way. One opportunity center around certain neglected market, in education, health care, financial services, and public administration. These industries are often heavily inefficient, requiring huge technological solutions on a digital or platform basis for innovation.

Trends around digital transformation also reinforces this opportunity landscape. The acceleration of digital adoption after COVID-19 has improved preparedness for technology adoption in public and private sectors (European Commission, 2025). It is the perfect background to scale up startups selling SaaS and platform-based business models.

Further strategic opportunity is in regional integration in the WB6 and EU markets where Albanian startups might be able to scale regionally if they can leverage cross border innovation frameworks and harmonized rules and regulations.

The importance of “digital ecosystem orchestrators” in the coordination of systems (Gawer & Cusumano, 2014) in the innovation theory is crucial. Promising avenue for development are Platform-driven innovation ecosystems where digital match-making platforms between academia, industry and public and private sector institutions, such as research and innovation platforms, can greatly break down silos and promote effective knowledge circulation.

For of the Albanian ecosystem the relative immaturity can be re-conceptualized as a resource in a more adaptive way. In consistent with progressive views of innovation system innovation, which focus on the advantages of institutional flexibility in early stages, and the relative inertia of institutional boundaries and/or limitations of structures, in such ecosystem development (Lundvall, 2010), Albania can afford to foster agile, digital-first policy settings and to try out institutional forms that help to spread innovation faster.

In a transitional development phase of the Albanian start up ecosystem featuring two elements: structural constraints as well as high potentials of growth, with limitations including lack of the right funding, regulatory inefficiency, transfer of talent, or fragmentation of the ecosystem persist, some initial strengths: digitalization, the diaspora’s engagement and still undefined sectorial markets, offer a solid base for future growth. Given coordinated action and increasing access to EU innovation policy, Albania has opportunities to become a competitive emerging innovation hub in the Western Balkans and wider European innovation field (World Bank, 2022; OECD, 2023).

4. Paper Analysis

The population from which our sample is from Startups operating in the city of Tirana. Tirana has not only the biggest initiatives in numbers as a result and biggest opportunities, numerous institutions/organizations but undoubtedly it also has the largest concentration of clients for whom these start-ups offer products or services within the fields where they operate.

Our sample consists of 50 new companies (Startups) that were founded and operate in the city of Tirana, where the opportunities for creation and development are even greater. They make up about 10% of the number of startups registered at the end of last year (2025). The sample represents some of the sectors where the startups have the largest number, thus making efforts and trying to be as representative as possible of this category. So based on their numbers in the main sectors, a certain number were selected from each sector. Information was secured (obtained) using the main instrument which is survey with questionnaires. The questionnaire was shared to Start ups through the Google form platform as main purpose to provide the necessary information, as quickly as possible and without disrupting the respondents from their work. The analysis is not only descriptive but also analytical by assessing the correlation of variables between them. The programs used for this analysis are SPSS 25 version, as well as Smart PLS.

We have built up a Conceptual Research model based on grouping questions in the questionnaire in Appendix B.

The 50 startups were asked about General Characteristics, Internal Operating Model, External Operating Model (partnerships), financial dimensions, innovation processes and open questions regarding opportunities and challenges that they are facing in the market.

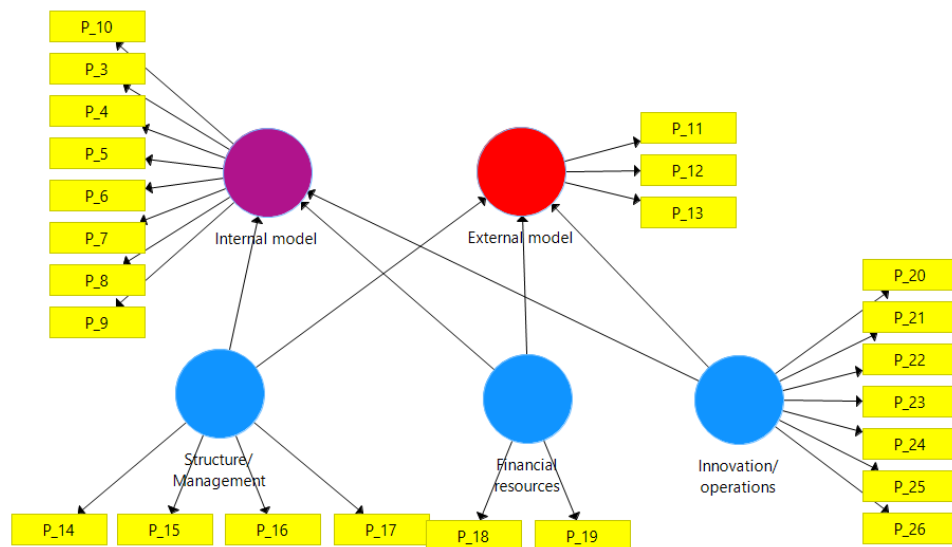


Figure 1. Conceptual Research Model (source: author)

5. Main Findings

Based on the analysis of the sample, is identified that most of the startups taken into this analysis, 48% of them perform their activity in ICT/Tech field, followed by another 34% that belong to the education sector. While the rest is divided between startups that are part of Manufacturing, and Services respectively represented by % of the total, but it's worth to mention that there are also from other sectors as well.

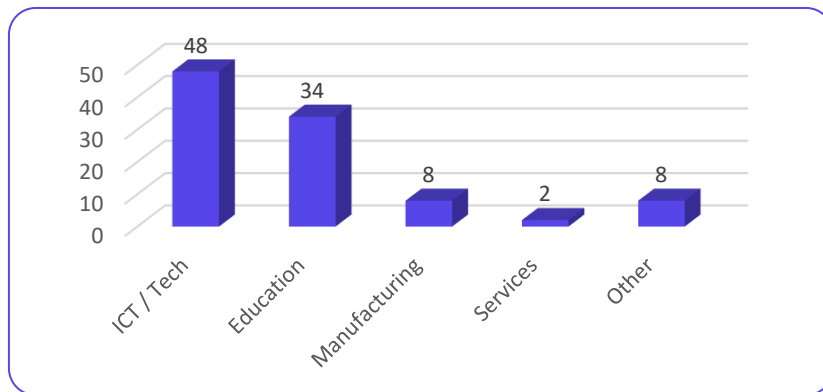


Figure 2. Distribution of Start-ups according to sectors (in %)

Concerning the level of longevity which refers to the period since their founding and the duration of their operational activities, the majority part with 40% are newly created businesses that have less than 1 year of activity, where 55% of them belong to the ICT/Tech sector, followed by another 35% that have their focus on the field of education. On the other hand, 36 have 1-3 years activity and a further 20%, 3-5 years thus them being more consolidated in the market. Only a very small number represented by 4% of the total have a minimum of 5 years activity, mainly in production and education.

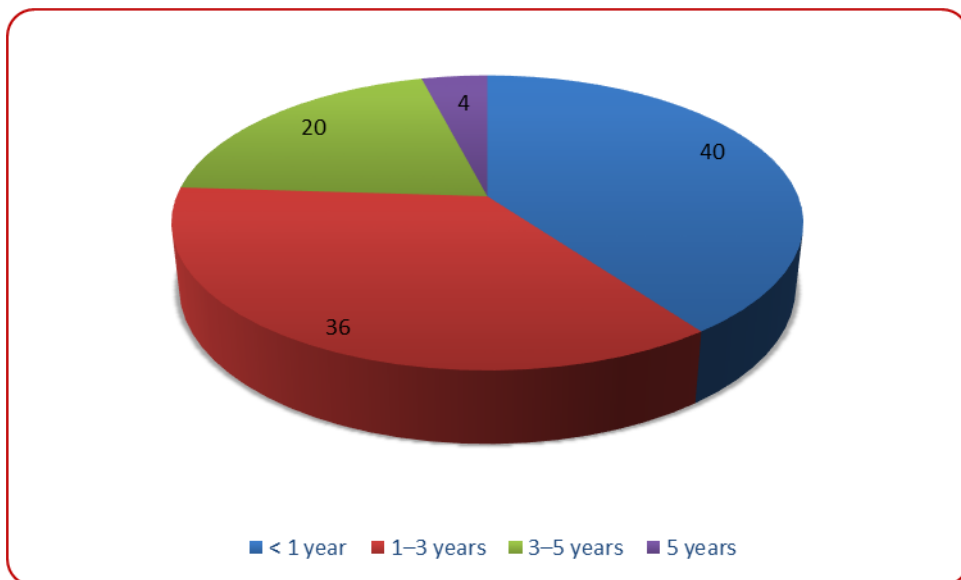


Figure 3. Distribution of Startups based on their longevity (in %)

Knowing that these are new businesses, the number of employees is also limited and precisely our data shows that 78% of them have 1-5 employees, followed by another 20% with a staff ranging from 6-10 employees. Only 2% of them have a larger number of employees and mainly in Manufacturing.

Startups were also asked about the opportunities that will lead them to rapid growth in the market and their answers are related mainly with opportunities to have collaborations with other startups and not only, even widening these partnerships not only nationally but also within the region. But a significant part addresses to defining market rules properly or creating greater opportunities for financing through Grants or specific program schemes or even facilities in providing loans from banks. But we have other startups that refer to marketing as a helpful tool for getting to know the products/services that they offer. While asked about the main challenges they face, a significant part of them mentioned the lack of a precise strategy for their development, not being able to focus on marketing and lack of financing, including also difficulties in obtaining bank loans. Another challenge refers to securing employees with good knowledge (talents) but also competitiveness within the sector they operate their activity in.

These findings strongly support Thang (2026) and Kato (2024), who identify financial access as a key determinant of startup survival and ecosystem development.

Moreover, the data suggests that while startups are innovative, their growth potential is constrained by capital limitations, limiting their ability to scale technologies and expand regionally.

Based on the purpose of this study, the measured variables through the questionnaire are designed for its benefit. This way the analysis has dependent variable, Internal Operating Model of the Start-up and External Model (Partnership), the independent variables are: Internal Management, Financial Resources and Innovation/Operational Activity. While their lifespan has been taken as a moderating variable.

Starting from this model, we first evaluate its reliability and validity. This analysis was carried through the Smart PLS program which is suitable for analyzing models in their entirety even when the sample is small as in the case in our study. Reliability was measured using the values of Cronbach's Alpha, Rho_A, and Composite Reliability.

The values of the Alpha coefficient for each of the variables range from (0.364 - 0.584) referred to the value 0.7 as the limit value ¹, indicating a moderate reliability value. The values of rho_a which shows if the questions/indicators are stable and well related to each other, with the condition that the limit value, that in our model except, Financial Resources, all others have values higher than the limit value. And finally Composite Reliability (≥ 0.7) shows that high reliability values that exceed the limit

value are Financial Resources and Internal Structure of Businesses, while the other variables have these values with this reliability coefficient below 0.7. (Table 1) However, in general the model has relatively good values (referring to our sample which obviously has a limited number of units).

The validity refers to the Constructive and Discriminant, which is assessed through the values of Average Variance Extracted (AVE) (≥ 0.5) (Table 1) and Fornell-Larcker Criterion (≤ 0.85). Regarding the construct validity (AVE), financial resources, the External/Partnership Model have values above the cut-off value while the others are close to this value. While the values measured through the Fornell-Larcker Criterion are all ≤ 0.85 (Table 2). It shows that the model has moderated reliability and considerable validity.

The respective values of R^2 that indicates the impact of independent variables on the change in the variance of a dependent variable are relatively high (78.9%) in relation of their impact on the internal Model and (43.2%) in relation of external Model. (Table 3). Meanwhile in relation to predictive ability of this model, the value that measures it is Q^2 in condition (>0) in our model case for dependent variable-internal Model, this coefficient has the value 0.213 and for variable external Model/Partnerships (0.136), (Table5). These two considerable values that show strong predictive ability of our model. Also, the significance of each factor in correlation with dependent measured variables through f^2 shows that financial reduces and innovation are very important in relation with internal Model of Startups because the values are respectively 0.208 and 1.148, both of them greater than 0.35. While at the external Model/partnerships the most sensitive factor is internal Structuring/management of startups, so how do they see and organize the access this start up in rapport of the internal environment let it be partners of the same field or the chain of economic ecosystem.

This reflects the network bricolage strategies described in emerging market literature (Chandel, 2025), where startups leverage relationships to overcome institutional deficiencies.

However, the need for partnerships is driven more by necessity than by a well-functioning ecosystem, indicating fragmentation and lack of structured collaboration mechanisms.

Hypothesis 1: Most important dimension that directly affect the Internal Model of Start Ups is Innovation and operational activity related to them

According to the data of the following table, it is evident that the innovation/operational activity it's the only dimension which correlates positively with the internal model, since the respective value of p-values is 0.00 thus <0.05 .

Correlation between it's with a positive direction since coefficient value of β is positive (0.646). This doesn't mean that these other two dimensions don't affect but, in our model, according to the data of the chosen sample their influence is most of all indirect. The effect of this dimension measured via $f^2 = 1.229$ (Table 6. In Appendix A.), shows that this effect is extremely crucial.

Table 1. Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Financial recources -> Internal model	0.184	0.163	0.107	1.718	0.086
Inova/operac -> Internal model	0.646	0.639	0.101	6.413	0.000
Strctre/Managmement-> Internal model	0.205	0.232	0.113	1.805	0.072

These findings suggest that startups are internally adaptive, customer-focused, and innovation-driven, aligning with the Resource-Based View (Barney, 1991), which emphasizes internal capabilities as drivers of competitive advantage.

Hypothesis 2: External model/partnership of startups depends most of on innovation and operational processes.

The data shows that the respective values to P-values of the financial resources dimension and Structure/Management are more than 0.05 respectively (0.169 and 0.126) that's why these two dimensions don't have a sufficient impact in this correlation but on the other hand innovation again secures stability and seriousness in the labor market related to the name of the startup but also the partnerships with businesses and other organizations. β coefficient of this dimension (Innovation) is positive (0.522) which shows that the greater the possibility of developing innovation and operational processes the more stable the company itself and the greater the possibility of creating effective partnerships with such successful companies that offer acceptable products/services in the market economy where competitiveness is constantly increasing as a result of technological advancement, education, new approaches, etc. This effect gets confirmed also from the value $f^2 = 0.247$ (Table 7, Appendix A) when its known that when the value of this effect its between 0.15-0.35 that indicates that the effect is average. Even in this dimension – innovation has average effect to the external model/ partnership but other factors also impact.

Table 2. Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Financial resources -> Internal model	-0.253	-0.099	0.184	1.376	0.169
Inova/operac -> Internal model	0.522	0.507	0.215	2.424	0.016
Strctre/Managmement-> Internal model	0.356	0.348	0.232	1.533	0.126

Research question 1: How does longevity of Start-ups impacts in the relations of dimensions and Internal Model?

We analyze this question adding the other moderated variable, longevity of Start-ups, expect three dimensions of the model. The data of this analysis shows that the addition of this factor has valued except the dimension – innovation and the importance of financial resources because the value of P-values = 0.043 < 0.05. So, the sustainability, effectiveness and the overall development of one Start up, doesn't depend only on the idea, but also the financial support in aimed at ensuring the expansion and increasing the growth opportunities of these Start-Ups.

Table 3. Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Financial resources -> Internal model	0.190	0.167	0.094	2.034	0.043
Inova/operac -> Internal model	0.651	0.638	0.105	6.188	0.000
Longevity of a start-up-> Internal model	-0.057	-0.057	0.079	0.712	0.477
Moderating Effect 1 -> Internal model	-0.041	-0.034	0.083	0.494	0.622
Strctre/Managmement-> Internal model	0.218	0.247	0.120	1.818	0.070

Research question 2: How does the longevity of Startups effects on the internal model in relation with partnerships with other businesses?

We analyze the addition of the factor-longevity of Start Ups the relation of our dimensions related to their external model. The data of this analysis according to the following table shows that this factor in this correlation doesn't have any significant

importance ($p=0.488 > 0.05$) and again the only dimension that effects the internal model of Startups related to creating partnerships or cooperation with other businesses is innovation. ($p=0.017 < 0.05$) even strengthening a bit more the effect of its impact ($f^2 = 0.263$). This shows that the partnership or cooperation gets supported mainly in what its offered, let this be a product or service, as well as in their effectiveness regardless if the startups is new or experienced, starting from the fact that the technological developments advance very quickly that new ideas can produce innovative view which gets associated with low cost and high effectivity.

Table 4. Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Financial recources -> External model	-0.238	-0.107	0.193	1.231	0.219
Inova/operac -> External model	0.538	0.533	0.225	2.393	0.017
Longevity of the Start Up -> External model	-0.077	-0.050	0.111	0.694	0.488
Moderating Effect 1 -> External model	-0.089	-0.052	0.133	0.668	0.504
Strcture/Management -> External model	0.339	0.329	0.243	1.394	0.164

The two last questions in the questionnaire were about opportunities and challenges that startups are facing in the market. Based on their perception we have built the table below with main results.

Table 5. Key Opportunities and Challenges for Startup Growth and Scaling

Dimension	Core Element	Opportunities	Challenges
Finance & Funding	Access to capital	Funding enables faster scaling, product development, and market entry.	Limited access to investment restricts growth and innovation.
Technology & Digitalization	AI, automation, digital tools	Digital technologies enable scalable and innovative solutions.	Rapid technological change requires constant adaptation.
Market Development	Market expansion	Regional and international expansion	Small or immature markets limit demand.

		increases growth potential.	
Partnerships & Ecosystem	Strategic collaborations	Partnerships enable faster entry and shared resources.	Weak ecosystems hinder implementation.
Human Capital	Talent availability	Access to skilled talent strengthens innovation.	Difficulty retaining talent limits capacity.
Customer & Demand	Market needs and adoption	Increasing demand for digital solutions creates opportunities.	Low awareness and trust reduce adoption.
Competition	Competitive landscape	Niche markets offer first-mover advantages.	Strong competition reduces market share.
Business Model & Innovation	Product/service innovation	Innovative models increase differentiation.	Low product maturity slows growth.
Sales & Marketing	Customer acquisition	Digital marketing increases visibility and growth.	High acquisition costs limit performance.
Institutional Environment	Regulation & support	Formalization improves structured growth conditions.	Bureaucracy creates operational barriers.
Operational Capacity	Implementation & scaling	Scalable systems support efficient expansion.	Inefficiencies slow execution.
Product Development	Innovation cycles	Rapid testing improves market fit.	Validation and sourcing delays innovation.

Findings suggest that opportunities for growth are perceived among Albanian startups particularly in the areas of digital transformation, AI, technological innovation, strategic partnerships, and regional/international market expansion. The demand for technology-driven solutions increased, entrepreneurs emphasized, and with no direct competitors in certain niche markets, they see access to new funding opportunities and stronger collaboration with industry, research institutions, and diaspora networks as some of the drivers of growth for the sector in the future. On the flip side, they come with significant challenges that still prevent startups from scaling properly. Barriers commonly cited included difficulties to access finance and investment, lack of training and talent acquisition, size of the domestic market (and thus lack of customer trust in innovative solutions), and poor visibility and networking opportunities as well

regulatory, bureaucratic processes, and market competition. Some investors further highlighted the importance of increased mentoring, business acceleration and institutional backing in order to confirm new products and to penetrate new markets more successfully. Taken together, the findings indicate that whilst Albanian startups will see great potential in technological and economic change, the opportunities will arise only when the persistent structural and institutional barriers are overcome.

These results present an important question for future research and policy development: How can Albania establish a more cohesive and conducive entrepreneurial ecosystem to enable startup companies to fully exploit new technological opportunities and to overcome financial, institutional and market constraints with sustainable scale-up in Albania?

6. Conclusions

This study examined the enablers of startup ecosystem in Albania. The results show that the basic building blocks of entrepreneurial ecosystem: availability of funding, human capital, institutional support, infrastructure, innovation and networks, are common in countries, whereas their effectiveness is significantly influenced by both the degree of development and alignment of the related institutional system. In Albania, the startup ecosystem is seen to be in a state of transition, with potential for entrepreneurship at the firm level, and relatively weak ecosystem-level support. The findings confirm that innovation is the most important driver for start-ups, growth, and competitiveness, especially in the current phase of technology transformation. In addition to driving new startups, innovation supports collaborative networking, knowledge exchange and collaboration between startups, universities, enterprises and public bodies, connecting the ecosystem. Nevertheless, the results clearly show that innovation alone is not enough to secure a viable entrepreneurial growth. The most important facilitating factor is still financial support; restricted access to venture capital, angel funding and targeted funding programs substantially hamper startups' survival, innovation commercialization and internationalization. The study further finds that institutional fragmentation and lack of coordination between government, academia, investors and the private sector are key challenges to ecosystem development. A fragmented governance structure results in a loss of knowledge transfer, collaboration and efficient resource allocation leading entrepreneurs to informal networks and founder-driven initiatives. Concurrently, limited demand in domestic markets, lower consumer confidence in innovative products and slow introduction of new technologies pose additional barriers to commercialization. Despite startups relying more on digital technology, AI and automation for scale up, these innovations have not become a fully mature innovation ecosystem. This human capital can be a double-edged sword. Albanian startups enjoy adaptable, innovative

teams, but as the turnover of skilled professionals and shortages of specialized talent continue, their potential for ongoing growth and innovation is curtailed. These results have also policy implications. A sustainable startup ecosystem can only be developed through a coherent and coordinated approach that includes not only increased funding with grants and by risk capital instruments, but also a strengthened institutional coordination, transparent and consistent policy, investment in people, as well as better cooperation among universities, industries, government and investors. Deepening partnerships and international cooperation will not only lead to more choices and services, but it will also enhance the uptake and expansion of technology and in market. Innovation should, however, be facilitated by strong financial, institutional and market conditions in order to convert entrepreneurial potential into sustainable, scalable, and even universal economic development in emerging economies.

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APPENDIX A. STATISTICAL DATA

Table 1. Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Financial resources	0.364	0.367	0.758	0.611
Inova/operac	0.522	0.827	0.682	0.410
Internal model	0.554	0.848	0.609	0.341
External model	0.342	0.797	0.646	0.509
Strcture/Management	0.584	0.706	0.755	0.448

Table 2. Discriminant Validity - Fornell-Larcker Criterion

	Financial resources	Inova/operac	Internal model	External model	Strcture/Management
Financial resources	0.782				
Inova/operac	0.446	0.640			
Internal model	0.587	0.857	0.584		
External model	0.053	0.460	0.285	0.713	
Strcture/Management	0.480	0.706	0.677	0.593	0.669

Table 3. R²

	R Square	R Square Adjusted
Internal model	0.789	0.776
External model	0.432	0.395

Table 4. f²

	Internal model	External model

Financial resources	0.208	0.136
Inova/operac	1.148	0.020
Strcture/Management	0.009	0.337

Table 5. Q^2

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Financial resources	100.000	100.000	
Inova/operac	350.000	350.000	
Internal model	400.000	314.944	0.213
External model	150.000	129.632	0.136
Strcture/Management	200.000	200.000	

Table 6. f^2 – Internal Model

	Internal model
Financial resources	0.129
Inova/operac	1.229
Strcture/Management	0.113

Table 7. f^2 – External Model /Partnership

	External model
Financial resources	0.135
Inova/operac	0.247
Strcture/Management	0.110

APPENDIX B. QUESTIONNAIRE ITEMS**B1. General Characteristics**

1. Industry sector of your start-up
2. Age of the start-up
3. Number of employees

B2. Internal Operating Model

4. Our startup frequently updates its business model. (1–5 Likert scale)
5. We experiment with new ways of creating value. (1–5 Likert scale)
6. Our business model differs from competitors. (1–5 Likert scale)
7. We use digital tools and automation. (1–5 Likert scale)
8. Information flows efficiently within the organization. (1–5 Likert scale)
9. Customer experience is a priority. (1–5 Likert scale)
10. We use innovative sales models. (1–5 Likert scale)
11. We provide innovative after-sales services. (1–5 Likert scale)

B3. External Operating Model/Partnerships

12. We build partnerships to support innovation. (1–5 Likert scale)
13. We innovate in customer interaction. (1–5 Likert scale)
14. We manage customer relationships effectively. (1–5 Likert scale)

B4. Organizational Dimension

15. Our structure supports flexibility. (1–5 Likert scale)
16. Decision-making is fast and adaptive. (1–5 Likert scale)
17. Our team structure supports innovation. (1–5 Likert scale)

18. We use innovative positioning in the market. (1–5 Likert scale)

B5. Financial Dimension

19. We have sufficient financial resources. (1–5 Likert scale)
20. We invest in R&D and/or technology. (1–5 Likert scale)

B6. Innovation and Processes

21. We continuously improve processes. (1–5 Likert scale)
22. Our processes rarely change. (Reverse coded, 1–5 Likert scale)
23. We introduce new or improved products. (1–5 Likert scale)
24. Our products offer unique features. (1–5 Likert scale)
25. Our brand is differentiated in the market. (1–5 Likert scale)
26. We innovate in distribution and/or delivery. (1–5 Likert scale)
27. Our operations are efficient. (1–5 Likert scale)

B7. Open Questions

28. What are the opportunities to grow faster in the market for your start-up?
29. What do you consider the main challenges to scale up faster? (Please mention at least three challenges.)

DURÁN, R., ORELLANA GONZÁLEZ, E. & LÓPEZ RODRÍGUEZ, J. / *Key Success Factors for Women Microentrepreneurs in the Valparaíso Region*

Key Success Factors for Women Microentrepreneurs in the Valparaíso Region: An Analysis to Strengthen Local Management and Development

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Abstract

The success of women-led entrepreneurship is determined by multiple internal and external factors. Additionally, personal and socioeconomic variables and market conditions play a role, along with economic, political, and regulatory factors that can become significant barriers to business development.

Although studies conducted by public and private institutions characterize microentrepreneurs, evidence remains limited regarding the perceptions that female entrepreneurs themselves have of the success or failure of their businesses. In this context, the objective of this research is to analyze the key success factors influencing female microentrepreneurs in the Valparaíso region, considering both their personal characteristics and environmental factors, as well as aspects related to the management of their ventures.

This research is based on the author's work as professors of service-learning courses related to micro-entrepreneurship at the University of Las Americas in Chile, where Business administration students serve as advisors, helping female entrepreneurs strengthen their business models.

The study examines a sample of 380 beneficiaries of state entrepreneurship support programs from various municipalities in the area. Methodologically, a mixed-methods approach is adopted, allowing for an examination of both the entrepreneur's profiles and their perceptions of the factors influencing their business performance.

The study's relevance lies in the contribution of microenterprises to the economic and social development of Chile and the region, generating useful evidence to guide training programs, promote formalization and strengthen female regional employment.

Keywords: Female entrepreneurship, entrepreneur profile, Key Success factors in entrepreneurship

JEL Classification: L26.

1. Introduction

Women's entrepreneurship has become a key driver of economic and social development in Latin America, particularly in contexts where women start businesses in response to limited job opportunities, economic necessity, and the pursuit of greater financial independence.

In recent years, the Latin American region has recorded some of the highest rates of female entrepreneurial activity worldwide. According to the Global Entrepreneurship Monitor (GEM), as of 2024, Chile ranks among the leading countries in Latin America in terms of women's participation in entrepreneurship.

Despite this strong participation, women entrepreneurs in Latin America and Chile continue to face significant challenges. In this context, understanding the factors that contribute to the success of women entrepreneurs is essential for promoting inclusive economic development and strengthening local economies.

Furthermore, in Chile, micro, small, and medium-sized enterprises account for most of all registered businesses, reaching nearly 99%, which underscores the importance of smaller businesses in the national economy.

Table 1. Share of companies in Chile (Endeavor Chile, based on data from the Internal Revenue Service, 2023).

Company Size	Share of companies	Share of employment
MSMEs (Micro, Small and Medium-sized Enterprises)	98,8%	45.5%
Large Companies	1.2%	54.4%

Although there are studies that describe entrepreneurs in Chile, empirical evidence allowing for the identification of perceptions regarding the success or failure of these businesses at the regional level remains limited, because major government surveys, such as the Microenterprise (EME) by the National Institute of Statistics (INE) and that of the National Training and Employment Service (SENCE) are aimed at characterizing entrepreneurship, and on the private side, the Global Entrepreneurship Monitor (GEM) contributes important data on the characterization of entrepreneurs and their motivations.

On the other hand, the aforementioned studies analyze entrepreneurship by including sales categories designated as micro (micro 1, 2, and 3) and small (small 1, 2, and 3), which have different sales ranges according to the Internal Revenue Service's classification and, consequently, a wide dispersion in sales levels between the lower and upper categories.

Table 2. Classification of companies in Chile (Internal Revenue Service, 2025)

Business Size Category	Annual Sales UF (Euros)	Number of employees
Microenterprise	0.01 – 2,400 (€ 92.150)	1 to 9.
Small enterprise	2,400.01 – 25,000 UF (€ 955.400)	10 to 49.
Medium-sized Enterprise	25,000.01 – 100,000 UF (€ 3.668.000).	50 to 199.
Large Enterprise	100,000.01 UF and above (+ € 3.668.000)	More than 200.

In this way, the research focuses on the micro-entrepreneurship level (micro 1 and 2) within the microenterprise category, those with the lowest sales levels, which is also the category currently facing the most challenges given the region's labor market context. This aspect is key to distinguishing the results of national and regional surveys conducted by National Institute of Statistics and GEM.

In terms of production, the Valparaíso region ranks third in terms of contribution to the national GDP, accounting for 8.2% in 2024, but it is one of the regions with the highest rates of informal employment in Chile.

According to the 8th Microenterprise Survey published by the National Institute of Statistics in December 2025, Valparaíso Region has an estimated 188.316 microentrepreneurs, and accounts for 9.4% of the national total, ranking as the region with the second-highest number of microentrepreneurs in the country, behind the Metropolitan Region.

At the regional level, 40.3% are women (75.891) and 59.7% are men. Nearly half (49.4%) of these businesses are informal. This leads to the following research question:

What are the key success factors for women-led microenterprises in the Valparaíso region?

The aim is to analyze the key success factors (KSFs) that influence female microentrepreneurs in the Valparaíso region, considering both their personal characteristics and environmental factors, as well as elements specific to the management of their businesses. Another distinctive aspect is the assessment of how female microentrepreneurs in the region perceives their own success.

Research will contribute to the generation of knowledge applied to a regional context, with results to be shared with government institutions involved in entrepreneurship. This will enable these entities to be more effective in their management and, at the macro level, help formalize more entrepreneurs so they can transition out of the informal sector, thereby improving regional employment indicators and the quality of life for women and their families.

2. Theoretical framework

Entrepreneurship has become one of the central drivers of contemporary capitalism. And, as entrepreneurs introduce new technologies, products, and business models, they give rise to new industries, creating jobs that in turn contribute, in part, to improving people's quality of life (Baumol, 1990; Baumol et al., 2007).

However, this phenomenon is neither uniform nor always virtuous, since not all entrepreneurship is productive; it can also be driven solely by the pursuit of a salary or by activities that do not contribute to social value. This leads us to question the balance between the creation of economic wealth and the building of "social wealth," understood as collective well-being and human development (Baumol, 2010; McMullen & Warnick, 2015).

It is in this context that entrepreneurship can be understood as a process through which something new and valuable is created, one that will require effort, dedication, and a willingness to take on financial, psychological, and social risks. Whether by starting a business or by driving initiatives within existing organizations—what is now known as intrapreneurship (Hisrich et al., 2017; Kuratko, 2016).

It is worth noting that, while opportunity-driven entrepreneurship predominates in Latin America, a significant portion of these initiatives remain subsistence-based or driven by necessity, characterized by low productivity and limited capacity for innovation. (OECD & CAF 2016). (GEM, 2024).

The literature on entrepreneurship cites various personal factors—such as age, gender, educational level, socioeconomic status, and family background—that play a crucial role in determining who is most likely to succeed as an entrepreneur (Scott A. Shane; Jonathan T. Eckhardt, 2012).

Access to resources, support networks, and market opportunities is also influenced by and attributed to the sociodemographic characteristics of micro and small entrepreneurs, as this variable affects the perception of opportunities and the ability to overcome obstacles. (Hechavarria, D.M., Reynolds, 2009).

In this regard, it is worth noting that entrepreneurial success cannot be measured solely in terms of growth or profitability, but also by the extent to which the activity allows individuals to realize their potential and experience well-being. This is because happiness is key to success. Scientific research shows a link between happiness and professional success.

Those who are dissatisfied tend to be less productive. Researchers Boehm and Lyubomirsky initially noted that success can lead to happiness, based on research available in 2008. However, upon reviewing the empirical evidence in detail, they proposed that the hypothesis was the reverse, that is, that happiness leads to success,

which is equally plausible. For this reason, they conducted a broader review of the literature, incorporating new studies into their initial analyses, and assessed whether the results of cross-sectional, longitudinal, and experimental studies provided additional support for this second hypothesis.

Finally, they concluded that there is solid evidence that happiness not only correlates with professional success but often precedes it. They also found that positive emotions can contribute to better outcomes in the workplace. (Boehm, J. K., & Lyubomirsky, S. 2008).

This leads us to conclude that business ventures that align with personal values and generate intrinsic satisfaction tend to be more sustainable over time and contribute more deeply to the entrepreneur's personal fulfillment.

3. Methodology

The study design is cross-sectional and descriptive, incorporating both quantitative and qualitative data. This approach allows for the simultaneous analysis of the characteristics of female entrepreneurs and their perceptions of the factors that influence the success of their businesses.

The literature indicates that the use of mixed methods, combining quantitative and qualitative data in a single study, has been validated as appropriate for investigating entrepreneurial phenomena.

The research involves administering a survey to an estimated sample of 380 female microentrepreneurs participating in state-sponsored entrepreneurship support programs and residing in various municipalities within the Valparaíso region.

The inclusion criteria for the sample were being a female microentrepreneur, as classified by the Internal Revenue Service (SII) according to annual sales, and residing and conducting business activities in the Valparaíso Region. A stratified sampling approach was applied based on sales volume and geographic location.

The structured survey consists of two main sections:

Descriptive Variables (31 items): Multiple-choice questions designed to characterize the entrepreneur's profile, including descriptive information about the entrepreneurs, the business, their financial situation, and their training need.

Latent Variable Scales (31 items): Assessed using Likert-type scales, ranging from 1 (Not Important) to 5 (Very Important), divided into three theoretical blocks:

- Perception of the Importance of Digitalization (5 items).
- Perception of Success in Entrepreneurship (12 items).
- Perception of the Importance of Barriers to Entrepreneurship (14 items).

Regarding the data analysis strategy, the first section will be evaluated using descriptive statistics, including frequencies, percentages, means, and standard deviations.

In addition, an exploratory factor analysis (EFA) will be conducted on the Likert scale items related to the importance of digitalization, perceptions of key success factors, and barriers to entrepreneurship.

The objective of the factor analysis is to identify the underlying dimensions that explain the relationships between the observed variables and to reduce a large number of indicators to a smaller set of significant factors.

In the second stage, Confirmatory Factor Analysis (CFA) will be conducted, with the objective of validating that the factor structure identified in the exploratory phase exhibits a satisfactory statistical fit with the theory and the empirical data found.

Finally, Structural Equation Modeling (SEM) will be included to determine how the exogenous variables (the dimensions of Barriers and Digitalization) jointly and simultaneously influence the study's main endogenous variable (Perception of Success).

4. Results

The research is currently in the preliminary stage of survey administration; therefore, the results presented below correspond to only 28% of the total required responses, that is, 105 female entrepreneurs have responded as of May 2026.

For this reason, the analysis that follows will be descriptive only, and the factor analysis and SME stages will be conducted once the collection of responses is complete.

4.1 Description of the business and the entrepreneur

The age of the female entrepreneurs surveyed is concentrated primarily among those over 40; 26% are between 40 and 49 years old, and 48% are over 50. This finding is linked to their motivations for starting a business, which are associated with potential job losses that lead women to become self-employed.

Educational attainment is also linked to age, as 65% of these women pursued a technical or university-level degree, reflecting the growing trend among Chilean women to start their own businesses in the face of a job market that becomes less accessible after the age of 40.

As for the number of employees or people working in the business, nearly 90% are self-employed, a fact linked to the consolidation of these ventures over time and also hiring restrictions.

DURÁN, R., ORELLANA GONZÁLEZ, E. & LÓPEZ RODRÍGUEZ, J. / *Key Success Factors for Women Microentrepreneurs in the Valparaíso Region*

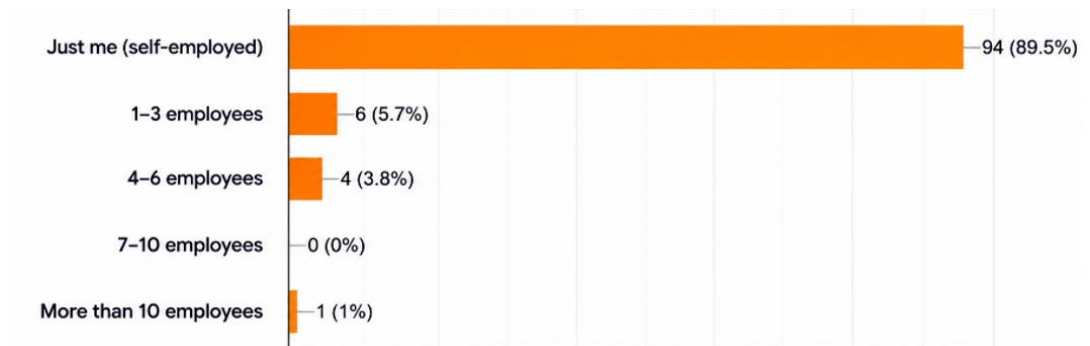


Figure 1. Number of employees (source: own work)

Another challenge facing small businesses at the regional level, according to national surveys, is informality, that is, the lack of legal registration for the business. In this case, nearly half of the respondents have not formally registered their businesses, which limits their opportunities for growth and financing.

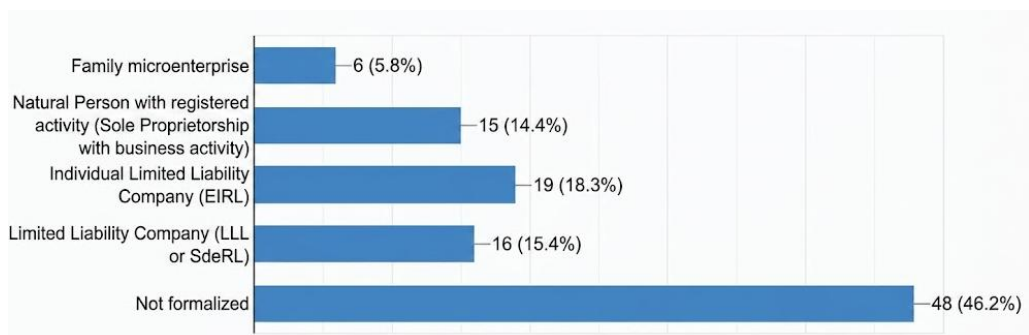


Figure 2. Type of business based on legal structure (source: own work)

In terms of the sectors in which these businesses operate, they are clearly concentrated in design, crafts, and handicrafts (48.6%), followed by beauty, aesthetics, and wellness (18.1%).

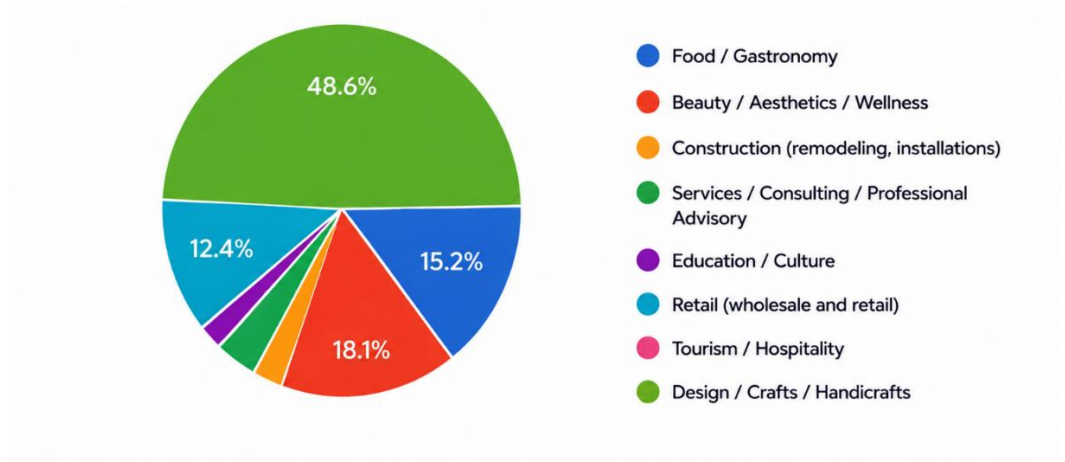


Figure 3. Business operating segment (source: own work)

This indicates that women are starting businesses in sectors with low barriers to entry, relying primarily on personal savings for funding (74,3%) as shown in the figure 4.

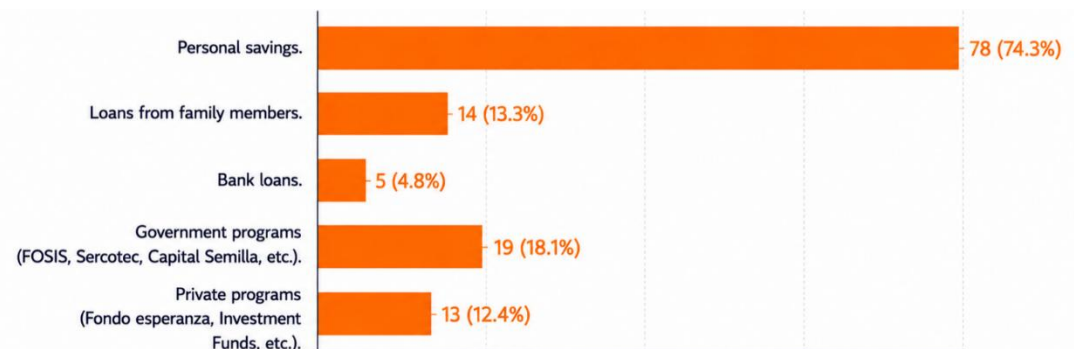


Figure 4. Type of financing used (source: own work)

As national entrepreneurship surveys show, in the Valparaíso region, the primary motivation for starting a business is economic necessity (51.4%), followed by a desire for independence or work flexibility (27.6%).

This trend is also evident in other Latin American countries, where the labor market context is a greater driver of entrepreneurship than the search for opportunities, family businesses, or a calling.

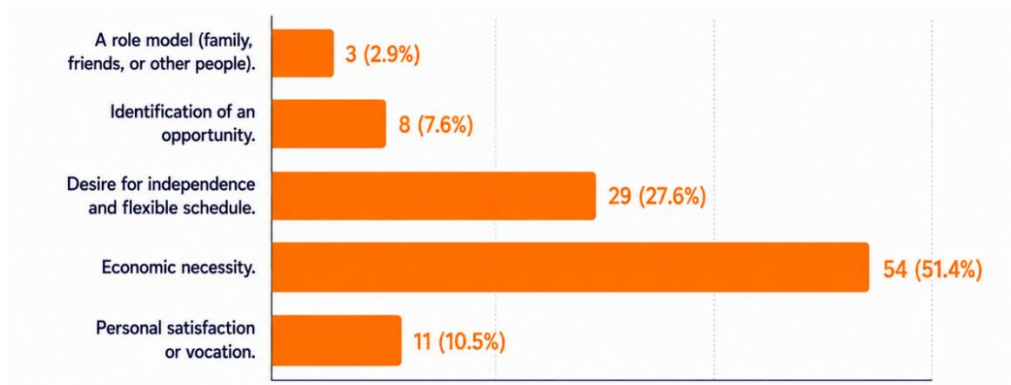


Figure 5. Motivation to start a business (source: own work)

When it comes to business management, a low percentage of entrepreneurs use any form of accounting. 35.2% do not keep any accounting records, and 41.9% only maintain basic records manually or digitally.

This aspect is key to business growth, and the lack of comprehensive accounting is linked to the high level of informality among startups, which stems from a lack of awareness of regulations and the belief that formalizing a business entails paying taxes.

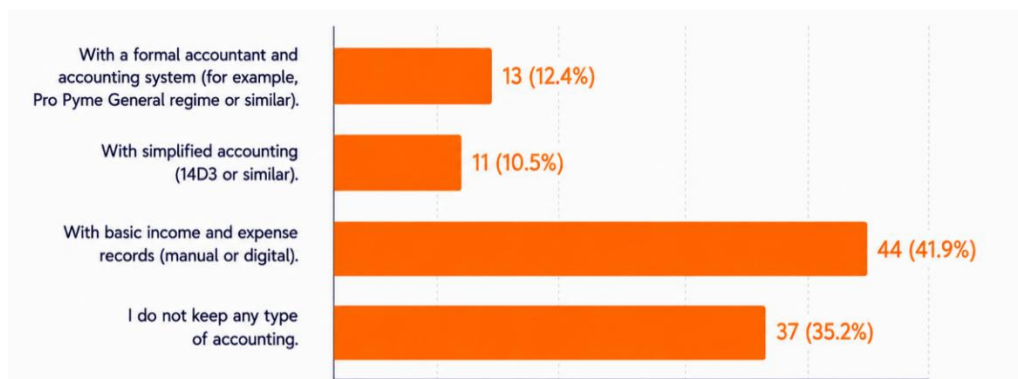


Figure 6. Accounting Methods (source: own work)

Finally, when asked about the types of government support entrepreneurs need, nearly 48% said that financing is the most essential, followed by training or business consulting.

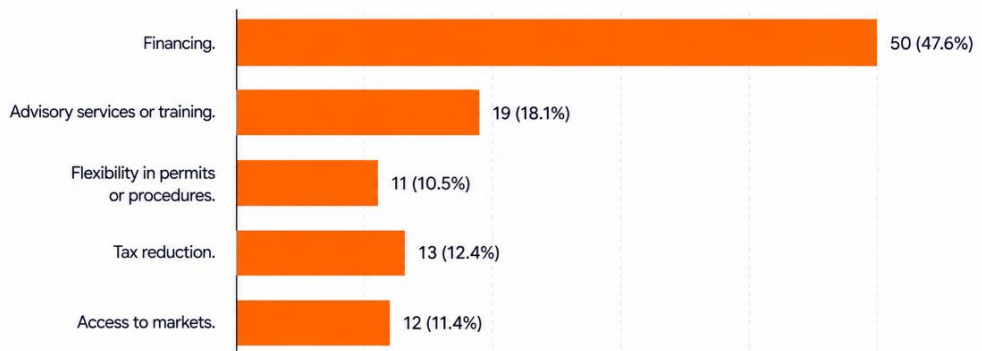


Figure 7. Government support considered most necessary (source: own work)

4.2 Perceptions of success and barriers to entrepreneurship

The second part of the study aims to identify how female entrepreneurs perceive success. In general, it seeks to answer the question:

What does having a successful business mean to you?

Table 3 identifies the characteristics most associated with business success by the entrepreneurs surveyed. The results indicate that product or service quality, together with good customer service, is perceived as the most important determinant of success (84%). This suggests that entrepreneurs primarily associate business performance with the ability to deliver value to customers and maintain satisfactory customer experiences. Achieving sales growth is the second most frequently mentioned indicator (83%), reflecting the importance of financial performance and business expansion as measures of success. Customer loyalty ranks third (82%), highlighting the relevance of long-term relationships with clients and repeat purchases as key elements for business sustainability.

Table 3. Perception of business success (source: own work)

Manifestation of success	%
Quality of your product or service / Good customer service.	84
Achieving sales growth.	83
Customer loyalty.	82
Maintaining affordable prices.	75
Having a larger number of customers or followers.	74
Having networks or partnerships with other entrepreneurs / Strategic location.	67
The region's idiosyncrasy expressed through the values, beliefs, or customs of its population.	47

Maintaining affordable prices (75%) and increasing the number of customers or followers (74%) indicate that women entrepreneurs recognize the importance of competitiveness and market reach. Likewise, having networks or partnerships with other entrepreneurs and benefiting from a strategic location (67%).

In contrast, the region's idiosyncrasy, expressed through local values, beliefs, and customs, received the lowest percentage (47%).

Regarding perceptions of barriers to entrepreneurship, the results show that the main barriers are associated with access to public funding (66%). And while support programs and instruments do exist, there is still a lack of awareness regarding the requirements and procedures for applying for and subsequently receiving these funds.

Second, the region's current economic situation (58%) appears to be a significant constraint on business development. This finding is consistent with the negative regional unemployment and informality statistics, within a macroeconomic context marked by heightened uncertainty.

Table 4. Identification of Barriers for Business (source: own work)

Barriers for Business	%)
Access to financing through public funds (Sercotec, Fosis, Corfo, others)	66
The current economic situation in the region.	58
New tax regulations (Transfer Law, Propyme Regime).	57
Lack of legal formalization of the entrepreneurship.	56
Difficulties in obtaining business licenses or municipal permits.	53
Difficulty in accessing new markets or customers.	52
Difficulty in incorporating sustainable or circular economy practices.	51
Effects derived from the COVID pandemic (lower sales, business closures).	41
Increase in products like those I offer (competition).	41
Difficulty in finding reliable suppliers.	38

Similarly, new tax regulations (57%) and the lack of legal formalization of businesses (56%) are perceived as significant obstacles, highlighting the importance of regulatory and administrative factors in the sustainability of microenterprises.

Furthermore, more than half of female entrepreneurs identify difficulties related to obtaining municipal permits or business licenses (53%), as well as accessing new markets or customers (52%). These results suggest that bureaucratic and commercial barriers continue to limit business growth opportunities, restricting both formalization and expansion of economic activities.

Another important finding is that 51% of participants consider the integration of sustainability or circular economy practices into their businesses to be complex. While there is greater awareness of these practices in Chile, their implementation is primarily limited to medium and large enterprises.

Meanwhile, the barriers with the lowest incidence are the effects of the COVID-19 pandemic (41%), increased competition (41%), and difficulties in finding reliable suppliers (38%).

5. Conclusions

Preliminary research findings show that most women-led businesses are very small-scale microenterprises, corresponding to micro level 1 in Chile's business classification system.

In most cases, these businesses are managed by the owners themselves or have a maximum of three employees. This structure reflects the limited productive capacities and financial resources available to many women entrepreneurs, as well as the tendency to start and operate businesses with low investment—primarily relying on personal savings—and low operating costs. These characteristics are consistent with the profile of micro-enterprises observed in official nationwide surveys.

The data indicate that women's entrepreneurship is often driven by economic necessity rather than by the identification of innovative market opportunities. Many women entrepreneurs start their businesses as a strategy to generate income, achieve financial independence, or overcome difficulties in accessing formal employment. This finding highlights the important social and economic role of entrepreneurship as a mechanism for labor market inclusion, especially for women facing the labor market constraints typical of a region with high unemployment and informality.

Regarding the economic activities undertaken, the most common sectors are design and crafts, beauty and wellness services, and gastronomy. These data confirm a trend in Chile in recent years, as these are sectors that typically require low initial investment and present lower barriers to entry compared to more capital-intensive industries.

As a result, they offer accessible opportunities for women seeking to establish their own businesses. However, the concentration of female entrepreneurs in these sectors has increased competition and could limit opportunities for differentiation and long-term growth.

The study also reveals that informality remains a key characteristic of many microenterprises, which are consistent with the findings mentioned above. Furthermore, it is evident that there is a lack of accounting or record-keeping for purchases and sales, low tax compliance, and minimal administrative procedures in business management.

One of the distinguishing aspects of the research relates to the perception of success. Female entrepreneurs in the region generally define business success in terms of concrete operational results. The most frequently cited indicators of success are the quality of the products and services offered, sustained sales growth, and the ability to build customer loyalty. These factors are perceived as more important than rapid expansion or innovation, suggesting that stability, customer satisfaction, and sustainable growth are central objectives for many women entrepreneurs.

Financial constraints emerge as one of the most significant barriers to business development. Many women entrepreneurs report limited access to public financing programs, credit, or external investment, forcing them to rely primarily on personal savings and family resources to fund their operations. This reliance on their own resources can limit their ability to invest in technology, marketing, infrastructure, and other activities necessary for the growth of their businesses.

The results also highlight various external challenges that create uncertainty among women entrepreneurs. Economic and social instability, changes in tax regulations, and the complexity of administrative procedures associated with starting a business are frequently identified as major concerns.

Overall, the results are consistent with the evidence reported by national surveys on entrepreneurship in Chile. Similar patterns are observed regarding the prevalence of necessity-driven entrepreneurship, the concentration of women-led businesses in service-oriented sectors, the persistence of informality, and the difficulties associated with accessing financing and business growth.

Consequently, the findings reinforce existing knowledge about the challenges and opportunities faced by women microentrepreneurs and provide valuable information for the design of public policies and support programs that consider the characteristics of women entrepreneurs within the regional context.

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Leadership succession in Albanian family firms: intergenerational differences, and innovation

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Abstract

This paper explores leadership succession from founders to the next generation in Albanian family businesses. Although succession has been widely researched internationally, empirical studies in Albania remain scarce. Using a theoretically driven multiple-case study design, the research draws on three case studies based on interviews with successors and secondary public data. It addresses three questions: the challenges faced during succession, how founders and successors cope with intergenerational differences, and how the next generation approaches innovation to ensure long-term survival. Findings show that contextual factors are the most decisive influences on succession and innovation, offering insights into an underexplored Albanian context.

Keywords: family business succession; Albanian contextual factors; intergenerational differences; approach to innovation

JEL Classification: L26, M12, G34, O31, D23

1. Introduction

Intergenerational succession in family business it is still a major challenge, as only 10-15% of firms survive into the third generation (De Massis et al., 2021). As family firms mature, safeguarding continuity and long-term prosperity becomes increasingly vital (Hiebl, 2015). Family businesses represent a unique system in which the overlap between family and business creates inimitable resource combinations which can be transmitted through long-term investment and altruistic behavior (Gu et al., 2019). Prior research has identified key assets transmitted across generations such as wealth (Carr et al., 2016), knowledge (Wang and Shibing Jiang, 2018) and social capital unique to the family business (Schell et al., 2018). These resources play a crucial role in shaping the next generation of leaders and sustaining business continuity.

Leadership in family firms differs from that in non-family firms due to the simultaneous involvement of multiple generations during the succession process. Incumbents often retain strong emotional attachment and influence over the firm

(Gomez-Mejia et al., 2011; Carney, 2005), while successors, as they absorb tacit knowledge embedded in the incumbent's experience, seek to develop distinct leadership identities. Empirical studies suggest that founders tend to adopt expert and paternalistic leadership styles, whereas successors are more likely to engage in participative and transformational approaches (Fries, Kammerlander, & Leitterstorf, 2021).

Leadership in family firms is different from that in other firms due to the simultaneous involvement of multiple generations during the succession process. Incumbents often retain strong emotional attachment and influence over the firm (Gomez-Mejia et al., 2011; Carney, 2005), while successors, as they absorb tacit knowledge embedded in the incumbent's experience, seek to develop distinct leadership styles. Various studies suggest that founder generation tend to adopt expert leadership accompanied by paternalistic behavior (Fries, Kammerlander and Leitterstorf, 2021) whereas successors are more likely to engage in participative decision-making process and a more transformative leadership.

The interaction between different family leadership styles can generate both tensions and opportunities particularly related to knowledge creation (Cunningham, Seaman and McGuire, 2016) and innovation (De Massis, Frattini and Lichtenthaler, 2013). Innovation represents a key mechanism for long-term survival and competitiveness. In the context of family business innovation emerges through a balance between the exploitation of current resources and exploration of new ideas. This balance, known as organizational ambidexterity, is directly associated with the longevity of family firms (Hiebl, 2015)

Despite extensive research on succession, leadership and innovation in family firms, Albania remains an underexplored context. The country's transition from a totalitarian regime to a market-oriented economy has shaped the rise of first- generation entrepreneurs and contributed to marked intergenerational differences between founders and successors.

This study aims to provide an in-depth qualitative analysis on the main intergenerational challenges Albanian incumbents and successors are facing while passing the leadership, the different leadership styles developed by each generation how these styles influence the next generation approach to innovation. By focusing on an under-researched context, the study contributes to the literature by highlighting how contextual factors shape intergenerational dynamics, leadership evolution and innovation approaches in family businesses.

The paper is organized as follows. Section two reviews the literature on leadership in family business, the rise of Albania's first entrepreneurs, intergenerational differences, and approaches to innovation. Section three outlines the research

methodology, section four presents the findings, and five concludes with the study's contributions and some limitations.

2. Literature Review

2.1. Leadership in family business

In the widely accepted definition of family business as *"a business governed and/or managed with the intention to shape and pursue the vision of the business held by a dominant coalition controlled by members of the same family or a small number of families in a manner that is potentially sustainable across generations"* (Chua, Chrisman & Sharma, 1999), continuity in the hands of the same family is at the core of existence of family business. Thus, business succession as a process which facilitates the transfer of management control from one family member to the other (Sharma, 1997) is crucial to ensure the existence of family business.

Family business succession is a complex process which involves planning, development of successors and the alignment of the objectives of family, business and ownership (Le Breton-Miller et al., 2004). Several studies relate the complexity of the process among other things with the difficulty to transfer the capabilities of managing the business (Chirico and Salvato, 2008), tacit knowledge embedded in the incumbent's mind (Sharma, 2004) and the unique resources and capabilities that a family firm develops due to the involvement of the family in the business otherwise called *"familiness"* (Habershon and Williams, 1999). All these factors point to the importance of leadership succession, thus the selection and formation of the next leader of the family business which will carry on with the legacy.

Leadership in family firms is different from non-family firms. This is due to the high levels of influence of the existing leaders on the firm (Carney, 2005) and their personal emotional attachment (Gomez-Mejia Cruz, Berrone and De Castro, 2011). In fact, one of the factors preventing succession in family firms is the personal attachment of the incumbent to the business, which might not leave space to the successor to develop his own skills and earn the respect of other stakeholders (De Masis, Chua and Chrisman, 2008). The long tenures of existing leaders (Bernhard and O Driscoll, 2011) that affect the identification of the company with the leader, is another factor. Due to these factors, family businesses can exhibit different leadership styles and behaviors.

In order to achieve business success, stewardship behavior and a transformational leadership style are seen to produce better financial results for the company (Fries, Kammerlander and Leitterstorf, 2021). Stewardship culture may materialize in different forms in family firms. It inspires collectivistic attitudes and trustworthy behaviors in the organizational members which contributes to a competitive advantage for the firm (Eddleston, Kellermans & Zellweger, 2010). This behavior is better complemented with transformational leadership style to nurture business success. Transformational leadership occurs when charismatic leaders inspire their employees to look beyond their own self-interest. Their charisma is translated in a great power of inspiration of

employees to identify with the leaders (Bass, 1990). As a result, this leadership style instills commitment in employees which translates in better business performance.

Transformational leadership style has also been recognized as more beneficial for non-family employees' satisfaction compared to other leadership styles because it cultivates the sense of belonging to the company (Sornson, 2000). Family firms are long-term oriented and aim to protect their non-financial objectives such as socio-emotional wealth, identity and status (Berrone et al., 2012). These aspects are also reflected in their behavior as employers (Heino, Alimov and Tronimen, 2024) treating employees as resource rather than cost, valuing their needs and interests (Stavrou et al., 2007). The two prevalent behaviors of family firm leaders which reflect these values are steward (Pearson&Marler, 2010) and paternalistic (Sorenson, 2010). While paternalistic leadership behavior is debated regarding its impact on employees' satisfaction, stewardship behavior associated with a transformational and participative leadership styles, are positively related to the commitment and psychological ownership of employees to the firm (Fries, Kammerlander and Leitterstorf, 2021).

Differently from the other two objectives, which are supported by stewardship behavior and participative and transformational leadership, family success is achieved through a paternalistic behavior and expert leadership style (Fries, Kammerlander and Leittersotrf, 2021). Paternalism as a behavior of showing such high concern for others as to interfere with their decisions, has had negative ramifications (Mussolino and Calabro, 2014). Nonetheless when it is properly managed by a leader who serves as a protector and mentor, it can promote value creation (Pellegrini and Scandura, 2006).

On the other hand, in order for the knowledge and know how to pass from the incumbent to the successor, the more the decision making is centered around the leader the more she has the opportunity to transfer this knowledge to the successor. This calls for an expert leadership who understands the importance of the knowledge and how to allocate it with the key employees in the firm (Fries, Kammerlander and Leitterstorf, 2021). Nonetheless, despite their protective and mentor behavior, these leaders should adapt to the external changes in order to secure longevity of the firm. In their endeavor to adapt to external changes, transformational leadership style comes at help (Stafford, Danes and Haynes, 2013) along their role as mentors and experts.

Succession is defining feature for family firms (Yu, Lumpkin, Sorenson and Brigham, 2012). As CEO is the most prominent individual in a firm (Pettigrew, 1992), leadership succession is crucial to the continuity of family firm (Cabreara-Suarez, 2005). The success of leadership transition is highly dependent on the leadership style and behavior of the current leader (Cabrera- Suarez, 2005). Monopolistic leadership styles such as autocratic harm the succession process with paternalistic leaders who are unwilling to select and make space for the successor (Mussolino and Calabro, 2014). On the other hand, more participative leadership styles and supportive leadership behavior is found to nurture the formalization of a timely succession process. In family firms with stewardship behavior where the leader serves as a mentor and provides

proper training for the successor, a smooth succession process takes place enabling the successor to gain necessary skills to take over the business (Lockamy et al., 2016).

2.2. The rising of first Albanian entrepreneurs

Albania, a small country of 2,363,314 inhabitants (INSTAT, 2025), faces population decline due to low natural increase and persistent youth out-migration. A member of the UN and NATO, its GDP reached USD 29.94 billion in 2025 (IMF). Within this context, SMEs and large enterprises operate against a backdrop of tumultuous economic and political development.

From the end of the World War II until 1989, Albania operated as a closed totalitarian regime under the Albanian Labor Party, rooted in Marxist- Leninist ideology (Iseni & Jakupi, 2017). The system rested on state ownership of land, resources and production, sustaining centralized planning, forced agricultural collectivization, and a heavy industry focus.

Albania was the last communist country to embrace democracy. It embarked on economic transformation following the first pluralistic elections of 1991. This transition toward a market-oriented economy was marked by political volatility, controversies, and instability (Kume and Llaci, 2010), yet liberalization simultaneously opened new opportunities for the first entrepreneurs.

The rise of the market economy enabled private ownership, with risk-taking individuals founding early enterprises through the privatization of state assets or by leveraging opportunities created by the entry of first foreign investors. Despite minimal managerial experience and limited formal business education, their willingness to assume risk and recognize opportunities proved decisive in establishing the first generation of private enterprises. Today, this founding generation is approaching retirement age, making succession not only a strategic necessity but also a biological inevitability, as the transfer of leadership to the next generation becomes increasingly urgent.

According to a study by Gasparshvili (2001) in four ex-communist countries, the first generation of managers used three leadership styles: transactional, transformational and laissez-faire. Among these, transactional leadership was mostly applied compared to two other styles of leadership (Gasparshvili, 2001). Transactional leadership is based on an exchange of reward for good performance or penalties for poor performance (Bass, 1985). In Albania's enterprises, emerging in uncertain conditions and led by unexperienced managers, there was little capacity to craft long-term, inclusive strategies. Leadership of the first entrepreneurs was confined to transactional practices, emphasizing efficiency over vision; no room was left for strategic or inclusive leadership.

2.3. Intergenerational differences

The definition of family firms consists of family members related by blood or marriage owning and controlling a business (Liu et al., 2023). The corporate governance of family firms differs deeply from that of non-family firms because family members aim to transfer their vision across generations through socioemotional wealth (LeCounte, 2023). Karl Mannheim (1952) in his theory of intergenerational differences stated that groups from different ages show different attitudes and behaviors affected by events that marked their periods of living and growing environments. Such events could be political events, technological or transformation of the social economy. Therefore, when a successor takes on the management of the family business, it is expected to be a shift in the management strategy (Levering & Moskowitz, 1993). On the other hand, the different values that founders and successors adhere, affect their approach to innovation and transformation (Guo, 2011).

Different academics have noted that later generations are more risk averse in their decision making due to their socioemotional wealth. According to Gomez-Mejia et al. (2007) socioemotional wealth represents the non-financial benefits such as family identity, the ability to exercise family influence and the long-term vision of the family business. Thus, the later generations are prone to give up part of their growth in order to preserve family control (Molly, Laveren, & Jorissen, 2012). The need to preserve family control is related to the growth of the business and the need for the use of debt. Therefore, the founder generation has been found to be more business oriented and successor generation more family oriented (Reid, Dunn, Cromie, & Adams, 1999).

In order for the successor generation to overcome this setback and be more explorative, it is imperative for the incumbent generation to avoid dysfunctional paternalistic behavior and adopt mentor behavior (Mussolino & Valabro, 2014). In this case Canovi et al. (2022), states that it is important for the successor to understand the role of the incumbent but also to create his own identity in the company. This identity is enhanced by the transfer of entrepreneurial spirit from one generation to the next in order for the successors to give meaning to their own experience within the firm. The lack of such entrepreneurial mindset creates successors overly dependent on founders for their leadership, networks and technical abilities (Feltham et al., 2005).

2.4. Innovation as means for business survival

The succession process in family firms represents a generational change which generates challenges specific only to family business which are addressed differently depending on the characteristics of each generation (Jaffe and Lane, 2004). The successor generations may pursue strategic decisions aimed at the modernization of the company or decisions of no intervention (De Clercq and Belausteguigoitia, 2015).

With either decision, each generation contributes to the stock of knowledge shaping also the innovation capacity of the family business (Hauck & Prügl, 2015).

Family firms are oriented toward longevity, with the objective of passing a healthy and sustainable business across generations. Therefore, innovation becomes a crucial factor for them to ensure business's long-term viability (Hult et al., 2004). The degree and nature of family involvement in business through ownership, management and governance influences how innovation is pursued within family firms (Cucculelli and Peruzzi, 2020). In this regard, organizational ambidexterity has emerged as a pertinent concept which describes how family business approach innovation (Hiebl, 2015). This concept refers to the ability of an organization to simultaneously engage in explorative and exploitative activities (Tushman and O'Reilly, 1996). Explorative activities refer to exploring new ideas and opportunities while exploitative activities refer to refining and leveraging current capabilities and competencies (Raisch et al., 2009). In order for family businesses to thrive in long-term, they need to balance both kinds of activities aiming at high levels of organizational ambidexterity (Hiebl, 2015).

Prior research suggests that later generations family firms are more risk averse than founder generations. This can be attributed to several factors. First, second generation inherits a bigger family firm with more formal structures and processes in place which may reduce their ability to make changes (Westhead et al., 2002). Second, the increased involvement of multiple family members may increase pressure to preserve the status quo (Kellermanns et al., 2012). Additionally, successors operate under the "shadow" of the founder (Short et al., 2009). This "shadow" reflects the founder dominant influence regarding the usual way things are run and his reliance on tacit knowledge which has driven innovation so far within the firm (Short et al., 2009).

3. Methodology

This study adopts a qualitative research design which is appropriate for exploring complex and context-dependent social processes. According to Creswell (2014), qualitative methods are more suitable when the study relies more on open-ended questions to understand meanings that individuals give to a social problem.

The present research investigates leadership succession in Albanian family firms which is a contemporary phenomenon by addressing the following research questions:

- What are the challenges faced by Albanian family firms during leadership succession?
- How do founders and successors cope with intergenerational differences?
- How does the next generation approach innovation as mean of ensuring survival of the company in the long term?

Given the exploratory nature of these questions and the limited empirical research in the Albanian context, a qualitative approach is chosen as the most appropriate.

3.1. Research Design

The study employs a multiple-case study design following the methodological logic of Yin (2018). Case studies are suitable for investigating a contemporary phenomenon within their natural setting especially when the phenomenon and context have blurred boundaries.

To enable an analytical generalization and triangulation of data, three family firms operating in different industries were selected. Three case study offers greater robustness of findings through cross-case comparison.

3.2. Sample and Data Collection

Data was collected through semi-structured interviews with the successors of three family businesses actively involved in the management of the business. Successors were chosen to share their perceptions and experiences about challenges in this process of passing the leadership from the founder generation.

To capture richer contextual insights, interviews were conducted within company's premises. In addition to primary data, secondary data were collected from company's web sites and other public information websites. This enabled data triangulation to strengthen the accuracy of the findings. All successors included in this study have been actively involved in the management of their respective firms for over five years, ensuring a sufficient depth of experience to provide proper insights into leadership practices, intergenerational dynamics and strategic decision-making processes.

Access to the founding generation proved to be limited, as incumbents declined participation in interviews, often perceiving such inquires as an intrusion to their privacy. Consequently, data collection focused on successors as primary informants, who are directly involved in the ongoing succession process and able to reflect on intergenerational dynamics.

Relatively larger firms were chosen against SME-s, to allow a broader examination of succession dynamics, professionalization processes and innovation challenges. This offered a better understanding of the succession process's impact on the family and business.

3.3. Data Analysis

The data were analyzed using a thematic analysis approach following the principles of Braun and Clarke (2006). This required identifying patterns across interviews followed by a cross-case comparison to note similarities and differences among the cases.

4. Findings

Albanian family firms, after more than three decades of operating in the market economy, are at the stage of generational transition. Among the different dimensions of this process, leadership transition emerges as the most challenging. This challenge is particularly pronounced in the Albanian context where first-generation entrepreneurs are predominantly self-made, shaped by the uncertainties of the post-communist period while successors are more formally educated and professionally prepared. This study tried to make an in-depth analysis on what kind of leadership the second generation is developing and how does this leadership shape the firm's innovation orientation to sustain competitive advantage.

The companies selected for this study are large Albanian family firms, each employing more than 50 employees and generating an annual turnover higher than 15 million EUR. Companies B and C have been operating in the Albanian market since 1994, while Company A was established in 2004. Despite this difference in the founding year, the three founders can be considered part of the same entrepreneurial generation shaped by similar contextual conditions and thus likely to exhibit comparable leadership characteristics.

The selected cases are particularly valuable as they provide variation in successor pathways while maintaining comparability at the founder level. In companies A and B, successors have been involved in the family business since childhood, suggesting early socialization into the firm and a clear vision of inheriting the business in their future. In contrast, the successor of company C followed a different path, acquiring prior professional experience outside the family firm before joining the business.

Furthermore, the educational formation of the successors reflects these diverse trajectories. The successors of companies A and B were guided by their families toward the choice of academic field they were going to study which would be aligned with future leadership roles. In fact they chose to study respectively business administration and finance. In contrast, the successor of Company, who did not initially envision a future within the family business, pursued studies in information technology and only later saw the need to complement his background with a second degree in business administration after becoming involved in the firm.

4.1. Leadership and intergenerational challenges

Across the three cases under study, Albanian incumbents exhibit a form of expert leadership with a concentration of knowledge and final decision-making authority. On the other hand, the successors lean on a more inclusive decision-making process tending toward a more transformative leadership style.

Based on the interviews with the three successors, stewardship and paternalistic behavior are both present in the way respective incumbents act towards them and

older employees. This suggests that such leadership style is not industry-specific but rooted in the socio-economic and historical context of Albanian entrepreneurship.

As one successor explains:

"There is a tendency of my father to give a listening ear to older employees before filtering information through my brother and I" (Successor, company A)

This characteristic of paternalistic behavior tends to limit the authority of the successor while still identifying the company with the founder. Long-serving employees who supported the founder during the early stages of the business, have a privileged position in the company independently of their competencies. This reflects a stewardship culture in the leadership by incumbents in Albanian family firms. In this context, this acts as an inhibitor to leadership succession because the successors feel limited in making strategic decisions without direct or indirect resistance from incumbents.

"There is no way I can implement a general human resources policy without my parent intervening for an old employee who now practically brings nothing to the company" (Successor company C).

In contrast, successors across all three cases display characteristics of a more participative leadership leaning on a more inclusive decision-making system. They have inherited a larger and more complex company and perceive the formalization of hierarchical structures and policies as a step for further growth and sustainability.

For instance, as one successor notes:

"The company has already reached a point where it covers most of the market potential. I need competent people to manage its main sectors, myself dedicating to other projects" (Successor company C).

Similarly, another successor highlights the need for financial and strategic formalization:

"I really need some competent financial advisors to be able to separate the finances of the company from the family and also to advise us on the best way to implement our strategy" (Successor company B).

These statements illustrate a clear shift from founder-centered control toward participative leadership. As the three companies started as small SME with a few employees and have now grown into big companies with over fifty employees, the limitations of family-based management become evident. The successors are conscious that members of the family cannot possess all required skills and competencies to manage expanding operations. Thus, they seek to build a more professionalized company with competent managers in different sectors with delegated decision-making authority.

What can be deduced from the three cases is that the expert status of the incumbent and their attachment to the company interferes with the changes inspired

by the successors as the upcoming leaders. Albanian incumbents try to fulfill their role as mentors by avoiding the delegation of all risks to the successors, a factor which is considered as an inhibition by successors to implement changes in their management strategy.

4.2. Approach to risk and innovation

The findings indicate that despite the ongoing generational transition, the main source of innovation is still the founder of the company. Consistent with a study from Short et al., (2009) who state that successors often operate under the enduring of the "shadow" of the founder, this is also observable in Albanian companies. The presence of the founder is still very strong and altering established routines and practices is particularly challenging. The three successors have expressed that the main difficulty in implementing change is to convince the incumbent of the needed change. This often results in prolonged negotiations and informal discussions within the business and family.

"I don't remember any family dinner not ending in long debates regarding any decision that was different from the mentality of my parents" (Successor, company C)

"Time has come to have a family board and formalize things, but it is difficult to convince my father on the necessity of this" (Successor company B)

"We have a family board and a constitution, but sometimes it is my own father who overcomes these structures" (Successor company A)

Interestingly despite these challenges, successors do not advocate for the complete retirement of the founder from the business. The founder is still seen as the expert, and they still need their advice for important decisions particularly in situations requiring strategic judgement and innovation in the context of exploring new solutions. Successors feel competent in the exploitation of current resources in solving problems, making improvements and increasing efficiency. Nonetheless they rely heavily on the founder when it comes to explorative decisions. Empirical evidence from the cases illustrates this dynamic clearly:

"If it wasn't for my father that made a prompt decision to completely shift the company's activity when the crisis of the EUR exchange rate hit the market, we would have gone bankrupt." (Successor company A).

"Instead of settling debts debts, my father invested in new premises, which boosted activity and ensured greater long-term income" (Successor company B).

These examples highlight the founder's strong entrepreneurial orientation and capacity to take risks when they see an opportunity. This can be attributed to the Albanian founder generation's experience in navigating the uncertainty of the post-communist transition which has fostered a more intuitive approach to opportunity recognition.

In contrast, successors demonstrate a more cautious approach to risk, focusing more on the refinement and optimization of existing operations. These differences among generations suggest an imbalanced form of organizational ambidexterity where founders are keener into undertaking explorative activities while successors predominantly engage in exploitative activities.

According to Hiebl (2015) achieving a balance between exploration and exploitation activities is essential for long-term sustainability of family business. However, the findings indicate that in the Albanian context this balance is not yet fully achieved by the successor generation. Instead, firms so far remain dependent on the founder's innovation-driven decision. This challenge of leadership succession can be gradually overcome as both generations engage in company management, with the incumbent passing tacit knowledge and know-how to their successors.

5. Conclusions

This study examined leadership succession in Albanian family firms, focusing on intergenerational differences and their implications for innovation as a tool to preserve the competitiveness of the company in the market. Drawing on evidence from multiple case studies, the findings reveal a tension between two leadership logics: a founder expert leadership with a paternalistic behavior versus a more inclusive policy with a tendency toward a transformational leadership of the successors. This tension is reflected in the management strategy both generations display. While incumbents try to guide the successors not only as mentors but also as "risk-avoiders" by limiting their decision-making power, the successors seek more space to make changes especially toward more formalized structures and management policies.

A key contribution of this study lies in its insights into the relationship between succession and approach to risk taking abilities and innovation. The findings suggest that founders remain the primary drivers for explorative activities based on their abilities of opportunity recognition and their entrepreneurial spirit. While successors are primarily engaged in exploitative activities including operational efficiency, gradual improvements mainly focused on formalizing the company structure which certainly is a steppingstone for stable growth of the business. It can be deduced that innovation capability as well as the entrepreneurial spirit is not fully transferred into the next generation.

These findings contribute to the family business literature by extending existing knowledge on succession and innovation to the underexplored context of Albania. They also emphasize the importance of considering succession as a process of transfer of knowledge, of building risk-taking capabilities and entrepreneurial skills in next generation, rather than a mere change of leadership position.

From a practical perspective, this study suggests that both generations should find common ground to make needed changes toward a more professionalized structure of family business while the second generation is still receiving tacit knowledge from

incumbents and building its entrepreneurial abilities. Despite its contributions, this study is subject to limitations, including the small number of cases and the focus on successors' perspectives. Future research could expand the sample, including both generations and explore longitudinal dynamics of succession and innovation over time.

Section headings should be left justified, with the first letter capitalized and numbered consecutively, starting with the Introduction. Sub-section headings should be in capital and lower-case italic letters, numbered 1.1., 1.2., etc., and left justified, with second and subsequent lines indented. You may need to insert a page break to keep a heading with its text.

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GROFELNIK, H. / *From Natural Resource to Entrepreneurial Value: Entrepreneurship in the Service of Sustainable Tourism on Croatian Islands*

From Natural Resource to Entrepreneurial Value - Entrepreneurship in the Service of Sustainable Tourism on Croatian Islands

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Abstract

This paper examines how natural resources, local entrepreneurship, and sustainable tourism are interconnected and offers insights into developing opportunities to create new economic value in tourism, using the case study of small-scale island communities.

The Croatian islands demonstrate how natural resources can support sustainable businesses and quality tourism. Through case studies of the Cres and Lošinj islands, the paper shows how family businesses use local resources and traditional skills to create products and services such as local foods, wellness experiences, agritourism, natural cosmetics, and ecotourism experiences. These activities generate income, protect the environment, preserve culture, and help local communities.

The analysis finds that natural resources can inspire new business ideas when combined with sustainable business models and tourism. Small family businesses play a key role by offering authentic experiences, supporting ESG (environmental, social, and governance) values, and encouraging responsible resource use. The paper also notes that being remote or isolated is not always a disadvantage for small islands. These qualities can help create a unique identity and make the destination more attractive.

Examples from Cres and Lošinj show that local entrepreneurship and tourism can develop by focusing on quality rather than simply increasing visitor numbers. By linking natural resources, environmental care, local businesses, and new tourism ideas, small islands offer a model for other Mediterranean regions seeking sustainable growth and long-term protection of their natural resources and identity.

Keywords: Tourism, Natural Resources, Entrepreneurship, Sustainability, Islands

JEL Classification: L83, L26, Q01, R12, R11

1. Introduction

1.1. Connecting Tourism Entrepreneurship and Natural Resources

Tourism entrepreneurship is an important means of turning natural resources into long-term economic opportunities, especially in remote, resource-rich places like the Mediterranean small islands. It is important to see how natural assets can be developed into new tourism products and services, especially on small islands where growth needs to be balanced with environmental protection. The Croatian islands, especially Cres and Lošinj (Northern Adriatic), are good examples of how local resources can support businesses that help the small-scale local economy and promote sustainable tourism.

As a first step in analysing the state of the field, a preliminary literature review has been conducted. By reviewing papers indexed in the Scopus database using the keywords *Tourism*, *Natural Resource*, and *Entrepreneurship*, a total of 129 publications were identified. An examination of their titles and abstracts revealed that most international studies focus on the relationship between entrepreneurship and sustainable tourism from the perspectives of human resources and cultural heritage, particularly in the context of the development of the hospitality industry (e.g., Kisroh et al., 2020; Ramaano, 2022; Munjal, 2023). Given this identified research gap, this study focuses on the potential of valorising natural resources through tourism entrepreneurship on small Mediterranean islands. The selected case study, Cres and Lošinj islands, provides insights applicable to the development of similar rural and remote areas characterised by well-preserved natural heritage. As noted by Efthimiou (2025), tourism entrepreneurship is a key opportunity for economic revitalisation, leveraging local natural and cultural resources to establish businesses that attract visitors, create jobs, and contribute to the conservation of regional heritage. In the valorisation of natural heritage, it is also important to develop smaller tourism niches such as ecotourism, agritourism, and educational tourism. For example, Beeton (2002) highlights educational opportunities for tourists through organised field trips and guided tours originally developed for nature lovers, farmers, scientists, and school groups coming from urban areas. At the same time, reliance on natural resources requires prioritising sustainability over growth (Lundberg et al., 2014). This approach represents an effective development model for rural communities, particularly on islands, where sustainable tourism can be directed towards specific forms of tourism, smaller visitor groups, and the activation of natural resources and inland island areas beyond the coastal zone, both during the peak season and in the off-season.

The Croatian islands are attractive to tourists who value both nature and cultural heritage. Today, there is a greater emphasis on sustainability in tourism, and natural resources are essential to it. The Mediterranean islands' landscapes, unique plants,

clean seas, fresh air, forests, and coastline provide resources that can be developed into business opportunities through crafts, ecotourism, agritourism, wellness, and outdoor activities.

On Cres and Lošinj, using natural resources for business offers opportunities to create new local products and tourism experiences that protect the environment and benefit local communities. Both small family farms and tourism businesses use local resources and traditional skills to produce quality cosmetics, food, and wellness products. This supports the local economy, upholds ESG (environmental, social, and governance) values, encourages responsible resource use, and helps island communities stay competitive in the global tourism market. Cres and Lošinj have diverse ecosystems, including karst landscapes, Mediterranean plants and animals, and very clean seas. These features attract tourists, but they also need careful management to protect these valuable natural areas. Turning natural resources into tourism products must be done responsibly to prevent environmental degradation.

The specific geographical features, climate, and cultural-historical heritage have directly influenced the economic development of the Croatian islands. Primary industries, such as agriculture, fisheries, and maritime affairs, historically formed the backbone of the island economy. In recent times, a structural change has occurred, with tourism taking on a dominant role. Nevertheless, the key competitive advantages of the islands remain an ecologically preserved environment and authentic local communities. The integration of high-quality agricultural products and the traditional lifestyle into the tourism sector represents significant potential for further development (Đogić & Cerjak, 2015).

As early as 2001, Vlahović, in his work "Conceptual Framework for the Development of Island Tourism Policy," stated that Croatian islands are economically oriented towards activities most closely related to their immediate natural environment. Also, Vlahović (2001) further states that the affirmation of the Croatian archipelago in tourism development is related to the revival of local initiatives and the development of specific island entrepreneurship, where the wealth of nature is one of the most valuable spatial reserves for the development of the highest quality forms of tourism on the islands.

Vidučuć (2007) states that the development of tourism on the islands must be based on local initiative and specific island entrepreneurship, and on determining the island's reception capacity, which is crucial for its sustainable future.

The resource base of the islands, on the one hand, makes them rich and preserved areas, but on the other hand, it makes them remote and sensitive, for example, in terms of water supply, which is crucial for the development of tourism. The main characteristics of the island's water supply system are seasonal pressure during the

summer tourist peak, a simultaneous increase in the number of weekenders on the islands, rising temperatures, and increasingly frequent summer dry periods (Grofelnik & Maradin, 2023). So, careful water management on small islands is crucial for their sustainable and balanced valorisation in tourism.

Since the 1990s, Croatian tourism has undergone significant globalisation and transition processes, leading to changes in the ownership structure of tourist facilities and the growth of private accommodation (Vukonić, 2005). After the interruption of tourism development caused by war events in the early 1990s, Croatian tourism was directed towards structural and spatial diversification of the offer, including island destinations that sought to reduce dependence on the “sun and sea” model (Šulc, 2014). At the same time, Croatian islands have become heavily dependent on tourism, while traditional economic activities such as agriculture, shipbuilding and fishing have weakened. Additional development challenges are present even today due to infrastructure deficiencies, depopulation, and unfavourable demographic trends (Podgorelec & Klempić-Bogadi, 2013).

Contemporary processes of tourism development on the Croatian islands increasingly show a change in the concept from mass to sustainable tourism, which is the only one that enables the survival of small local island communities (Mackelworth & Carić, 2010; Gamberožić & Tonković, 2015; Grofelnik, 2019).

2. Theoretical Overview of the Topic with Evaluation Concepts

Natural resources are not only the foundation of tourism attractiveness but also represent important opportunities for local entrepreneurship. Sustainable valorisation of natural resources in tourism entails recognising and utilising their economic, ecological, and social value in ways that contribute to long-term development. Depending on the characteristics of the resource and how it is incorporated into tourism activities, entrepreneurial initiatives can be classified by several criteria.

2.1. Entrepreneurial Initiatives - According to the Type of Natural Resource

One of the most common approaches is to classify entrepreneurial activities by the type of natural resource they rely on. Biological Mediterranean resources include medicinal and aromatic plants, olives, carobs, citrus fruits, traditional livestock such as sheep, goats, and donkeys, and wildlife species such as birds and dolphins. These resources provide the basis for producing food products, cosmetics, and health-related goods, while also creating opportunities for ecotourism activities such as wildlife observation and nature interpretation.

Landscape resources encompass forests, Mediterranean shrub vegetation, karst landforms, rocky terrains, and coastal and marine environments. Their attractiveness

supports a wide range of tourism activities, particularly hiking, cycling, snorkelling, diving, and other forms of outdoor and adventure tourism.

Climate resources are equally important. Favourable weather conditions, clean air, specific insular characteristics, and winds suitable for recreational activities create opportunities for health, wellness, recreational, and nautical tourism, while also enabling outdoor activities throughout much of the year.

2.2. Entrepreneurial Initiatives - According to the Type of Natural Resource

Natural resources can also be classified by how they are incorporated into tourism products and experiences. Productive valorisation refers to activities focused on producing local goods, such as olive oil, cheese, honey, or traditional handicrafts, often carried out on family farms and by small local producers.

Experiential valorisation focuses on visitor participation and engagement through activities such as tastings, agricultural work, and educational workshops. Recreational valorisation is associated with active tourism and outdoor activities. Also, educational valorisation involves guided tours, interpretation centres, environmental education programmes, and other forms of knowledge transfer related to local natural heritage.

2.3. Entrepreneurial Initiatives - According to the Type of Natural Resource

Entrepreneurial initiatives can also be distinguished by the degree of innovation involved. Traditional activities primarily rely on established practices such as olive harvesting, sheep farming, and cheese production. In many destinations, these activities have been modernised and adapted to tourism through organised tastings, workshops, and interpretive experiences that increase their market potential.

At the highest level of innovation are activities that combine natural resources with contemporary tourism trends and technologies. Examples include birdwatching and dolphin-watching programmes, digital interpretation tools, wellness products based on local natural resources, and various forms of eco-tourism that integrate education, conservation, and visitor experiences, including virtual reality gadgets.

3. Case Study - Valorisation of Natural Resources on Cres and Lošinj Islands

3.1. Examples of the valorisation of natural resources in tourism on the islands of Cres and Lošinj

The islands of Cres and Lošinj provide valuable examples of how natural resources can be transformed into sustainable tourism products and entrepreneurial initiatives. Their preserved environment, rich biodiversity, and strong local traditions have

enabled the development of a variety of initiatives that combine economic activities with the protection and promotion of local heritage.

Organic agriculture represents one of the most important resources on Cres. Relatively low levels of environmental pollution and favourable natural conditions support the production of high-quality olive oil, cheese, honey, and other local products. These products increasingly form part of the tourism offer through authentic gastronomic experiences that connect visitors with local producers and traditional production methods.

A good example of connecting local production and tourism is the “Creska butega” initiative, a seasonal market that brings together island producers and visitors. In addition to selling local products, various events and presentations promote the island’s identity and increase recognition of local products, which, in turn, provides support to small entrepreneurs.

Traditional activities such as sheep farming and olive growing have successfully adapted to modern tourism trends. Cres lamb is today one of the island’s most famous products, while olive oil producers are increasingly complementing their offer with tastings, guided tours and educational content. Similarly, the wealth of aromatic and medicinal herbs has encouraged the development of products such as essential oils and natural cosmetics, linking the preservation of biodiversity and the growing demand for wellness content.

Beekeeping is another resource with great development potential. Although its potential has not yet been fully exploited. Additional opportunities arise from processing local agricultural products, such as cheeses, cured meats, and fruit and vegetable products, thereby further strengthening the island’s gastronomic identity.

In such an environment, agritourism is emerging as one of the most comprehensive forms of valorisation of natural resources. By connecting agricultural production, local tradition, gastronomy and tourist experiences, additional value is created for producers and visitors. Examples such as the Ernest Lužina Family Farm, the Cres Agricultural Cooperative, the Novak Family Farm and the Maestral Oil Mill show how production activities can be successfully complemented by tourist content. The Fragrant Island Garden (Lošinj) stands out in particular, combining botanical collections, educational programs, gastronomy and the development of local products into a unique tourist attraction.

Ecotourism also plays an important role in the tourism offer, especially in areas covered by the Natura 2000 network and other protected areas. Among the most famous examples is the Blue World Institute (Lošinj), which promotes and protects dolphins and the marine environment through research, education, and tourism programs.

Active tourism has also developed significantly in recent years. Bicycle paths developed through the Cres Bike and Lošinj Bike projects, as well as opportunities for kayaking, diving and hiking, attract an increasing number of visitors interested in spending time in nature. The offer is further enriched by facilities such as the Griffon Vulture Visitor Centre in Beli (Cres), which successfully combines education, nature protection and recreation.

3.2. Development Opportunities of the valorisation of natural resources in tourism on the islands of Cres and Lošinj

Future entrepreneurial opportunities on Cres and Lošinj are closely linked to the continued sustainable use of local natural resources. Additional value can be generated through organic production, product processing, direct marketing, and tourism experiences such as tastings, workshops, and thematic routes.

Natural heritage and biodiversity also provide a strong foundation for future development. Protected areas, Natura 2000 sites, and flagship species such as griffon vultures and dolphins offer a wide variety of opportunities to expand ecotourism through wildlife observation, interpretation programmes, and conservation and scientific research activities.

At the same time, favourable climatic conditions and diverse landscapes create opportunities for the further development of health, wellness, and active tourism. Cycling, hiking, kayaking, snorkelling, fishing, and wellness programmes based on local natural resources, particularly aromatic plants, can help extend the tourism season and attract new market segments.

The analysis of development opportunities shows that entrepreneurial initiatives based on the natural resources and traditional heritage of Cres and Lošinj can be grouped into several areas: agro-gastronomic resources; natural heritage and ecotourism; scientific and educational tourism; health, wellness, and active tourism. Such a structure reflects the main comparative advantages of these islands and enables the development of sustainable tourism products with high added value throughout the whole year.

3.2.1. Agro-gastronomic resources

Agricultural resources provide numerous opportunities to develop the tourist offer. Tastings of local products, presentations of traditional production methods, workshops on the collection and processing of medicinal herbs, visits to farms, and thematic trails dedicated to olive growing, sheep farming, or island gastronomy are just some examples of their tourist valorisation. In this way, local products gain a new

dimension and, in addition to their economic function, become an important part of the destination's authentic experience.

3.2.2. Natural heritage and ecotourism

The high level of preservation of natural ecosystems and great biodiversity represent one of the most valuable development resources of Cres and Lošinj. These resources can be used to develop various forms of ecotourism, including bird and dolphin-watching, interpretive walks, and educational programs aimed at understanding natural heritage. Additional potential is offered by programs that connect tourism with scientific research and nature conservation volunteering, making visitors active participants in protecting the area.

3.2.3. Health, wellness, and active tourism

Favourable climatic conditions, a preserved environment, and diverse natural landscapes provide a quality basis for the development of health, wellness, and active tourism. The advantage of these forms of tourism is that they can take place outside the peak summer season, thereby extending the tourist year and enabling a more even use of resources. Additional opportunities are provided by digital innovations, such as the use of augmented and virtual reality in heritage interpretation, the development of common labels for authenticity and sustainability, and stronger networking among local producers, tourism companies, and institutions. Such an integrated approach enables the creation of a recognisable and competitive destination that simultaneously preserves natural resources and strengthens the resilience of the local economy.

4. Conclusion

The analysis of Cres and Lošinj shows that natural resources can be a powerful driver of local entrepreneurship and the foundation for the development of sustainable tourism. Preserved landscapes, rich biodiversity, climatic advantages, and traditional economic activities such as sheep farming, olive growing, beekeeping, and aromatic herb cultivation create a resource base on which numerous entrepreneurial initiatives are developed. Their value does not stem solely from the production itself, but from the ability to integrate local products, knowledge, and natural heritage into comprehensive tourist experiences and higher-added-value products.

Examples of agritourism, the production of indigenous food products, the interpretation of natural heritage, ecotourism programs, and health and wellness facilities show how entrepreneurship can successfully transform natural resources into economic value while contributing to their conservation. A special role in this is played

by local entrepreneurs and family farms that, through innovative business models, connect traditional activities with new forms of tourist demand. Such an approach creates additional sources of income, strengthens the resilience of the local economy, and helps preserve the identity of island communities.

Cres and Lošinj show that their island position and distance from larger markets do not have to be a limitation on development. On the contrary, their isolation, preserved environment, and the authenticity of the local community are among the most important features that give these islands a recognisable identity and a competitive advantage. Thanks to their natural peculiarities and preserved heritage, they are developing as destinations based on quality, sustainability and a unique experience of space.

Future development should therefore not focus on increasing the number of visitors but on creating greater value through specialised tourism products and services. Ecotourism, health and wellness tourism, local gastronomy, active holidays, and various forms of experiential, educational, and scientific tourism have particular potential in this regard. Such facilities extend the tourist season, attract market niches, and strengthen the local economy with less pressure on space and resources.

The sustainability of such a development model largely depends on the successful coordination of economic activities with the need to preserve natural values. The greatest development strength of Cres and Lošinj lies precisely in the integration of natural resources, local entrepreneurship, and sustainable development principles. Their example shows that natural resources, if managed responsibly and with a long-term perspective, can be simultaneously a subject of protection, the basis for entrepreneurial initiatives and an important driver of local development. Therefore, the models of natural resources valorisation presented in this paper can serve as valuable examples not only for other Croatian islands but also for other Mediterranean destinations seeking to develop authentic, sustainable small-scale tourism.

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External Drivers and the Design of Business Model Innovation in Fragile Digital Economies: Evidence from Iraqi E-Commerce

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Abstract

Business Model Innovation (BMI) is widely acknowledged as a strategic reaction to technological, market, and regulatory changes; yet existing research remains largely focused on institutionally stable and digitally advanced economies. This study examines how external factors influence the early-stage design phase of BMI in Iraq's fragile digital economy, characterized by infrastructure difficulties, regulatory uncertainty, and market instability alongside swift digital transformation. The study employed an exploratory qualitative design, utilizing semi-structured interviews with top executives from Iraqi e-commerce platforms, digital payment providers, and online retailers. Research indicates that technological advancement, market changes, and evolving regulatory frameworks function as paradoxical and interrelated factors that simultaneously facilitate and limit the redesign of business models. In this perspective, BMI appears as a primarily reactive and adaptive process, characterized by ongoing adjustments and workaround strategies rather than intentional strategic planning. This research enhances BMI theory by emphasizing the often-overlooked design phase in unstable digital contexts, redefining external factors as context-specific and interdependent constraints, and providing empirically supported insights for entrepreneurs and policymakers managing innovation amidst institutional volatility.

Keywords: Business Model Innovation; External Drivers; E-commerce; Developing and Post-Conflict Economies, Iraq.

JEL Classification: O31, L26, M15

1. INTRODUCTION

BMI is growing as a vital strategic tool for companies navigating settings influenced by swift technological advancement and evolving consumer demands (Teece, 2007; Clauss, 2017). In e-commerce, BMI gains increased significance as the digital transformation rapidly reshapes value generation, customer engagement, and competitive dynamics (Wirtz et al., 2016; Vaska et al., 2021). However, a significant portion of the current BMI literature has originated from stable, institutionally developed countries where enterprises advantageously operate inside dependable digital infrastructures, unified regulatory systems, and consistent market changes (Ramdani et al., 2019; Ancillai et al., 2023). Consequently, existing frameworks inadequately account for the conditions of institutional fragility, resource scarcity, and uncertainty that characterize post-conflict markets.

Iraq constitutes a unique and relevant context in this respect. Despite recent years showing heightened internet penetration, expanded smartphone accessibility, and incremental adoption of digital payments, the fundamental commercial landscape continues to be characterized by significant infrastructural challenges, poor institutional coordination, and regulatory uncertainty (Fathian et al., 2008; UNDP, 2023). E-commerce companies function in a hybrid environment characterized by the coexistence of formal and informal market participants, uneven logistics networks, and inconsistent compliance procedures.

In these circumstances, businesses are often forced to alter their business models due to external pressures rather than via intentional, long-term strategic planning.

Despite the swift expansion of digital commerce in Iraq, scholarly investigation into the impact of external drivers on BMI in such fragile environments is still insufficient. Current regional studies highlight challenges in digital adoption, entrepreneurial conditions, and institutional barriers (Bashir et al., 2023; Vaska et al., 2021), yet empirical research investigating the combined influence of technological, market, and regulatory drivers on early-stage BMI is markedly limited. The lack of context-specific evidence creates a substantial void in BMI research, especially in economies where institutional instability and infrastructural constraints profoundly alter the innovation process. Furthermore, a significant portion of the current BMI research identifies external drivers mostly as opportunity-enhancing factors, an assumption that insufficiently addresses scenarios where these same drivers may concurrently impede innovation.

This study conceptualizes the design stage of business model innovation (BMI) as an early, exploratory phase characterized by the initial reconfiguration of value creation, value delivery, and value capture mechanisms in response to perceived environmental forces, prior to formal adoption or large-scale organizational

restructuring (Clauss, 2017; Foss & Saebi, 2017; Ramdani et al., 2019). In contrast to subsequent stages of implementation or optimization, the design stage emphasizes managerial sensemaking, experimentation, and provisional solution development under conditions of uncertainty (Mihalache & Volberda, 2021; Funke et al., 2023; Hock-Doeppen et al., 2025).

The investigation is directed by the subsequent research question:

How do technological, market, and regulatory drivers shape the design stage of BMI in Iraq's e-commerce sector?

This paper aims to achieve three objectives to address the question.

(1) To determine the perceptions and prioritization of key external drivers by Iraqi e-commerce firms impacting their business models.

(2) To investigate the influence of these drivers on the adaptation, redesign, or emergence of new components within business models.

(3) To provide context-specific insights that enhance BMI theory in fragile and institutionally constrained digital markets.

The paper employs an exploratory and empirically based approach to investigate how external technological, market, and regulatory drivers influence and affect the design phase of BMI in Iraq's e-commerce sector. The study concentrates on early-stage adaptation decisions guided by qualitative inputs from senior industry executives, thereby refining the analytical focus to activities frequently overlooked in prevailing BMI frameworks. This applied focus enables the paper to provide context-specific insights into innovation amid institutional instability.

This study enhances the literature on business model innovation in three distinct ways. Initially, it reconceptualizes the BMI design phase as an adaptive and constraint-oriented process inside fragile digital economies. Secondly, it empirically illustrates how technological, market, and regulatory drives function as paradoxical and interrelated forces. Third, it enhances BMI theory with context-specific evidence derived from a post-conflict e-commerce environment.

2. LITERATURE REVIEW

2.1. Business Model Innovation in E-Commerce

BMI is commonly viewed as a strategic reaction to environmental volatility, allowing organizations to reorganize their value framework in their search for sustained competitiveness. BMI refers to purposeful changes in how firms create, deliver, and capture value in response to environmental shifts (Teece, 2007; Clauss, 2017). In e-commerce, BMI is particularly prominent due to the ongoing reconfiguration of value

production and value capture processes influenced by digital transformation (Wirtz et al., 2016; Vaska et al., 2021).

Literature increasingly acknowledges that BMI is not simply a series of structural modifications but a complicated, iterative process that encompasses organizational learning, resource orchestration, and experimentation. Recent studies define BMI as an iterative and adaptable process influenced by managerial interpretation of external variables, rather than as a singular structural modification (Zott & Amit, 2017; Bouncken et al., 2021).

Research based on developed economies typically emphasizes intentional restructuring supported by robust institutional frameworks, sophisticated logistical networks, and dependable digital ecosystems (Foss & Saebi, 2017; Zhou & Lee, 2023). In these circumstances, BMI frequently appears as a proactive and opportunity-orientated initiative.

This prevailing body of research implicitly implies that businesses have the necessary institutional backing, infrastructural dependability, and strategic autonomy to undertake purposeful and proactive BMI.

This assumption constrains the relevance of current BMI frameworks to fragile and developing economies. In environments controlled by institutional factors, businesses often lack the regulatory clarity, infrastructural reliability, and strategic autonomy assumed by existing frameworks. Empirical research from emerging and post-conflict economies suggests that BMI frequently arises as a necessity-driven reaction to enduring external limitations rather than a purposeful strategic decision (Fathian et al., 2008; Mihalache & Volberda, 2021).

The Iraqi e-commerce sector illustrates this discrepancy. Notwithstanding the rise in digital engagement, the ecosystem is still defined by hybrid formal-informal frameworks, inconsistent payment systems, and disparate logistics capabilities (UNDP, 2023). According to Funke et al. (2023) and Sewpersadh (2023), inadequate infrastructure and regulatory inconsistency significantly constrain the potential for proactive BMI in these contexts. BMI in fragile digital economies should be perceived as a process of ongoing adaptation rather than intentional strategic redesign, emphasizing the necessity for context-sensitive theorization.

2.2. External Drivers of Business Model Innovation

Research frequently emphasizes that external drivers, including technological advancements, market changes, and regulatory changes, significantly influence BMI. A growing body of literature recognizes these drivers as significant influences on BMI across several industries (Funke et al., 2023; Hock-Doepgen et al., 2025). Yet, the impact of these elements is not necessarily direct and may yield both

facilitative and restrictive outcomes. Notwithstanding this recognition, a significant portion of the current literature regards external drivers as predominantly exogenous factors that universally promote innovation. Current BMI frameworks typically view external drivers as opportunities to improve mechanisms, frequently neglecting the impact of institutional fragility on their consequences and the limitations it imposes on enterprises' strategic actions. This gap is especially pronounced in research concerning digital innovation in developing and post-conflict countries.

2.2.1 Technological advancement driver

Digital transformation is often regarded as a driver of BMI, facilitating novel customer engagement methods, data-driven decision-making, and scalable operational systems. Technological advancement is acknowledged as a catalyst for BMI by facilitating novel customer interactions, enhancing operational efficiency, and optimizing value capture (Sewpersadh, 2023; Teoh et al., 2023).

This enabling perspective assumes the existence of solid digital infrastructure and institutional support, factors often lacking in fragile economies. Research from developing contexts indicates that technological opportunities exist with infrastructural inadequacies, disparate digital competencies, and system unreliability (Fathian et al., 2008; Bashir et al., 2020). In developing and post-conflict contexts such as Iraq, technological advancements act as a paradoxical catalyst, promoting innovation while simultaneously revealing and intensifying the infrastructural and security limitations that hinder the complete realization of digital transformation (Bashir et al., 2020).

Consequently, technological advancement serves as a paradoxical driver, fostering innovation while imposing new limits that influence BMI through a business's capacity to address infrastructural deficiencies rather than only through transformative potential.

2.2.2 Market changes drivers

Market changes, encompassing evolving consumer expectations, heightened competition, and macroeconomic instability, represent a significant influence on BMI (Palmié et al., 2022; Bashir et al., 2023).

In competitive e-commerce landscapes, businesses must distinguish themselves by service personalization, rapid delivery, and payment facilitation.

In stable markets, businesses frequently address these constraints via organized innovation portfolios and strategic business model modifications.

Nonetheless, firms functioning in fragile and institutionally deficient contexts often resort to reactive adaptation, addressing inflation, currency volatility, and variable demand through short-term adjustments to their business models. Empirical evidence from Iraq demonstrates that informal competition and swiftly changing customer behavior force businesses to focus on operational survival rather than strategic reconfiguration (UNDP, 2023; Kapita, 2024). These conditions dispute the notion that BMI is primarily proactive, instead framing it as an aspect of adaptive resilience against market volatility.

2.2.3 Regulatory Influences

Regulatory frameworks impose complex and frequently conflicting influences on BMI. Regulatory frameworks significantly influence the viability, direction, and effectiveness of BMI (Minatogawa et al., 2018; Kemppainen et al., 2022). Coherent regulatory frameworks may promote digital scaling and innovation, but fragmented and ambiguous regulatory regimes create compliance uncertainty and operational risk, hindering long-term investment (Stojčić et al., 2025). In Iraq, irregular enforcement, ambiguous licensing criteria, and unpredictable customs processes necessitate that companies establish internal workaround strategies (UNDP, 2023). Research by Paun et al. (2024) and Rodrigues & de Noronha (2023) claims that regulatory uncertainty poses significant challenges for businesses in emerging economies, as the lack of stable legal frameworks complicates the adaptation of business models.

Consequently, regulatory influences in fragile economies not only temper innovation but also fundamentally shape the design, limitations, and implementation of business models. The literature collectively indicates that technological, market, and regulatory factors function interdependently.

Current research indicates that external factors interact in complicated and context-specific manners, especially in settings marked by institutional instability. Ammirato et al. (2022) emphasize that these external forces frequently function concurrently, generating synergies or conflicts that influence the BMI process in styles not entirely comprehended by traditional stable-economy models. Nevertheless, existing BMI theories, primarily formulated in stable economies, offer insufficient understanding of how firms construct and modify business models in such contexts. The initial design phase of BMI is significantly underexamined in the precarious digital economy, where innovation is often reactive, improvisational, and influenced by workaround methodologies. This gap leads the current study to investigate the impact of external drivers on business model design decisions in Iraq's e-commerce sector.

3. METHODOLOGY

3.1. Research Design and Context

This study used an exploratory qualitative research approach to investigate how technological advancement, market changes, and regulatory changes shape BMI in Iraq's rapidly changing yet institutionally weak e-commerce sector. Qualitative inquiry is suitable due to the scarcity of empirical research in post-conflict digital economies and the necessity to produce contextually grounded explanations instead of statistical generalizations (Bashir et al., 2022; Funke et al., 2023). The objective is to clarify how managers perceive environmental pressures and convert them into modifications of business models amidst infrastructural fragmentation and regulatory uncertainty.

An exploratory qualitative design is especially suitable in under-theorized environments where current theoretical frameworks may inadequately represent localized innovation processes. This approach facilitates the identification of context-specific mechanisms by which external drivers affect business model design, rather than testing established hypotheses.

Iraq offers a significant empirical framework for this study. A variety of data sources were analyzed to develop an accurate comprehension of the sector and guide sampling choices. For instance, Aftership.com (2025) analytics project that approximately 729 online merchants functioned throughout various categories, including fashion, electronics, and home goods in 2025, whereas Go-Globe (2025) indicates around 1,274 platform-based e-commerce enterprises utilizing systems like Shopify, WooCommerce, and custom-built carts. These figures, though approximate, demonstrate the extent and diversification of Iraq's digital economy and underline the merging of formal and informal e-commerce activity. Moreover, information from industry reports reveals that by mid-2025, approximately 500 enterprises had implemented official digital payment systems, while the bulk persisted in relying primarily on cash-on-delivery.

This contextual review underscores the appropriateness of qualitative research for documenting immediate strategic responses in settings marked by institutional fragmentation and varying levels of digital maturity.

3.2. Sampling and Participants

Purposive sampling was utilized to identify information-rich cases that could explain the impact of external drivers on business model adaptation in Iraq's digital economy. In accordance with qualitative methodological principles prioritizing depth over representativeness (Guest & Johnson, 2006; Stratton, 2024), participants were

selected for their direct engagement in strategic or operational decision-making concerning e-commerce value creation and digital service delivery.

This sampling technique guaranteed that participants had both strategic insight and practical experience on the impact of technological, market, and regulatory drivers on business model design decisions.

The final sample included six senior executives from critical sectors of the Iraqi e-commerce ecosystem, one C2C platform operator, four B2C online retailers, and one representative from both a digital bank and a digital wallet provider. The inclusion of both merchant-facing and financial-infrastructure entities enhanced triangulation by obtaining diverse perspectives on how technological, market, and regulatory changes affect operational decisions, customer engagements, and business model adaptations. The profile of interview participants is summarized in Table 1.

Despite the small sample size, it aligns with qualitative research criteria that prioritize analytical depth and thematic saturation over statistical generalizability.

Table 1. Profile of Interview Participants

Respondent Code	Position/Role	Company Type	Years of Experience
R1	Founder/ General Manager	Online retail	6
R2	Managing Director	online retail and marketplace	5
R3	General Manager	Digital Wallet and E-commerce	13
R4	Deputy CEO	Digital Bank	16
R5	CEO	Online Shopping and Shipping	7
R6	Chief Development Officer	Online retail	15

Interviews continued until thematic saturation was reached, at which point no significant new insights or patterns were identified from further interviews. Due to the uniformity of the participant group regarding strategic responsibility and sectoral significance, saturation was achieved with a small number of information-rich examples, in accordance with qualitative research standards prioritizing analytical rigour over sample size (Guest & Johnson, 2006). Due to the elite characteristics of the respondents and the strategic emphasis of the research question, saturation was attained with a comparatively small yet information-rich sample.

3.3. Data Collection and Analysis

Data were collected via semi-structured interviews, enabling participants to describe their experiences with technological advancements, market changes, and

regulatory changes while affording adequate flexibility to explore emerging themes. Interviews were performed either in person or online, based on participant accessibility, and lasted between 35 and 50 minutes. All interviews were audio-recorded with consent and transcribed accurately to guarantee precision and transparency.

Despite the interview protocol being organized around technological, market, and regulatory themes aligned with the study's conceptual framework, participants often noted intersections among these drivers. This natural convergence provided enhanced understanding of the cumulative and interactive impacts of external drivers on business model adaptation. The semi-structured interview technique was created in accordance with the study's conceptual framework, with inquiries categorized by technological, market, and regulatory influences on BMI.

The methodological flexibility in data collection facilitated the discovery of unanticipated insights, which is especially beneficial in exploratory studies concerning intricate and interconnected external factors. This flexibility enabled participants to articulate and evaluate environmental impacts according to their own perspectives, rather than within established analytical frameworks. The data analysis employed Braun & Clarke (2006) reflexive thematic analysis, facilitating an iterative interaction with the data through ongoing transitions across empirical material, developing themes, and theoretical interpretation.

The procedure entailed (1) familiarization with transcripts, (2) preliminary coding of statements pertaining to perceptions of external drivers, (3) categorizing codes into overarching conceptual patterns, and (4) synthesizing inter-case linkages. NVivo software enabled systematic organizing, coding traceability, and clear audit trails throughout the dataset. Themes were constructed through iterative comparisons of interviews to enhance analytical credibility and interpretive coherence. Flexible engagement with the data facilitated ongoing refinement of codes and themes, hence enhancing the reliability of the analytical process.

To improve analytical rigor, coding selections were consistently evaluated and revised through iterative comparisons across interviews, assuring coherence, transparency, and analytical consistency, ensuring sustained interpretive alignment across the dataset.

This methodological framework corresponds with the exploratory aim of the study to comprehend how firms perceive, interpret, and react to technological advancement, market changes, and regulatory changes influences within contexts of institutional fragility. The qualitative design emphasizes conceptual depth and contextual accuracy, providing empirical insights into the progression of BMI within Iraq's emerging digital economy.

The methodological approach emphasizes credibility, contextual sensitivity, and theoretical relevance, consistent with best practices in qualitative research within innovation and strategy studies.

4. RESULTS AND DISCUSSIONS

The qualitative analysis identified five external themes that influence the creation and adaptation of business models by Iraqi e-commerce businesses. These themes illustrate the significant technological, market, and regulatory influences stated in the interviews, and they closely correspond with existing literature highlighting the impact of environmental changes on driving BMI (Palmié et al., 2022; Funke et al., 2023; Sewpersadh, 2023).

This section incorporates discussion to interpret how each theme adds to the understanding of BMI design in the context of institutional fragility, rather than presenting findings as independent empirical data.

Theme 1: Customer Experience and Digital Transformation

All respondents highlighted rapid digital transformation, specifically enhanced smartphone penetration, greater internet connectivity, and the widespread adoption of digital payments as a significant driver for business model adaptation. A participant elucidated:

“The spread of smartphones... and enhancing the internet connection in Iraq... are the main reasons for increasing the acquisition of customers.” (R4)

Another highlighted shifting payment behavior:

“Customers’ perception... changed to use electronic wallets and banks... number of transactions with e-commerce applications is increasing.” (R3)

These findings align with global BMI literature indicating that digital transformation alters customer experience expectations and compels businesses to reconfigure value delivery (Wirtz et al., 2016; Clauss, 2017). In Iraq's fragile economy, digital transformation is hindered by infrastructural limitations, supporting findings that technological adoption in developing markets is inconsistent and context-dependent (Bashir et al., 2020; Vaska et al., 2021).

The findings suggest that technological advancement serves not only as a catalyst for innovation but also as a selection force that determines the viability of various business model configurations under infrastructural limitations.

These modifications essentially transformed value delivery methods by reconfiguring consumer interaction channels and service accessibility inside the business model.

Theme 2: Data-Driven Decision Making

Participants reported a significant transition towards utilizing consumer data to inform product selections, segmentation, promotions, and service design. This theme was distinctly highlighted in the literature, which observed that firms are progressively depending on digital analytics and performance dashboards to manage uncertainty.

Data-driven decision-making corresponds with emerging BMI scholarship, which argues that data availability allows organizations to refine value propositions and improve customer-centric models (Ammirato et al., 2022; Rodrigues & de Noronha, 2023).

In Iraq, firms utilize analytics not only for strategy enhancement but also to mitigate market volatility, supporting (Funke et al.'s (2023) assertion that environmental instability heightens the necessity for data-driven strategic modification.

This discovery enhances current theory by demonstrating that in vulnerable economies, data analytics play a stabilizing and risk-reducing function rather than only facilitating growth-focused optimization.

From a business model standpoint, data-driven decision-making facilitated the ongoing enhancement of value propositions and targeting tactics amid market unpredictability.

Theme 3: AI, Automation, and Intelligent Systems

Participants highlighted that AI-driven tools, especially automated customer support systems and behavioral analytics, are essential to e-commerce operations. This is evident in the interview data, for instance:

"We deployed AI chatbots... to eliminate waiting lists and reply instantly." (R5)

This theme illustrates the extensive literature on how AI facilitates the rapid redesign of business models through the enhancement of scalable operations, personalization, and efficiency improvements (Paun et al., 2024). For Iraqi businesses, AI serves as a compensatory mechanism, transforming value delivery and operational scalability within the business model by mitigating workforce shortages, minimizing response times, and improving reliability amid infrastructural challenges.

Consequently, AI-driven BMI in Iraq is necessitated by circumstances rather than simply opportunistic, an essential contextual distinction lacking in models formulated within stable digital economies.

This finding substantiates the claim that BMI in unstable environments is frequently motivated by necessity and replacement rather than proactive technological innovation.

This demonstrates how technological factors directly impact business model design by modifying value delivery and cost structures.

Theme 4: Market Changes (Consumer Shifts, Competition, Economic Pressures)

The interviews disclosed significant market pressures, aligning with the theme of market changes. Principal influences comprised:

- Post-COVID-19 customer transition towards integrated digital purchase
- Heightened competition, particularly from informal social media commerce
- Economic volatility, encompassing inflation and fluctuating purchasing power

One respondent explained:

“Since COVID-19... the digital payment increased dramatically... customers want to buy and pay seamlessly.” (R6)

Market driven adaptation, including the provision of BNPL solutions, tailored discounts, or enhanced delivery options, supports the literature indicating that BMI is frequently driven by evolving consumer preferences, competitive pressures, and economic disruptions (Palmié et al., 2022; Sewpersadh, 2023; Rodrigues & de Noronha, 2023).

In Iraq, these forces are compounded by the substantial informal sector, which imposes downward pressure on pricing and service quality (UNDP, 2023).

Thus, BMI transforms into a continual reaction to instability instead of actively influencing markets.

This theme highlights the responsive characteristics of BMI design in unstable marketplaces, questioning the assumption that businesses consistently participate in predictive and proactive BMI.

These adaptations affected value capture mechanisms by requiring frequent adjustments to pricing models, payment options, and service bundling.

Theme 5: Regulatory Changes

Regulatory volatility, recognized as a significant theme, impacts practically all strategic decisions. Examples cited in interviews include irregular customs protocols, ambiguous product licensing, and disjointed enforcement agencies:

“Some customs duties do not accept bank transfers... we created a special policy to mitigate risk.” (R5)

“Some international suppliers claim that items... are not licensed.” (R2)

This corresponds with the BMI research highlighting that legislative changes can both limit and encourage business model adaptation (Minatogawa et al., 2018; Sewpersadh, 2023; Paun et al., 2024).

In Iraq, regulatory inconsistency serves as a structural obstacle, necessitating businesses to innovate via workarounds, internal protocols, and informal mechanisms, behaviors noted in unstable economies but infrequently addressed in conventional BMI theory (Bashir et al., 2020; Funke et al., 2023).

This finding highlights that regulatory drivers in fragile economies shape not only the pace of BMI but also its direction, feasibility, and form.

Regulatory uncertainty limited the design of business models by influencing the feasibility, sequencing, and extent of value creation and delivery operations.

A distinct pattern emerges across these five themes:

- Technological drivers (Themes 1–3) generate opportunities yet are hindered by infrastructural and security constraints.
- Market drivers encourage businesses to swiftly modify price, service delivery, and value propositions.
- Regulatory drivers (Theme 5) generate uncertainty that requires operational innovation and alternative practices.

Collectively, these themes strengthen BMI scholarship by demonstrating that external drivers significantly influence innovation decisions (Palmié et al., 2022; Funke et al., 2023), while also expanding this theory by illustrating how institutionally fragile circumstances intensify the reactive and improvisational characteristics of BMI.

External drivers affect operational decisions and the fundamental logic of value creation, delivery, and capturing across all themes, suggesting that BMI in fragile contexts arises from ongoing environmental negotiation rather than strategically planned actions.

The findings indicate that external drivers function as interrelated and context-sensitive forces, influencing BMI design through ongoing adaptation rather than linear change. This underscores the necessity to perceive business model creation in fragile digital economies as a flexible, iterative process rooted in environmental negotiation.

The findings indicate that in fragile digital economies, BMI design is influenced not by intentional opportunity exploration, but by ongoing adaptation to interrelated external limitations. This expands current BMI theory by reconceptualizing the design phase as a non-linear, adaptive process influenced by institutional fragility instead of strategic planning.

5. CONCLUSION

This study analyzed the impact of technological advancement, market changes, and regulatory changes on BMI in Iraq's developing e-commerce sector. The findings, based on qualitative observations from senior executives, reveal that BMI in unstable digital ecosystems is influenced by a distinct interaction of digital transformation, technological advancement (including AI and automation), data-driven strategies, evolving consumer expectations, market volatility, and regulatory uncertainty. These dynamics function concurrently as facilitators and limitations, necessitating businesses to develop via ongoing adaptation instead of through intentional, long-term strategic planning. These findings enhance BMI theory by demonstrating that in fragile digital economies, business model design is predominantly flexible and affected by constraints rather than driven by opportunities and proactively planned.

The study enhances BMI scholarship by demonstrating that innovation in post-conflict and institutionally fragile environments does not adhere to the linear, opportunity-driven pathways typically proposed by Western-centric models. BMI in Iraq is characterized as adaptive, unpredictable, hybrid, and context-dependent, mirroring the challenges posed by infrastructure constraints and institutional instability. These observations highlight the necessity for context-sensitive theorization that incorporates workaround innovation and environmental volatility when analyzing BMI in developing economies.

The findings emphasize the necessity for e-commerce businesses to implement adaptable and robust business models that can effectively respond to technological advancement, shifting consumer behaviors, and regulatory discrepancies. Investments in digital tools such as artificial intelligence, analytics, and automation may assist businesses in mitigating operational limitations, while the formalization of internal procedures can improve reliability amid institutional uncertainty. The findings indicate an immediate necessity for policymakers to provide legislative clarity, optimize customs processes, and implement comprehensive digital-payment standardization to minimize obstacles and promote a conducive atmosphere for digital innovation.

This study has specific limitations. The qualitative sample comprises only six top executives from Iraq's e-commerce sector, hence limiting the generalizability of the findings. Secondly, the emphasis on administrative viewpoints may inadequately reflect operational-level experiences. Nonetheless, these constraints align with the study's exploratory objective, which emphasizes theoretical understanding and contextual richness rather than statistical representativeness.

Further studies may expand this preliminary study by investigating more sectors of Iraq's digital economy, evaluating innovation methodologies among fragile countries, or integrating longitudinal data to analyze the evolution of business models over time.

Such research would enhance comprehension of BMI within structural constraints and further elucidate theories of innovation in developing and post-conflict contexts.

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The Strategic Corporate Investment Cycle: Evidence from Slovenia

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Abstract

The article examines strategic investments as the key source of value creation for owners and a central driver of corporate growth. Its main objective is to test three hypotheses: that strategic investments are the primary generator of company growth, that they increase company value through profit creation, and that they enhance productivity and overall business performance. The author develops a conceptual framework termed the strategic investment cycle, which links strategic investments, company growth, profit generation, equity growth, and the financing of new investments. Strategic investments stimulate growth through higher net sales revenues and added value. When investment decisions are rational and risks well managed, growth leads to profit, which—if retained—raises equity, firm value, and owners' wealth. Retained earnings thus become an internal source for further strategic investments, closing the cycle. Based on an extensive literature review, the paper explains the individual constructs and their causal relationships. In the empirical section, the hypotheses are tested using statistical methods on primary and secondary data from a representative sample of medium-sized and large Slovenian companies over the period 2000–2017. All hypotheses are fully confirmed. The article concludes that strategic investment decisions have long-term effects on company performance and sustainable growth, with innovation, technological development, and managerial knowledge acting as key enablers of the strategic investment cycle.

Keywords: corporate strategic investments, company growth, innovations, company value, retained earnings

JEL Classification: G31

1. Introduction

In this paper, we examine the impact of strategic investments on company growth, their value, productivity, and business performance, which is also the main objective of our research. The purpose of this article is to present the results of testing three research hypotheses related to the relationships mentioned above. We are particularly interested in strategic investments, as only these create value for the owners. The value of the owners' equity increases if the business generates profit and if this profit is not

distributed in the form of dividends, but instead remains in the company as retained earnings and thus as a component of equity, while also serving as an internal source of financing for new investments. Of course, retained earnings and depreciation, as the highest-quality long-term sources for financing strategic investments, are not sufficient on their own. To finance strategic investments, a company must also seek external (debt) sources of funding.*

Profit in companies can be generated through sound management, on the one hand by increasing net sales revenue (we are concerned only with revenue generated from the company's core business activities, i.e., excluding financial and other income) and, on the other hand, by managing assets efficiently and reducing costs. A company can increase its net sales revenue either by raising prices – provided that its market position allows and permits it to do so (which in most cases it does not, as few companies hold a monopoly or oligopoly position in the market) – or by increasing productivity. Productivity growth can be influenced by employees through greater commitment, diligence, and a responsible attitude toward their work, particularly regarding the quality of products and services (so that there are fewer and fewer complaints from customers). To a large extent, however, productivity can also be improved through the so-called technical equipment of work – namely, the resources and technology employees use to produce goods and deliver services. If companies fail to keep up with the latest technological trends, such as today's digitalization of production and business processes, competitors will quickly overtake them, and the companies will be forced out of the market. The automation and digitalization of processes, along with the increasing integration of information and communication technology into company operations, is a necessary condition – a *conditio sine qua non*.

Such modernization and innovation, however, require certain expenditures – investments. If a company is to grow and develop, whether to maintain its market position or to increase its market share, it must invest continuously. Without investment, there is no growth. Investment in new machinery and equipment, in new production lines, in the development of new products and services, and in the innovation of processes, products, and services is indispensable if the company is to increase its sales volume, its revenues, and its economies of scale. In addition to organic growth, which is ensured by the above-mentioned investments, a company may also grow through acquisitions and mergers with other companies. This article does not address that area.

It is, however, indisputable that innovation also contributes to company growth – investments in the innovation of products and services, in the innovation of production processes, in short, investments in all types of innovations – which we will present in more detail later.

* See more in Bukvič (2024).

The investments outlined above, including those in innovation, are referred to as *strategic investments*. Strategic investments influence the growth of net sales revenue, added value, and thus also the growth of profit, which, according to the principle of *quid pro quo*, increases the value of equity for the owners. In this way, we have closed the loop, which can be presented schematically as a simplified conceptual model in Figure 1.

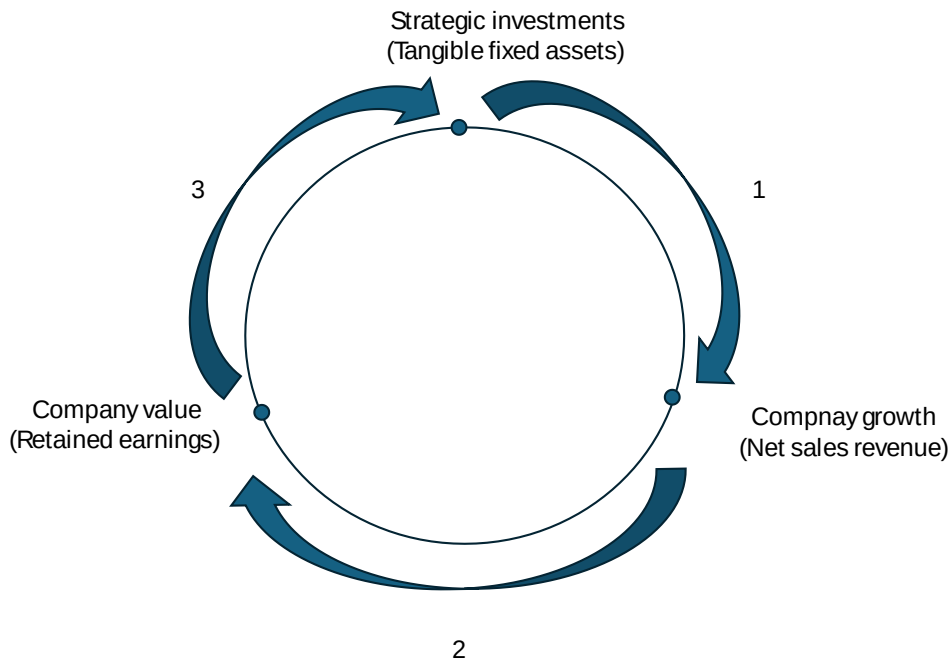


Figure 1: The cycle of strategic investments: strategic investments → company growth → company value (retained earnings) → strategic investments (Source: own work).

The aim of the study is to traverse this cycle. We begin with strategic investments (the starting point), first presenting them in more detail, assessing and measuring their impact on company growth; then examining how, through the growth of operating revenues, they influence company value and thereby the owners' wealth; how they can increase productivity and improve business performance; and, finally, how the profit generated by strategic investments can be used by companies to finance new strategic investments (the end point). In conclusion, we find that the cycle turns continuously—*eppur si muove!* This cycle operates over time with greater or lesser uneven speed and intensity. For this reason, we refer to it as the *cycle of strategic investments*.

Following a brief introductory presentation of the purpose and objectives of this paper, along with the conceptual model, in Section 2 (*Theoretical Foundations*) we provide an overview of current literature sources in the field of strategic investments, growth, value, and profit – essentially following, in a clockwise direction, the cycle

outlined above. We therefore examine in more detail both older and more recent scientific and professional articles in which the authors define strategic investments: what characterizes them, what is included among them, why they are important, and what their purpose is. This constitutes the first specific objective of our research.

In the cycle, company growth is the next area and the second specific research objective. Many researchers, academics, and corporate analysts have been engaged in this topic for years. They compare company growth to the growth of living organisms and attempt to identify the many factors that define or determine it.

With the first arc of the cycle, we connect strategic investments and company growth, and on this basis we formulate our first research hypothesis.

The next area, and the third specific research objective we follow in the cycle, is company value. The first questions that arise are: What is company value? What defines and determines it? Which factors influence its increase? These questions have been addressed by many economists – from the classics and neoclassics to financiers and others. Here, we immediately touch on equity on the liabilities side of the balance sheet and its owners, who pursue a single objective: increasing their wealth. The first to ask what capital actually is was Joan Robinson. She was followed by Ricardo, Marx, and other classical economists, who sought to provide a scientific basis for the concept of capital. This is, in fact, one of the most difficult questions in political economy. In this paper, we do not deal with this complex question; rather, we simply take capital as an accounting category. A very important part of it is profit – retained earnings, that is, the profit generated by the company's operations and kept within the company to finance its further growth. Such has been, and remains, a sovereign decision of the owners, who are aware that by reinvesting profit, they increase their future wealth.

With the second arc in Figure 1, we link company growth to company assets and retained earnings, and on this basis we formulate our second research hypothesis.

Before closing the cycle and returning to the initial area – strategic investments – in the final third of the cycle we pause at profit, as the fourth specific objective of our study. We have, in fact, already discussed it in the context of company value, where we noted that profit is the result of sound asset management and derives from increased net sales revenue (and, of course, from effective cost control), which expresses company growth – growth that is a consequence of strategic investments. In addition to increasing equity and the owners' wealth, profit plays another very important role in the cycle presented. It is precisely because of this role that we have highlighted it, within the context of company value, as a separate area of consideration in our cycle. Retained earnings in the company represent one of the highest-quality sources for financing long-term investments – that is, strategic investments.

With the third arc in Figure 1, we link the company's retained earnings to (new) strategic investments. In this way, we complete the cycle: strategic investments (long-term tangible fixed assets) stimulate company growth – namely, net sales revenue – which, through

increased profit, raises equity, i.e., the owners' wealth; a portion of this equity, referred to as retained earnings, then finances new strategic investments.

In this paper, we also aim to assess the productivity and financial performance of companies in relation to strategic investments, which constitutes the fifth specific objective of our research. We are interested in how strategic investments affect companies' productivity and certain financial performance indicators. On this basis, we formulate our third research hypothesis.

In Section 3 (*Research Methodology*), we first present the three research hypotheses, which we then test in the empirical part. We briefly introduce the research methods and techniques, separately for the theoretical and for the empirical part. We explain in more detail the approach and method of collecting both primary data (a questionnaire survey) and secondary data (the GVIN database). We highlight the limitations of our research, which also indicate directions for further studies in the field of strategic investments.

In the empirical part, in Section 4 (*Research Results*), where we based our study on the examination of the above-described topics using the case of large and medium-sized Slovenian companies in the period 2000–2017, we sequentially test the three research hypotheses and explain the results obtained. These results were derived through statistical data processing using the SPSS 24 software tool. We present the results in both tabular and graphical form.

The *Discussion* Section 5 places the empirical findings within the broader theoretical framework of strategic investment and corporate growth. It examines the role of investments in tangible fixed assets as a mechanism for expanding productive capacity and supporting long-term business development. Particular attention is devoted to the interrelationships between investment activity, sales growth, profitability, company value, capital structure, and financial leverage. The section further considers the implications of strategic investments for productivity and operational efficiency, while critically evaluating the proposed research hypotheses in light of the study's empirical evidence.

In the *Conclusion* of the paper, Section 6, we summarize the main findings of our research, and, above all, we answer the question of whether our research hypotheses can be confirmed. Finally, we emphasize the importance of technological and managerial knowledge as the driving force that continually propels and turns our cycle of strategic investments.

2. Theoretical Foundations

2.1. Definition of Corporate Strategic Investments

Investments are expenditures intended to increase or preserve capital stock and future income (Senjur, 1995). In economic theory, investments are usually divided into business long-term investments, residential investments, and inventory investments. This discussion focuses on corporate long-term investments, especially investments in

equipment, buildings, technology, and other assets that contribute to company development.

Investments play an important developmental role because they increase production capacity and stimulate economic growth (Majerič, 1991 in Kračun, 1991). At the corporate level, investments are closely linked to the desired level of capital stock, profitability expectations, and adjustment to market conditions (Senjur, 1995). Modern investments increasingly include technological transformation through robotics, artificial intelligence, cyber-physical systems, and digitalisation.

From the perspective of value-based management, investments can be divided into strategic and non-strategic investments (Weissenrieder, 1998). Strategic investments create new value and support company growth, while non-strategic investments maintain already-created value. Strategic investments may involve tangible or intangible assets, such as research and development, market expansion, technology acquisition, or innovation.

Achim & Klein (2022) define strategic investments as risky long-term decisions that influence competition and market dynamics. Barbieri et al. (2024/2025) emphasise their high impact on future performance, irreversibility, and significant resource requirements. Typical examples include acquisitions, mergers, new product development, production modernisation, and expansion into new markets (Mintzberg et al., 1976; Butler et al., 1991; Slagmulder et al., 1995).

Strategic investments often involve uncertainty and difficult evaluation processes. Excessive dependence on purely financial evaluation methods may discourage innovation and long-term capability development (Ashford et al., 1988; Cheung, 1993). According to Snyder et al. (2025), strategic investments generally include mergers and acquisition, research and development, ownership stakes and joint ventures. The benefits of strategic investments include diversification, market expansion, and technological progress (Snyder et al., 2025). Diversification reduces dependence on individual customers or markets, while technological investments improve competitiveness and create new revenue streams.

At the same time, strategic investments also involve risks. Financial risks arise because such projects require substantial capital and long implementation periods. Integration risks are especially important in mergers and acquisitions, where organisational cultures, human resources, and information systems must be aligned successfully (Bukvič, 2021).

Spence (1979) explains that strategic investments are often irreversible and strongly influence company positioning regarding market share, production capacity, and costs. They therefore represent a key element of long-term competitive strategy.

2.2. Understanding Business Growth as Their Imperative

Fasnacht (2009) compares business growth to the growth of living organisms. Although business growth cannot be explained solely through biological analogies,

growth remains a fundamental imperative for companies and economies. Economic growth generally refers to the increase in the value of goods and services produced within an economy, while corporate growth is reflected in increasing revenues, assets, and market presence.

Growth is essential for maintaining competitiveness, increasing market share, achieving economies of scale, and satisfying stakeholder expectations (Fasnacht, 2009). Dynamic growth generates cash flows necessary for future investments in innovation, productivity improvements, and expansion. Growing companies are also more attractive to customers, suppliers, investors, and employees.

Modern growth, however, must increasingly be sustainable. According to Fasnacht (2009), sustainable growth is based on differentiation, innovation, product quality, strong brands, customer satisfaction, and efficient management of human resources. Companies must therefore continuously improve products, services, technologies, and processes.

Growth strategies may focus on existing or new products and markets. In highly competitive global markets, companies must outperform competitors by innovating more effectively and managing profitability alongside growth. Revenue growth alone is insufficient; companies must also monitor efficiency and profitability.

2.3. Strategic Investments and Growth

Strategic investments are closely linked to business growth because they enable expansion, innovation, and stronger market positioning. According to Snyder et al. (2025), companies seeking growth opportunities invest in activities that increase revenues, geographic reach, technological capabilities, and customer bases.

Research by Desai et al. (2011) confirms a connection between investment decisions and company growth. Resource-based theory explains that growth differences between companies arise primarily from internal resources and dynamic capabilities (Barney, 1991; Grant, 1991). Companies possessing valuable and difficult-to-imitate resources are more likely to exploit growth opportunities successfully.

Industrial organisation theory offers another perspective, emphasising industry structure and entry barriers (Scherer & Ross, 1990; Caves & Porter, 1977). Industries with higher entry barriers often provide greater opportunities for sustained growth and profitability.

Studies also demonstrate that strategic investments can be particularly beneficial in concentrated or high-technology industries (Chan et al., 1990; Doukas & Switzer, 1992). Companies entering new industries or markets during growth phases may experience strong expansion opportunities because market demand exceeds supply (Spence, 1979).

Overall, strategic investments contribute to growth by enabling companies to improve capabilities, exploit market opportunities, and strengthen competitive advantages.

2.4. Strategic Investments and Maximizing Company Value for Owners through Profit Generation

The primary goal of companies is generally understood as maximizing company value for owners (Jensen & Meckling, 1976). Strategic investments contribute to this objective by improving profitability, strengthening competitive position, and increasing future cash flows.

Research on the relationship between investments and company value has produced mixed findings over time. Some studies found positive effects of investment decisions on company value (Bajo et al., 1998; Santos et al., 1993), while others identified weaker or negative effects (Brio et al., 2003; Lin & Kulatilaka, 2007). More recent research again confirms the importance of investment decisions for value creation (Efni, 2017; Susanti et al., 2019).

Signalling theory explains that investment expenditures send positive signals to investors about future company growth and profitability (Spence, 1973; Modigliani & Miller, 1958). Investments therefore influence investor confidence, shareholder wealth, and market value.

Profitability remains one of the most important indicators of successful investment activity. High profitability demonstrates managerial efficiency and increases investor interest (Amarudin et al., 2019; Yondrichs et al., 2021). Companies with profitable investments generally enjoy stronger liquidity, greater financial stability, and higher market value.

Investment decisions must therefore balance expected returns and risks. Rational strategic investments can increase company value by generating sustainable profits and long-term growth.

2.5. Profitability of Strategic Investments – A Factor in Increasing Company Value and Owners' Wealth

Value-based management theory emphasises that companies should increase shareholder wealth through profitable growth. Strategic investments are essential because they create opportunities for sustainable expansion and above-average returns.

The P/E ratio is frequently used as an indicator of market expectations regarding company profitability and growth potential (Fasnacht, 2009). A high P/E ratio may reflect strong expectations of future growth, innovation, or profitability, although interpretations vary across industries and economic periods.

According to Fasnacht (2009), company growth and profitability depend mainly on four factors: return on invested capital relative to the cost of capital (1), the level of investments (2), the duration of profitable growth (3), and risk management (4).

Profitable strategic investments increase investor confidence and improve the company's ability to attract capital. However, sustaining above-average growth over

long periods is difficult. Christensen and Raynor (2013) argue that companies often fail because they suppress disruptive innovations before they can develop fully.

Risk management is therefore crucial. Companies must manage financial, operational, and strategic risks while simultaneously encouraging innovation and growth (Fasnacht, 2009). Strategic growth may occur through mergers, acquisitions, alliances, joint ventures, or organic expansion.

2.6. Innovation as a Strategic Investment – A Driver of Growth and an Enhancer of Company Value and Shareholder Wealth

Innovation is widely recognised as one of the main drivers of growth and competitiveness. In business practice, innovation usually refers to the development of new products, services, technologies, processes, or business models (Fasnacht, 2009). Innovations represent strategic investments because they require financial resources, organisational adaptation, and long-term planning. Their purpose is to create value for companies, customers, and investors. Innovations improve product quality, operational efficiency, and competitive advantage.

Fasnacht (2009) identifies several dimensions of innovation: expansion of products and services (1), development of new production and distribution methods (2), and organisational and managerial improvements (3).

Innovation benefits multiple stakeholders. Customers receive better products and services, employees gain new opportunities and skills, while companies achieve higher productivity, stronger growth, and increased profitability.

Recent studies continue to emphasise the importance of innovation and diversification. Judijanto et al. (2025) highlight innovation as a tool for resilience during economic downturns, while Zachary et al. (2025) analyse strategic investments in climate technologies and emerging value chains.

Without innovation, companies struggle to differentiate themselves from competitors or maintain sustainable growth. Innovation therefore represents a fundamental strategic investment that enhances company value and shareholder wealth.

2.7. The Impact of Strategic Investments on Productivity and (Non-)Financial Business Performance

Numerous studies confirm that strategic investments positively influence business performance, productivity, sales growth, and employment growth (Hugget & Ospina, 2001; Nilsen et al., 2009; Shima, 2010).

Strategic investments often improve productivity because new capital incorporates modern technologies (Jensen, McGuckin & Stiroh, 2001). However, productivity gains may initially develop slowly because employees require time to adapt to new technologies and processes.

Grazzi, Jacoby & Treibich (2013) found that large investments are generally associated with company growth, improved performance, and increased competitiveness. Nilsen et al. (2009) also identified positive effects of investments on labour productivity, profitability, and sales growth.

Traditional financial indicators alone are increasingly considered insufficient for measuring business success (Johnson & Kaplan, 1987; Kaplan & Norton, 1992). Companies now also monitor non-financial indicators such as innovation, customer satisfaction, service quality, employee productivity, and ESG performance.

Buglea et al. (2025) analyse the relationship between digital transformation and non-financial performance indicators, while Alves & Lourenço (2022) show that companies frequently combine financial and non-financial metrics when evaluating management performance.

Although profitability remains important, growth is often the primary driver of market capitalisation. Companies that successfully combine asset growth with profitability achieve stronger long-term performance. Strategic investments therefore play a critical role in ensuring sustainable growth, innovation, and competitive advantage.

3. Research Methodology

In this chapter, we present the quantitative methodology used, in which the stated hypotheses were tested with the help of the SPSS program. The data was obtained from a questionnaire and the publicly available GVIN database.

3.1. Research Hypotheses and Research Methods

In the study, we formulated, among others, the following research hypotheses:

H1: Strategic investments are the greatest driver of company growth.

H2: By generating profit, strategic investments increase the value of companies.

H3: Strategic investments increase productivity and improve business performance.

In the theoretical part of the study, we used the scientific method of description as well as scientific methods of classification, comparison, analysis, and synthesis.

In the empirical part of the study, we applied statistical methods (descriptive statistics, contingency tables, chi-square test, t-test, and linear regression) and processed the data using the SPSS 24 statistical package.

3.2. Financial Indicators

In our research, we used financial performance indicators derived from accounting data for selected companies in the sample. The financial indicators in our study are:

net sales revenue per employee, value added per employee, EBITDA margin, EBITDA compared to assets, return on equity or ROE, return on assets or ROA, net profit margin, cost-effectiveness (Operating revenue / Operating expenses), and net financial debt compared to EBITDA. With the exception of the last indicator, all the above represent measures of financial performance.

3.3. Data Collection Method

The data was collected at a specific point in time (cross-sectional data). This method is suitable for types of research aimed at finding connections between certain phenomena or factors (Churchill, 1995). Since our objective was to examine the relationship and effects between strategic investments and company growth and company value, and consequently on business performance, in this case it was more appropriate to analyze data referring to the same point in time rather than data collected sequentially over time (longitudinal data). Another important reason for choosing this research method was the fact that it has been used in most studies in the examined field, particularly regarding the impact of the dynamics and scope of strategic investments on productivity and business performance, which allows the results of our study to be, to some extent, comparable with those of others.

We used both primary and secondary data. Primary qualitative data was collected through a questionnaire. A total of 267 questionnaires were correctly completed (23.38% of all respondents). Quantitative data was obtained from the published annual reports of companies in the Slovenian economy, specifically those operating in categories A to J according to the Slovenian Standard Classification of Activities (SKD 2008, V2). Secondary data was obtained from the GVIN database.

The sample included only large and medium-sized Slovenian companies. Large companies are those that meet at least two of the following criteria: the average number of employees in the last financial year exceeds 250, net sales revenue in the last financial year exceeds 40 million €, and the value of assets at the end of the financial year exceeds 20 million €. Medium-sized companies are those that meet at least two of the following criteria: the average number of employees in the last financial year exceeds 50 and does not exceed 250, net sales revenue in the last financial year exceeds 8 million € and does not exceed 40 million €, and the value of assets at the end of the financial year exceeds 4 million € and does not exceed 20 million € (Article 55 of the Companies Act, ZGD-1-NPB14). The representativeness of our sample is demonstrated by the data in Table 1, Table 2, and Table 3, which show the characteristics of the companies in the sample compared to the overall population (the Republic of Slovenia).

Table 1. Size of Sample Companies According to Article 55 of the Companies Act (ZGD-1-NPB14) (source: Investment ability of the companies, questionnaire 2018)

Company size	Sample (Questionnaire)		Republic of Slovenia		Δ
	#	in %	#	in %	
Big	78	29,21	336	29,42	-0,21
Medium	189	70,79	806	70,58	0,21
Total	267	100	1 142	100	0

Table 2. Overview of Companies by Region (source: Investment ability of the companies, questionnaire 2018)

Region	Sample (Questionnaire)		Republic of Slovenia		Δ
	#	in %	#	in %	
Osrednjeslovenska	77	28.84	406	35.54	-6.70
Podravska	27	10.11	133	11.65	-1.54
Savinjska	50	18.73	125	10.95	7.78
Gorenjska	25	9.36	108	9.46	-0.0
Jugovzhodna Slovenija	19	7.12	71	6.22	0.90
Goriška	11	4.12	64	5.60	-1.48
Obalno-kraška	16	5.99	58	5.08	0.91
Pomurska	12	4.49	56	4.90	-0.41
Koroška	9	3.37	38	3.33	0.04
Posavska	10	3.75	36	3.15	0.60
Primorsko-notranjska	5	1.87	29	2.54	-0.67
Zasavska	6	2.25	18	1.58	0.67
Total	267	100	1 142	100	0.00

Table 3. Predominant activity according to the Standard Classification of Activities (SKD 2008, V2) (source: Investment ability of the companies, questionnaire 2018)

Core activity	Sample (Questionnaire)		Republic of Slovenia		Δ
	#	in %	#	in %	
Manufacturing activities	130	48.70	489	42.82	-5.88
Trade, maintenance and repair of motor vehicles	60	22.47	334	29.25	6.78
Transportation and storage	18	6.74	80	7.01	0.27
Construction	14	5.24	63	5.52	0.28
Hospitality	13	4.87	32	2.80	-2.07
Water supply, sewerage, waste management and remediation activities	11	4.12	40	3.50	-0.62
Electricity, gas and steam supply	11	4.12	29	2.54	-1.58
Information and communication activities	7	2.62	48	4.20	1.58
Mining	2	0.75	7	0.61	-0.14
Agriculture and hunting, forestry, fishing	1	0.37	20	1.75	1.38
Total	267	100	1 142	100	0.00

The study focuses on the period from 2010 to 2017, with certain sections covering the extended period from 2000 to 2017 (to compare the growth of tangible fixed assets with selected financial categories). The data were collected on an annual basis for each year within this period.

During the research process, we identified the variables to be measured, established the measurement scale (using a 7-point Likert scale), developed a questionnaire, and tested it for both reliability and content validity.

3.4. Limitations

It is important to acknowledge the limitations encountered in this study, primarily relating to the empirical component. The first limitation concerns the sample size, as the research was conducted exclusively on Slovenian companies. An international study would have included a larger number of larger companies, where the impact of strategic investments is typically more pronounced.

Relevant literature informed our assumption regarding the direction of causality in our conceptual model (the effect of strategic investments on company growth, value,

and business performance). As the study relied on cross-sectional data, direct causality cannot be established. Determining the direction of causality would require a longitudinal study, which presents a potential avenue for future research.

The second limitation pertains to the size of the companies studied, which are relatively small compared to international competitors. Consequently, the average size of their strategic investments is smaller than that of foreign companies. This limitation is particularly evident for medium-sized companies, which were also included in our sample.

The third limitation, specific to this paper and largely due to space constraints, is the exclusion of non-financial indicators of business performance in relation to strategic investments.[†]

The fourth limitation relates to potential subjectivity, as typically only one individual completed the questionnaire (usually the CFO, and in some cases the company director or another senior management member).

4. Research Results

In the following, we present and summarize the results of the study.

4.1. Testing Research Hypothesis H1 on the Impact of Increased Strategic Investments on Company Growth

We first test the research hypothesis that an increase in strategic investments affects company growth. Strategic investments are defined as investments in tangible fixed assets, while company growth is measured by the growth in net sales revenue. For this analysis, we consider a longer time series for the companies in our sample, specifically the period from 2000 to 2017.

To this end, it is first necessary to prepare the relevant data. We rely on the AJPE database based on the chart of accounts. For tangible fixed assets (OOS), we use annual data from account 0010102, and for net sales revenue (ČPP), we use annual data from account 050.

Account 0010102 shows the undepreciated book value of tangible fixed assets. This value naturally changes continuously, both within a year and across years. It is affected by depreciation, i.e., the write-off of the value of tangible fixed assets, and by the disposal of tangible fixed assets (divestment), both of which reduce the balance.

[†] We addressed non-financial indicators of business performance as a result of implemented strategic investments in the original study and presented them in a separate article. For more details, see Bukvič, Prašnikar & Tekavčič (2022).

Conversely, it is affected by purchases or acquisitions of new tangible fixed assets, including acquisitions under long-term financial leases. As mentioned, we disregarded any revaluation effects of tangible fixed assets for the companies in our sample.

If the difference between the acquisition cost of new tangible fixed assets and the depreciated value of existing tangible fixed assets or the value reduced due to divestment is positive, this is considered net investment in tangible fixed assets. By examining this balance, i.e., the undepreciated value of tangible fixed assets, over a longer period, we can determine from the differences (or chain indices) whether companies made net investments or divestments in each year. The difference between two annual balances (at the end of each calendar year, as of December 31) of the undepreciated value of tangible fixed assets, $OOST - OOST-1$ (account 0010102), represents net investments in tangible fixed assets in year t .

Since the analysis covers a long period and to ensure data comparability over time, all values are appropriately adjusted using deflators or inflators for each year (SURS – Inflation Adjustment for the Period 2000–2017).

For the entire sample (267 companies), we calculate the annual average values for both of the categories mentioned above. For each company included in the sample, we calculate chain indices and, based on them, the average growth rate of each economic category. In doing so, we use the geometric mean, which is calculated according to the following formula:

$$\left(\prod_{i=1}^n a_i\right)^{\frac{1}{n}} = \sqrt[n]{a_1 a_2 a_3 \dots a_n} \quad (1)$$

In the calculation of a simple linear regression, we consider tangible fixed assets (OOS) as the independent variable and net sales revenue (ČPP as the dependent variable, using the annual average values calculated for each year.

Below, we present the calculation of the linear regression for the pair of variables, OOS and ČPP.

Table 4. Linear Regression Calculation for the Dependent Variables OOS and ČPP
(source: Investment ability of the companies, questionnaire 2018)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,821 ^a	,673	,652	4054964,139

a. Predictors: (Constant), Opr osn sred

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-23654658,1	9981459,460		-2,370	,032
	Opr osn sred	1,505	,271	,821	5,561	,000

a. Dependent Variable: Cisti prihod od prod

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5,085E+14	1	5,085E+14	30,926	,000 ^b
	Residual	2,466E+14	15	1,644E+13		
	Total	7,552E+14	16			

a. Dependent Variable: Cisti prihod od prod

b. Predictors: (Constant), Opr osn sred

Bootstrap for Coefficients

Model		B	Bias	Std. Error	Bootstrap ^a	BCa 95% Confidence Interval	
					Sig. (2-tailed)	Lower	Upper
1	(Constant)	-23654658,1	-818984,712	11901364,94	,116	-47733387,8	-666241,520
	Opr osn sred	1,505	,027	,338	,012	,894	2,193

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The R^2 has been calculated as 0.673, which means that investments in tangible fixed assets account for more than two-thirds of the variation in net sales revenue. In other words, if we try to explain why companies increase the sales of their products, services, or goods/materials, we can look at the variation in net sales revenue. There is a whole range of factors that can explain this variation, but our model, which includes only investments in tangible fixed assets, can account for 67 % of it. This means that slightly

less than one-third of the variation in net sales revenue cannot be explained by investments in tangible fixed assets. Of course, other factors and variables also influence the increase in product/service sales volume.

In the analysis of variance (ANOVA) presented above, the sums of squares and degrees of freedom are provided. From these two values, we can calculate the mean squares by dividing the sums of squares by the corresponding degrees of freedom. The most important part of this table is the F-statistic, which equals 30.93 and is significant at $p < 0.001$ (since the value in the column labeled "Sig." is less than 0.001). This result indicates that the probability of obtaining an F-statistic of this magnitude is less than 0.1 % if the null hypothesis were true. Therefore, we can conclude that our regression model is a much better predictor of the increase in net sales revenue than simply using the average net sales revenue. Overall, the regression model predicts movements in net sales revenue very well. This result is logical and expected.

The calculation shows the estimates of the model parameters (beta values) and the significance of these values. In the equation above, b_0 represents the intercept on the ordinate axis and corresponds to the constant B. Here, b_0 is 23.6 million €.

In the same table, we can read the value of b_1 , which represents the slope of the regression line and equals 1.505.

Let's look at the t-values in the calculation above, where the t-test indicates whether the value of b is different from zero (0). The software tool SPSS 24 calculates the exact probability that the observed t-value would occur if the population value of b were zero (0). If this observed significance is less than 0.05, the result reflects a meaningful effect. In our case, this fully applies. For one t-value, the probability is 0.032, and for the other t-value it is 0.000 (rounded to three decimal places).

In the calculation, the bootstrap confidence interval indicates that the population value of b for tangible fixed assets (OOS) lies between 0.894 and 2.193. Because this interval does not include zero (0), we can conclude that a meaningful positive relationship exists in the population between investments in OOS and net sales revenue (ČPP). The significance associated with this confidence interval is $p = 0.012$. The bootstrap procedure also recalculates the standard error, which changes from 0.271 to 0.338. For the constant, the standard error is 9,981,459.46, while the bootstrap estimate of the standard error is 11,901,364.94.

Figure 2 shows the distribution of correlation coefficients between the variables OOS and ČPP for all companies included in the sample.

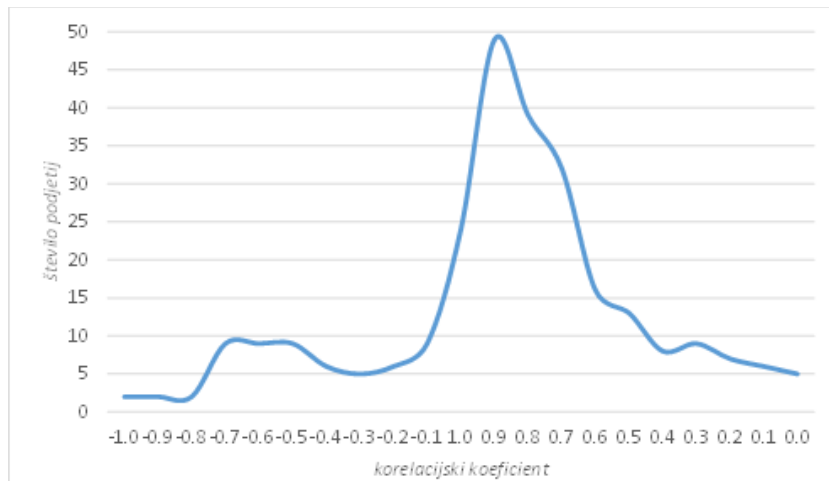


Figure 2. Distribution of correlation coefficients for the variables OOS and ČPP for all companies included in the sample for the period 2000–2017 (source: Own representation based on the calculation of correlation coefficients for the variables OOS and ČPP for 267 companies in the sample for the period 2000–2017)

Note: The ordinate (vertical) axis represents the number of companies, while the abscissa (horizontal) axis represents the correlation coefficients.

Based on the results presented above, we can confirm and accept our first research hypothesis H1: Strategic investments are the greatest driver of company growth.

4.2. Testing the Research Hypothesis H2 on the Impact of Increased Strategic Investments on Net Profit and Thus on Company Value

Let us examine how an increase in investments in tangible fixed assets affects the movement of net profit for the accounting period (NP) and, consequently, company value. In the case of this indicator, the predictive value of the regression coefficient b is completely lost. The returns on investments – measured by net profit for the accounting period – generated by the investments in tangible fixed assets by the companies in our sample during the period 2000–2017 were practically negligible.

The graph in Figure 3 shows the movement of absolute average values of some of the most important economic categories (financial indicators), including financial expenses, for our sample population of companies over the period 2000–2017.

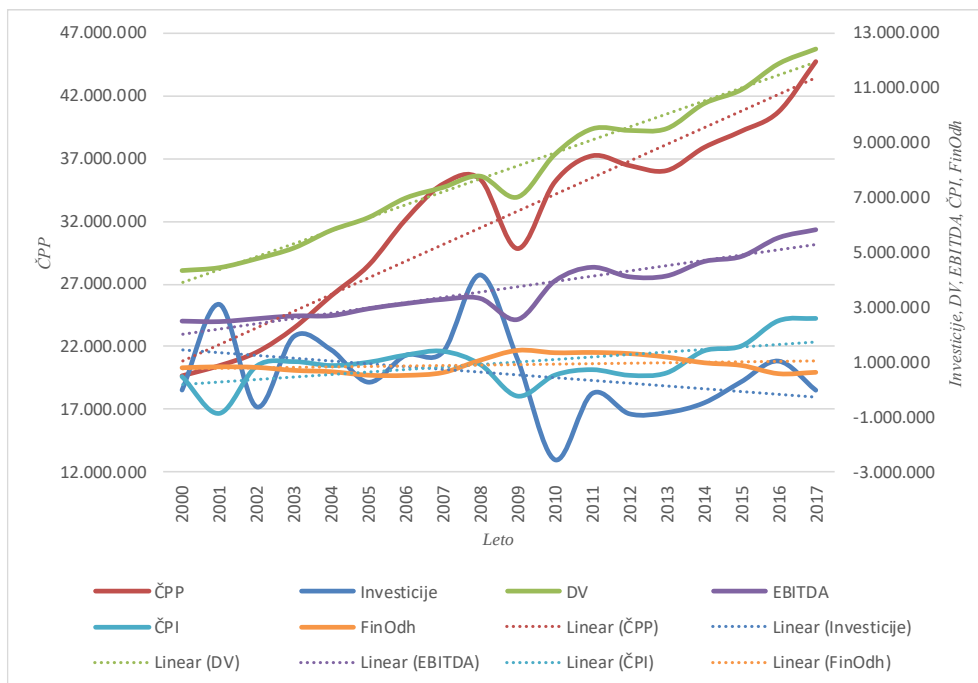


Figure 3. Financial indicators compared with the increase or decrease of tangible fixed assets for the sample companies (267) in the period 2000–2017 (source: Own presentation based on data from the AJPEs database for the period 2000–2017)

Legend: ČPP – net sales revenue; ČPI – net profit; Investicije – investments; FinOdh – financial expenses; DV – added value.

From Figure 3, it can be observed that during this 18-year period there was a specific phase marked by the global financial crisis and the worldwide economic recession, which lasted from 2008 to 2012. The dynamic growth of the mentioned categories – i.e., net sales revenue (ČPP), value added (DV), and net profit of the accounting period (ČPI) – halted in 2009; for the latter, the decline began already in 2008. The momentum of the rising trend in tangible fixed assets (OOS) continued despite the crisis until the end of 2009 (completion of pre-crisis investments). In 2010, there was a noticeable decline in the net book value of tangible fixed assets (reaching a low), as the net value of OOS decreased by approximately 6 %, and this level remained stable until 2015, when the average net value of OOS increased by about 3 % the following year, though it had not yet reached the pre-crisis average absolute level.

On the other hand, net sales revenue (ČPP) began to rise slightly after the significant drop in 2009, even during the recession period. The same applies to value added (DV). The greatest impact of the global financial crisis and economic recession was observed in the net profit of the accounting period (ČPI), which, as mentioned,

began to decline sharply in 2008, increased slightly two years later, but remained at roughly half of its 2007 average value until 2013. From 2008 to 2013, the financial expenses for interest and other obligations, in absolute terms for the sample companies, even exceeded their total net profit.

In this part of the study, we are also interested in how financial expenses (interest) changed during the past period – data are available for the sample companies from 2005 to 2017 – in relation to financial leverage or company indebtedness. We examine the linear regression between the NFD/EBITDA ratio and financial expenses.

In Figure 4, we first present the distribution curves of the NFD/EBITDA ratio for three time points: 2007 (pre-financial crisis), 2010 (during the financial crisis), and 2017 (post-financial crisis).

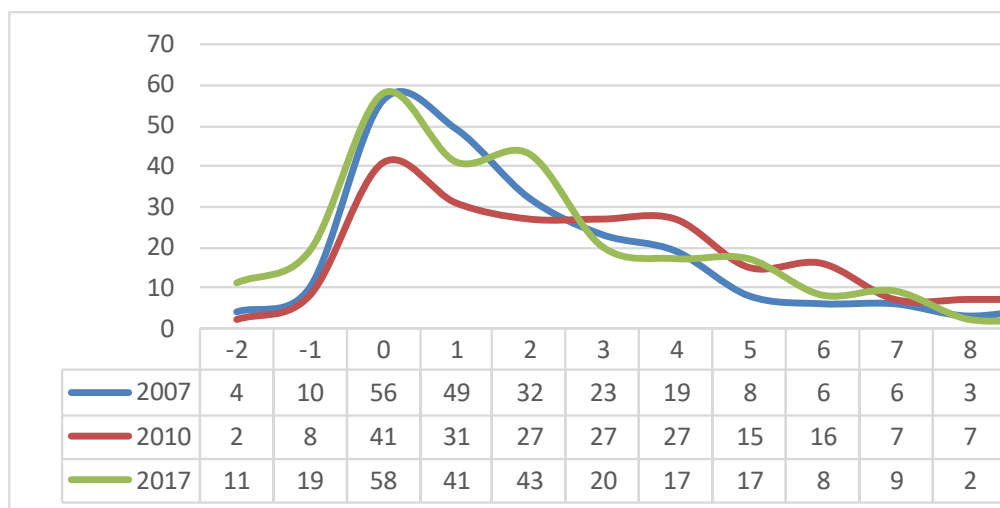


Figure 4. Distribution of the NFD/EBITDA ratio for the sample companies for the years 2007, 2010, and 2017 (source: Own presentation based on data from the AJPEs database for the years 2007, 2010, and 2017)

From the graph in Figure 4, it can be seen that the red curve, which represents the normal distribution of the NFD/EBITDA ratio for the sample companies in 2010, is right-skewed (similarly to the other two curves), flatter (the other two curves are more compressed with higher peaks), and more stretched to the right, generally lying above the other two curves. This means that in the year of the last major financial crisis, absolutely more companies had relatively higher NFD/EBITDA ratios (more EBITDA was needed to cover net financial debt). This is indicated by the right side of the curve from the value 0. The left side of the same curve from 0, which lies below the other two curves, supports a similar conclusion. Companies in the sample that were not indebted – their NFD/EBITDA ratio was negative – either had more cash and cash

equivalents, lower EBITDA, or both during the financial crisis. Thus, the NFD/EBITDA ratio below -2 was observed for more companies in 2007 and 2017 than in the crisis year.

If we calculate for each company the regression coefficient between the NFD/EBITDA ratio and financial expenses for the period 2005–2017, we find no statistically significant relationship between them.

Since net profit for the period is the main source for repaying principal on loans, we are finally interested in the relationship between the indebtedness of our sample companies and the profitability of their net sales revenue, which is graphically shown in Figure 5. It is evident that after the financial crisis and economic recession, net sales profitability began to improve, reaching 5 % in 2017. This provided indebted companies with a source to repay their debt. This conclusion is further supported by the fact that, during the same period, the indebtedness of companies in our research sample began to decrease. The NFD/EBITDA ratio, which was almost 2 in 2010, fell to 1.20 by 2017. As mentioned, this is the average ratio of all 267 companies, calculated based on weighting by each company's net sales revenue.

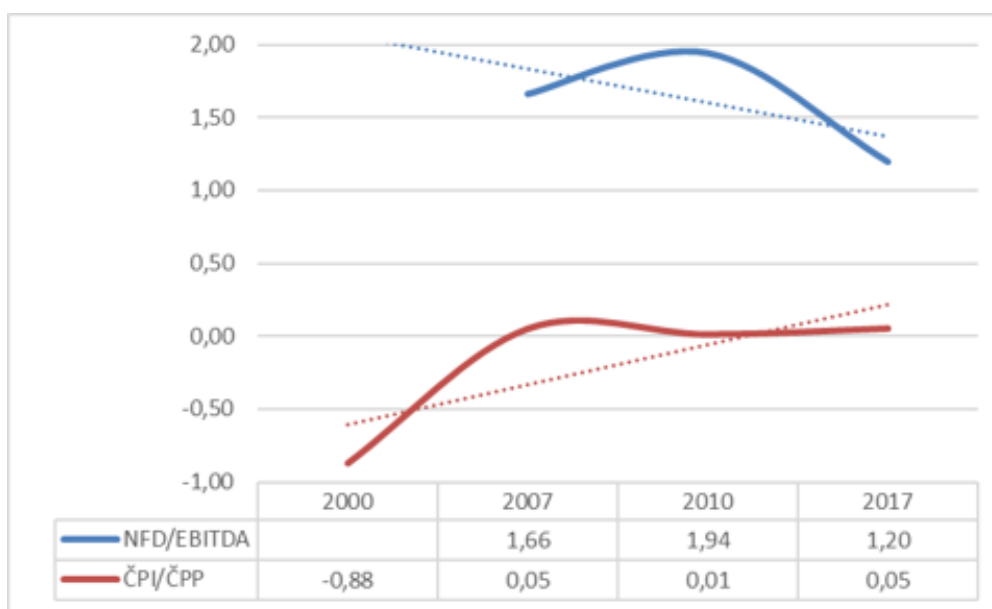


Figure 5. Trends in indebtedness (NFD/EBITDA) and profitability of net sales revenue (ČPI/ČPP) for the sample companies during the period 2000–2017 (source: Own work based on data from the AJPEŠ database for the period 2000–2017)

Based on the results presented above, we can confirm and accept our second research hypothesis *H2: Strategic investments increase company value by generating profit.*

4.3. Testing the third research hypothesis *H3 on the impact of increased strategic investments on productivity growth and improved financial performance of companies*

In the graph in Figure 6, we show, for all companies in our research sample, the trends of two productivity indicators, expressed in value terms, namely net sales per employee (ČPP/Z) and value added per employee (DV/Z), for the period 2000–2017.

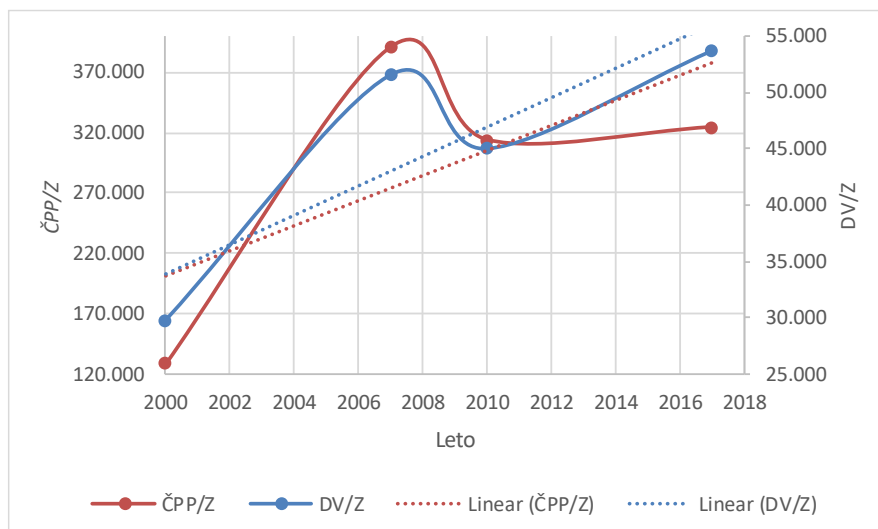


Figure 6. Trends in productivity (Net Sales per Employee – ČPP/Z; Value Added per Employee – DV/Z) for the sample companies in the period 2000–2017 (source: Own representation based on data from the AJPEs database for the period 2000–2017)

Productivity increased sharply in the period from 2000 until the major financial crisis in 2008. The crisis caused a decline, but after the crisis, productivity began to rise again, especially productivity measured by value added per employee. Figures 7 and 8 show the ratio between the value added of the 30 largest companies in the sample and the value added of the other companies in the sample over the past 18 years.

Both graphs show that, every year except during the year of the last major financial crisis and economic recession (2009), the 30 largest companies in the sample collectively generated more value added than the remaining companies in the sample (such data were available for only 237 companies in the sample) and that after that year, the gap began to widen.

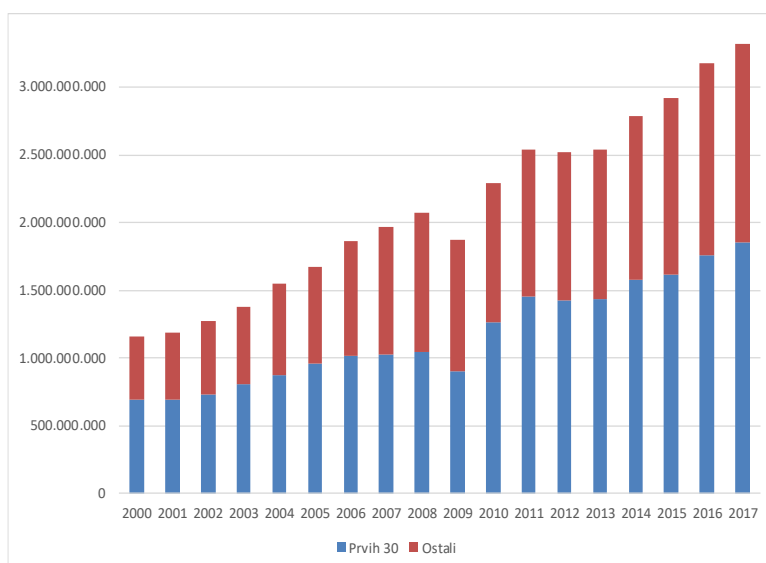


Figure 7. Dynamics of value added for the 30 largest sample companies in the period 2000 – 2017 (source: Own representation based on data from the AJPEs database for the period 2000 – 2017)

Note: The ordinate (vertical) axis represents value added in euros, while the abscissa (horizontal) axis represents the 30 largest sample companies (blue) and the others in the sample (red).

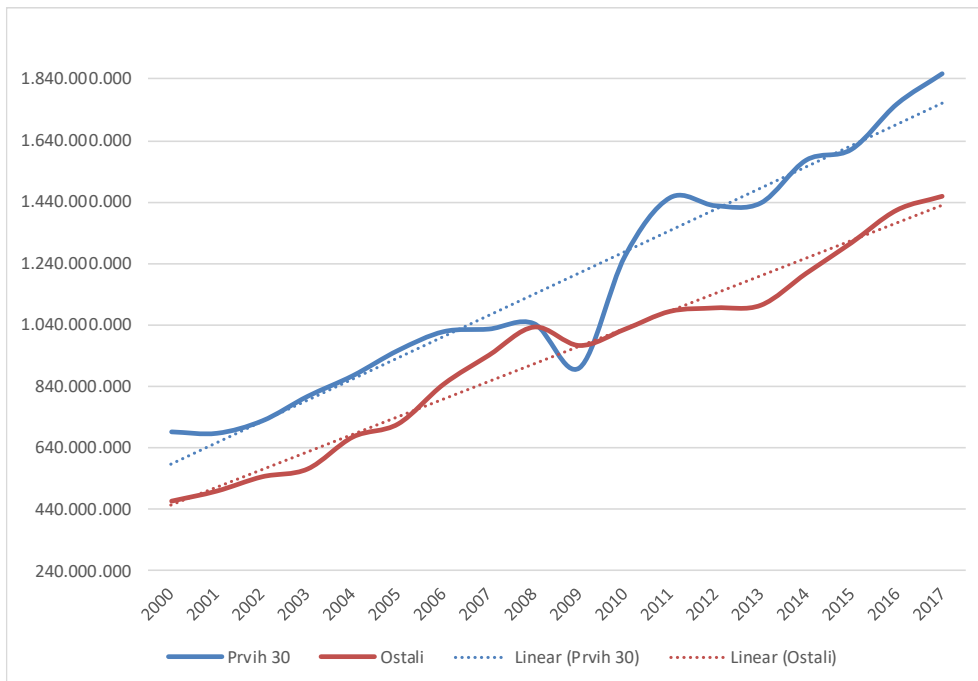


Figure 8. Dynamics of added value of the 30 largest sample companies in the period 2000 -2017 (source: Own illustration based on data from the AJPEs database for the period 2000 – 2017)

Figure 9 shows the ratio of added value generated over the past 18 years by large and medium-sized companies in our sample. From Figure 9, it can be seen that the 78 large companies created significantly more added value than the 189 medium-sized companies, but after 2009, at the start of economic recovery, the relative share of the latter gradually increases. Figure 9 shows how the financial crisis and economic recession affected the companies in our research sample and that, after these events, the added value per employee increased faster than net sales per employee, although by 2017 the companies had not yet reached pre-crisis levels.

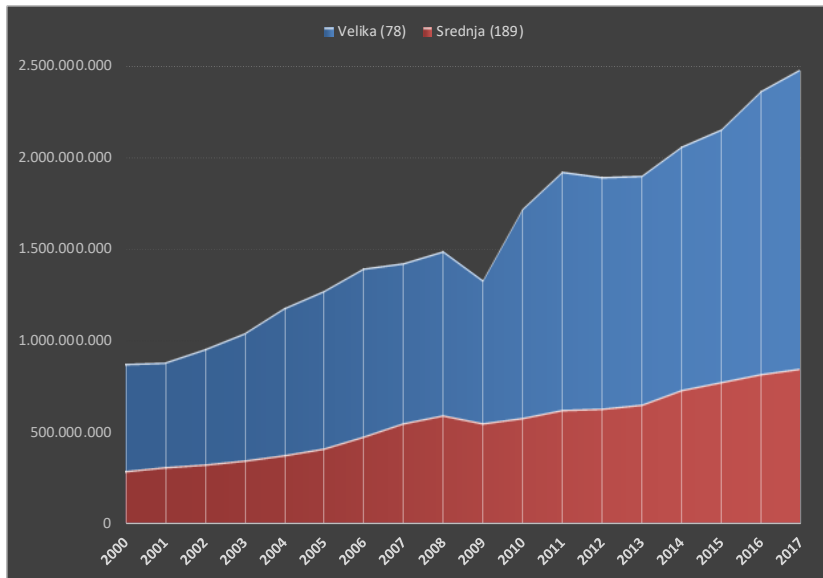


Figure 9. Dynamics of added value of large and medium-sized sample companies (267) in the period 2000 – 2017 (source: Own presentation based on data from the AJPES database for the period 2000 - 2017).

Next, we examine the impact of strategic investments on the financial performance of companies. For this purpose, we calculated the correlation between investments in tangible fixed assets and the financial indicators presented in the theoretical part of this paper (Chapter 2.7). Based on our findings and statistical analyses, the graphical presentation in Figure 10 includes only those financial indicators that show a statistically strong or moderately strong correlation with strategic investments, i.e., investments in tangible fixed assets. From Figure 10, it can be seen that the correlation is strong with net sales, added value, and EBITDA, but weaker with net profit. The impact of the independent variable, i.e., investment in tangible fixed assets, on the financial indicator, namely EBITDA, was found to be weak ($R^2 = 0.305$; $b_1 = 0.145$; Sig.: 0.02), while for net profit of the accounting period (ČPI) this impact was negligible ($R^2 = 0.025$). In the case of b for investments in tangible fixed assets, the result indicates that these investments significantly contribute ($p = 0.02$) to predicting an increase in EBITDA. An increase in tangible fixed assets by 1,000 € generates 145 € of operating cash flow. This, of course, applies to a one-year period. The investment generates cash flow over its entire useful life, which certainly spans multiple years depending on the type of tangible fixed asset. This is not a very high return on productively invested assets when compared to the returns of otherwise riskier financial investments.

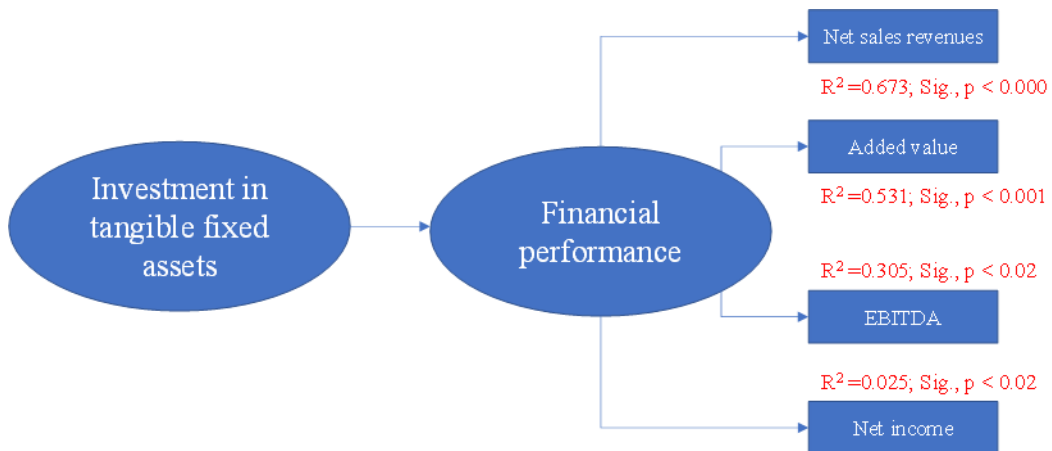


Figure 10. The impact of strategic investments (Tangible Fixed Assets) on improving financial business performance (source: Own representation based on data from the AJPEs database for the period 2000 - 2017 and statistical processing of data in SPSS 24)

Based on the results presented above, we can confirm and accept our third research hypothesis *H3: Strategic investments increase productivity and improve business performance.*

5. Discussion

At the very beginning of our discussion, we can ask why companies invest, why they allocate funds to purchase equipment, machinery, or to build new production or storage facilities. The answer is that new business opportunities arise in the market, with increased demand for their products or services. By expanding production and other capacities, increasing retail space in trade, or expanding vehicle fleets in transport and logistics, companies increase their resources to grow their sales volume, which in turn also increases net profit.

Other factors, beyond the increase in tangible fixed assets, that affect higher sales volume and thus company growth, but are not considered in this study, may include price increases, productivity improvements (higher output per unit of time), export incentives or customs relief, business process optimization, organizational changes, and so on.

ANOVA shows whether the model predicts the outcome variable well, but it does not reveal the individual contribution of variables – except in our model, which includes only one independent variable.

This can be interpreted as follows: if companies do not spend a single euro on investments in tangible fixed assets ($X = 0$), the model predicts that all companies in our sample would decrease their net sales revenue by 23.6 million €.

Although this value represents the slope, it is more useful to interpret it as the change in net sales revenue resulting from a 1 € change in investment in tangible fixed assets. For example, if investments increase by 100 €, net sales revenue from products/services would increase by 150.50 €, which can be considered a relatively good result, given that increases in investments in tangible fixed assets contribute more than two-thirds to the growth of net sales revenue.

Therefore, the b-values are significantly different from zero. For b representing investments in tangible fixed assets, this result means that these investments significantly contribute ($p < 0.001$) to predicting increases in net sales revenue.

Bootstrap confidence intervals and significance values are useful because they do not rely on assumptions about normality of the distribution or homoscedasticity (Field, 2013).

Relying on the research results presented above and on the discussion just provided, we can once again confirm and accept our first research hypothesis H1: *Strategic investments are the greatest driver of company growth.*

Further in our discussion, if we take into account financial expenses for interest and other obligations (account 06402), we can understand why net profit for the accounting period was relatively modest or even negative (loss). In the period before the financial crisis in 2008, companies borrowed heavily to finance their investments, for which they had to pay interest to financial institutions, thereby reducing net profit.

Instead of net profit generated by strategic investments – in particular, investments in tangible fixed assets – being a source of increasing company value and, consequently, an important source of financing new investments, this did not happen after the mentioned crisis. Companies instead used profits (their accumulated earnings) for deleveraging. Therefore, for this examined period, we cannot claim or prove that profit generates value. In a given year, yes, it does, but it does not remain in the company as retained earnings; instead, it is used to repay principal on loans. It is true, however, that by reducing net financial debt, the companies' capital adequacy improves, and their equity relatively increases.

Thus, we can confirm and accept our second research hypothesis H2: *Strategic investments increase company value by generating profit.*

We conclude our discussion while taking into account the assessment of productivity and business performance of the companies due to the strategic investments. Since net profit, especially if not distributed to owners and retained in the company, increases equity and thus the value of the company, and can also serve as a main source for debt repayment, we are also interested in the relationship between the indebtedness of our sample companies and their profit margin over the entire research period. This is shown in Figure 11 below. The profit margin began to improve immediately after the financial crisis and economic recession, reaching 5 % in 2017. Companies with higher financial leverage generated funds for debt repayment. This is further supported by the observation that companies in our sample began reducing their indebtedness during the same period. The NFD/EBITDA ratio,

which was almost 2 in 2010, decreased to 1.20 in 2017. As previously mentioned, this is a weighted average of all 267 companies, calculated using the net sales of each company as weights. We are also interested in another indicator, which we want to include in a regression equation alongside net sales (ČPP). This is ROA, return on assets. We would expect that if net sales increased significantly due to investments in tangible fixed assets (their impact was more than two-thirds), then ROA should also have increased correspondingly. Efficient use of production assets should be reflected in higher ROA. This raises the question of whether tangible fixed assets were truly well-utilized (production running in three or four shifts?) and whether companies were able to fully meet customer demand. Linear regression did not show a strong relationship between ROA and ČPP ($R^2 = 0.236$; Sig.: 0.048). This indicates a weak correlation between the compared variables.

Similar findings apply to other financial indicators, such as return on equity (ROE), the ratio of EBITDA to total assets, and the efficiency indicator (Operating Revenue / Operating Expenses), for which we also calculated linear regression with net sales revenue. The trends of these indicators for our sample companies in the period 2000 - 2017 are graphically shown in Figure 11. In the graph in Figure 11, the blue curve, representing ROE, stands out the most. This indicator was very high in 2007 (0.35) before the financial crisis, then gradually declined until 2010, and only by 2017 did the equity of owners in our sample companies reach an average annual return of 10 %.

When assessing the return on investments, it is necessary to consider their return from the perspective of all stakeholders who provided the financing. Since these include financial institutions, interest on borrowed loans is considered a form of return generated by the investments. This return does not remain with the companies or their owners, but it represents the return produced solely by the investments themselves.



Figure 11. Trends in profitability and efficiency indicators for the sample companies in the period 2000 – 2017 (source: Own illustration based on data from the AJPES database for the period 2000–2017)

Finally, we can confirm and accept our third research hypothesis *H3: Strategic investments increase productivity and improve business performance.*

6. Conclusion

In this paper, we have demonstrated and empirically proven that growth is vital for both the economy and individual companies, and that strategic investments – among which are investments in innovations – drive this growth. Growth stimulated by strategic investments also increases the value of companies through profits that remain within the company and are intended for reinvestment. Sustainable growth can be maintained in the long term only if companies effectively manage the risks associated with innovations and growth strategies.

In the theoretical part of this paper, we first presented, based on numerous literary sources from various authors and researchers in the field, key concepts in some detail, such as strategic investments, company growth, company value, and relevant financial performance indicators. Using a conceptual model, which we called the “*circle of strategic investments*,” we attempted to link these concepts and identify causal relationships between them. Specifically, we examined how strategic investments stimulate growth, and how this growth – measured through increased sales – translates into higher profits and, consequently, increased company value or owners’ wealth. In essence, strategic investments are the true generators of growth and value creation.

In the methodological part of this paper, we formulated three research hypotheses, which we summarize here and answer regarding whether they can be confirmed or accepted:

- *Research Hypothesis H1: Strategic investments are the main drivers of overall company growth.* This hypothesis is fully confirmed.
- *Research Hypothesis H2: Strategic investments increase company value through profit generation.* This hypothesis is fully confirmed.
- *Research Hypothesis H3: Strategic investments enhance productivity and improve business performance.* This hypothesis is fully confirmed.

These positive conclusions were reached in the empirical part of the study, where we tested these hypotheses using statistical methods and the SPSS software on a sample of large and medium-sized Slovenian companies. The study used primary data from a representative survey and secondary data from the GVIN database over a relatively long period from 2000 to 2017.

It should be emphasized that strategic investment decisions are important financial decisions for companies with long-term consequences, which, when investment risks are managed, provide sustainable growth. To simply illustrate profitable and sustainable growth driven by strategic investments – including innovation investments – we cannot ignore technological and managerial knowledge, which act as the *spiritus agens* driving our circle of strategic investments. Only when companies understand the interdependence of knowledge, innovation, and growth they can continue exploring new investment opportunities. Throughout, the cycle of strategic investments continues to revolve.

Several opportunities for further research on strategic investments and growth were already indicated within the limitations of this study. It would be appropriate to expand the sample size to include a larger number of large foreign companies. Furthermore, to identify causal directions of certain variables or constructs in our conceptual model, a longitudinal study would be useful. Including a set of relevant non-financial performance indicators related to strategic investments would also be meaningful. Finally, it would be interesting to repeat the study based on data from the period after 2018 – perhaps covering the following seven to ten years – and compare the results with those of the current study.

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PART II: MANAGEMENT, LEADERSHIP, AND ORGANIZATIONAL PRACTICES

Contemporary organizations operate in an environment characterized by technological disruption, demographic change, new employee expectations, growing workforce diversity, and increasing exposure to crises and uncertainty. These developments require management approaches that extend beyond traditional planning and control. Organizations are increasingly expected to combine operational effectiveness with responsible leadership, employee well-being, adaptability, inclusion, and clearly articulated professional values.

The contributions in this section examine management at the individual, organizational, project, and public-sector levels. They explore spirituality and professional values in the workplace, the importance of people and organizational culture in the age of artificial intelligence, gender differences in perceptions of workplace diversity, and organizational support for women returning to work after childbirth. Additional papers consider crisis communication and organizational preparedness, the evolution of the PRINCE2 project management methodology, and methodological challenges in evaluating the economic performance of territorial self-government units.

Collectively, the papers show that effective management depends on both human and analytical capabilities. Organizational success requires appropriate structures, reliable management methods, effective communication, and attention to the values, expectations, and experiences of employees and other stakeholders. This section therefore highlights the continuing importance of people-centred, evidence-based, and context-sensitive management practices.

Spirituality and core professional values in the workplace

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Abstract

Modern workplaces are subject to new and dynamic challenges that also show the need of a change of the leadership approach. The topic of spirituality and core values in the workplace can be seen in several ways: as an organizational phenomenon, an individual practice, a managerial philosophy, or a component of organizational culture. It is widely recognized that core professional values are essential for meaning, ethics, and well-being at work, and attention to employee performance and attitudes is more important than ever. Existing scientific literature discusses leadership, organizational culture, and value congruence; however, it is important to know employees' perceptions of values and office spirituality with a focus on meaningful work and alignment of values. People who feel good do good, and a workplace grounded in respect, compassion, and innovation fosters performance. Our study is a mixed method (qualitative and quantitative), exploratory research that aims to determine employees' perceptions of professional values and their opinions on workplace spirituality. Data were collected from two organizations in the health and hospitality sectors. Using a questionnaire with open and closed-ended inquiry-based questions, we focused on identifying the perception of professional core values and corporate spirituality. The research method involved a three-stage coding procedure specific to constructivist grounded theory. We proceeded from initial coding through axial coding and core theme identification. The study develops and provides initial empirical support for a theoretical framework proposing that the alignment between declared organizational values and lived workplace practices forms a foundational mechanism shaping workplace spirituality, employee wellbeing, and organizational. Participants expressed expectations that organizational spirituality would lead to reduced stress and anxiety, increased loyalty, engagement, collaboration, and trust. The study contributes to the research community by offering a new approach to the study of the contemporary workplace and proposing the relationship between core values and the new concept of office spirituality as part of the organizational culture for future research.

Keywords: Office spirituality, Core values, Organizational culture, Employees perception, Employees performance

JEL Classification: M14, J28, J24, D23, Z12

1. Introduction

The contemporary workplace is passing through a lot of changes and challenges due to the ever-changing international environment of the last ten years. Pandemics, international conflicts, economic crisis, migration are among others important factors that influence how the contemporary workplace operates and how the contemporary workers behave under the circumstances.

Workplace values are increasingly significant and their role in conduct and formation is undeniable. Core professional values enhance respect, adaptability, responsibility and ethical principles. The technical capabilities are important, but they are not enough to have a sustainable competitive advantage. The quality of the human experience within the workplace makes the difference between high and average performance.

In the modern workplace the classical transactional employment relationship is not enough anymore, employees desire meaningful work that is in alignment with their core values, authentic relationships and contribution to purposes transcending mainly economic objectives. We are living a shift in the dynamics of the contemporary workplace where core values, meaning and focus on the real needs of the employees provide the ideal mix for achieving high performance in any type of organization.

Core professional values and a good organizational culture are linked and have a positive influence on employee performance (Mehendale, S., & Hande, A. B., 2025). A good workplace culture influences performance, employee productivity and even shapes behaviors significantly (Jerab, 2025).

Alongside the increasing importance of the congruence of the core personal values with the workplace ones, the workplace spirituality is a concept that captures the aspirations and needs of the contemporary office, with dimensions as meaningful work, sense of community and the alignment with the organizational values.

Vision is important as well as leadership is linked to purpose and motivation. Organizations with a strong leadership inspire better employees and have values oriented towards a workplace environment that encourages and supports professional and personal growth. This is appealing to employees alongside values linked to a mission for a cleaner and better world (van Tuin, 2021).

There is an academic identified gap between stated values and enacted values inside an organization, and this is exactly what, in the contemporary workplace, generates disengagement and loss of motivation.

The study addresses the alignment of the stated and enacted values and the link to workplace spirituality. When the employees perceive authentic organizational core values they act and perform better and experience meaningful work, strong community and a general state of wellbeing.

The study used a mixed methods design that integrates a quantitative survey and a qualitative grounded theory analysis of open-ended questions. The research was conducted in medical and hospitality sectors, both characterized by high interpersonal demands, emotional labor and opportunities for meaningful service, making them particularly relevant for examining the workplace spirituality dynamics.

2. Literature review

Organizational core values represented a research theme for the scientific community for a long time. The concept resides in sociology and are seen as enduring beliefs that are individually or collectively preferable and can be divided in “end states” or “modes of conduct” (Rokeach, 1973). Core values serve multiple functions such as shaping employee behaviors, guiding strategic priorities and providing identity and distinctiveness.

Edgar Schein stated that organizational culture has three dimensions: declared values, artifacts and core underlying assumptions. He used the “iceberg metaphor” to demonstrate that an organizational culture is not represented only by what can be seen but a complex concept with beliefs that are deeply rooted (Schein, 2010).

The distinction between exposed values and enacted ones is studied in the research community and the discrepancy between them often is recognized by the organizations leading to incongruence and loss of employee’s engagement (Argyris and Schon, 1978).

Several core values are prevalent across organizations. Cameron and Quinn (2011) distinguished competing values such as flexibility versus stability and internal versus external focus. Several categories of organizational values were stated in the academic literature, from different perspectives, but the most important categories are presented below in Table 1.

Table 1. Organizational values – identified categories from the literature review process (author's own research)

Cameron and Quinn - 2011				
Categories	Clan	Adhocracy	Market	Hierarchy
Values	Collaboration	Innovation	Competition	Control
	Human development	Entrepreneurship	Achievement	Efficiency
Other authors				
Categories	Ethical	Relational	Developmental	Performance
Values	Integrity	Respect	Learning	Excellence
	Transparency	Teamwork	Growth	Accountability
	Fairness	Communication	Autonomy	Results orientation

The impact of core values on organizational outcomes depends on their authenticity and consistency and on what employees perceive and see in the contemporary workplace. Alignment between personal and organizational values and between stated and enacted ones is critical for a performance driven environment where employees thrive. The discrepancy between the two categories of alignment predicts disengagement and counterproductive behaviors.

The employee well-being and value congruence are linked, and this relationship is a part of the organizational culture that has a great importance especially when organizations experience negative workplace behaviors (Zhao et al.,2024).

Workplace spirituality represents a multidimensional concept that represents the employees' experiences of meaning, transcendence, purpose within the work context.

Meaningful work is the center notion of the workplace spirituality that defines the fact that employees need more than a transactional workplace relationship with the employer and that the orientation towards a greater purpose define a good, consolidated organizational culture. If core values shape employee's behaviors, workplace spirituality nourishes employees' sense of community and purpose (Ashmos and Duchon,2000).

There are multiple dimensions of the workplace spirituality but meaningful work the sense of community and alignment with the organizational values are in the center of the concept. These dimensions are interrelated and strongly associated with organizational commitment and job satisfaction (Milliman et al,2003).

Other dimensions found in the scientific literature are compassion, transcendence, mindfulness and holistic well-being. Meditation and consciousness (Petchsawang and Duchon,2009) alongside mystical experience, spiritual connection and engagement

(Kinjerski and Skrypnek, 2006) are also considered dimensions of the workplace spirituality.

Studied research is consistent in demonstrating positive outcomes associated with workplace spirituality such as job satisfaction, employee wellbeing, organizational commitment using mechanisms such as intrinsic motivation, psychological meaningfulness, alignment between personal and organizational values. Leadership styles that promote a positive culture and respect for employees significantly enhance subjective well-being and reduce turnover intention (Jun et al., 2023).

Studies also suggest that leadership and organizational culture must adapt to various demographic factors to sustain job satisfaction and reduce turnover (Joseph et al., 2025; Yang & Mostafa, 2024). This is often linked to contemporary workplace challenges as migration, pandemics and international conflicts that forced the rapid need to adaptation with various work types (remote or on premises work, etc.), and multiple cultures that share the same office. Workplace spirituality works at a higher level and goes above these challenges connecting employees under common purposes.

Workplace spirituality research faces several challenges, especially residing in conceptual ambiguity and the need avoid spiritual and religious frameworks that are not related to the concept. Cultural and religious boundaries require careful analysis and attention from researchers. There is a certain conceptual ambiguity between organizational culture, employee engagement, employees' wellbeing and workplace spirituality. There is a lack of research regarding practical guidance for organizational interventions.

The study focuses on the value congruence and the relation to the concept of workplace spirituality. What is the mechanism behind value congruence and how meaning, purpose and wellbeing are achieved in the contemporary workplace, represented one of research objectives. There are several theories that try to explain the workplace relations between employees and the organizations.

Contemporary research extends these theories by examining the consequences of value alignment. The Person-Organization Fit theory (Kristof, 1996), rooted in Schneider's Attraction-Selection-Attrition frame (Schneider, 1987), states that individuals are attracted to organizations whose values match their own.

Values are treated as static and seen only from the organizational perspectives and that is one of the main critics of the earlier research on this theme.

Person-Organization Fit theory (Kristof, 1996) demonstrates that value congruence between individuals and organizations can lead to positive outcomes such as

including job satisfaction, organizational commitment, and increased involvement in the workflow.

Value congruence predicts organizational attraction, commitment, job satisfaction and retention, while reducing turnover and stress (Edwards and Cable, 2009). Mechanism to achieve congruence include fulfillment (organizations satisfying individual value – based needs) and trust.

Despite a growing consensus regarding the impact of workplace spirituality on organizational effectiveness, and a well-developed discourse surrounding value congruence, the structural role of organizational practices in nurturing or constraining spirituality remains unresolved. More precisely, there is a distinct lack of theoretical framework and empirical evidence explaining the mechanisms by which institutional values alter individual experiences of meaningful work, a sense of community, and transcendence.

3. Methodology

The study is realized using a mixed research method design that integrates both qualitative and quantitative approaches that provide understanding of the relationship between organizational values, their congruence and workplace spirituality.

This approach assures that by addressing both confirmatory and exploratory questions the relations between values congruence and workplace spirituality can be understood and a clear theory can be stated through grounded three stage methodology.

The research had three stages: quantitative study, qualitative three stages grounded study and integration of the results to analyze statistical patterns and thematic insights.

Data collection was conducted in two types of organizations a hotel and a hospital. Two sectors, hospitality and health, both dealing with challenges in the human resources departments.

The inclusion criteria required participants to be currently employed and have at least three months of organizational tenure (ensuring sufficient experience to assess organizational values). The sample is purposive, targeting sectors characterized by high interpersonal demands and service orientation, making workplace spirituality particularly salient.

The study sample comprises 36 employees recruited from both sectors. Data collection employs a single comprehensive survey instrument administered in the organizations. The questionnaire combines quantitative Likert scale items and qualitative open-ended questions. The survey is structured in three sections: demographic data, quantitative Likert scale items (assessing nine value dimensions)

and open-ended questions exploring value experience and workplace spirituality. Participants provided informed consent and confidentiality is assured through anonymous data collection.

The study design was focused mainly on the qualitative data that due to the exploratory nature of the research that focused on the relationship between core values and workplace spirituality.

For data analysis were used NVivo, MS Excel, Python and SPSS software.

The demographic profile summary is presented in Table 2.

Table 2. Demographic profile summary

Demographic category	Value	Count	Percentage
Gender	Female	22	62,9%
	Male	13	37,1%
Age group	18 - 29	6	16,7 %
	30 - 39	6	16,7 %
	40-49	8	22,2 %
	50-59	14	38,9 %
	60 +	2	5,6 %
Education	High School	21	58,3 %
	Bachelor	9	25,0 %
	Master	3	8,3 %
	PhD	2	5,6 %
	Others	1	16,7 %
Business Sector	Healthcare	25	69,4 %
	Hospitality	11	30,6 %
Tenure	< 1 year	13	36,1 %
	1-3 years	6	16,7, %
	4-7 years	9	25,0 %
	8-15 Years	4	11,1 %
	15 + years	4	11,1 %
Job level	Coordinator	25	69,4 %
	Execution/ Staff	7	19,4 %
	Expert	3	8,3 %
	Manager	1	2,8 %

The medical sector represents the main component of the selected group, and the analysis was focused mainly on this group while allowing exploratory comparison with hospitality. The medical group include healthcare professionals, administrative staff and support personal from a hospital in Romania. From the hospitality sector the group included hotel, restaurant and sales employees.

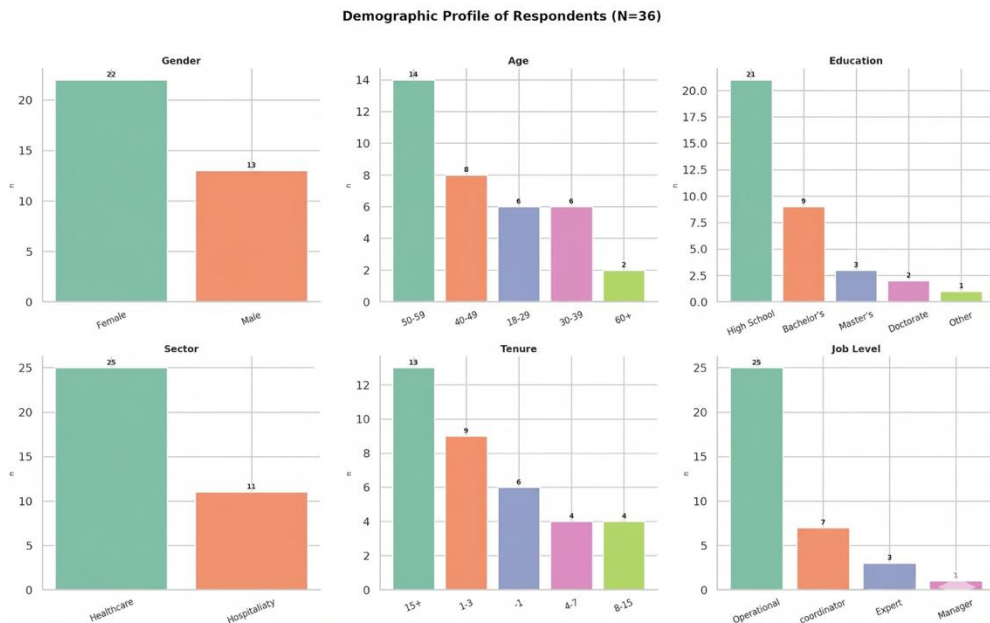


Figure 1. Demographic profile of respondents – graphical representation (authors own research)

The demographical analysis reveals a sample characterized by middle age concentration, majority females, with secondary education predominance, and tenure distribution focused on both long tenured and new employees. Most of the respondents are execution-level employees in both sectors. This sample assured a good foundation for the study of values and workplace spirituality characteristics from both sectors and across varied employees experience.

The sample size of only 36 respondents was based on a review of effective qualitative research methodologies. In this type of research depth is emphasized and data quality takes precedence over large samples. Experts recommend cohorts of around 20 participants (Moser and Korsjens, 2018). Smaller cohorts yield richer, more reliable data in social sector research. Data saturation and valuable insights are achieved with homogeneous groups. The cohort chosen for this exploratory research proved to be optimal for our objectives on the relationship between core values and workplace spirituality and produced enough distinct codes across six major categories.

The sample size ultimately depends on specific contexts, objectives and desired depth (Wutich et al.,2024).

The qualitative data analysis was conducted with a modified grounded theory research method (Strauss & Corbin, 1990, 1998; Charmaz, 2006). The process consists in three stages from initial coding and categories identification to core themes and relationships between values.

The coding process is presented bellow in Table 3.

Table 3. The coding process (authors own research)

Raw data		
36 participants		14 open questions
Line by line analysis	STAGE 1 Initial coding	
	247 codes	10 themes
	STAGE 2 Axial coding	
	3 high order dimensions	
	STAGE 3 Selective coding	
Core theme identified		Theoretical integration
	Final output	
	Integrated theoretical model	

Speculation beyond what the data supports was avoided.

Table 4. Responses distribution (authors own research)

Question	Targeted theme	Number of responses (out of 36)
Q1	Support / inhibition of professional development/ impact on engagement	20
Q2	The role of interpersonal relationships in a healthy work environment	16
Q3	Essential qualities of the leader who promotes values	21
Q4	Situations where ethical values were questioned	15
Q5	The meaning of authentic performance / The role of organizational culture	17
Q6	The relationship between professional demands and personal life	17
Q7	Deep purpose/ mission behind work	14
Q8	The meaning of "fulfillment" beyond remuneration	20
Q9	Treating employees as whole persons	20

Q10	The role of care, compassion, deep understanding	20
Q11	Ranking of the 7 value categories (top 3)	22
Q12	The gap between important values and observed reality	16
Q13	A single desired change in the organizational culture	17
Q14	Another dimension not covered by the questionnaire	12

For the questions with the highest rate of response (Q3,Q8 Q11) the codes have repeated and reached a reasonable level of thematic saturation. For the more sensible questions (Q4 – ethics) the high nonresponse rate and the “no”answers are results that were analyzed and presented in the discussion section.

In the first stage 247 initial codes were selected through line-by-line analysis. NVivo was used for the initial coding stage.

The core values categories analyzed in the questionnaire were:

- Development
- relational leadership
- ethical
- performance
- work–life balance
- organizational purpose

In the second stage the initial codes were distributed among the core categories, and 3 high order dimensions were extracted.

In the third stage revealed the core category that integrates all dimensions and explains the central phenomenon: “Value – experience congruence as foundation of organizational spirituality”.

The study also had a quantitative research phase that relied on a structured questionnaire designed to evaluate nine core organizational dimensions across 47 Likert-scale questions. Respondents observed their organizations and indicated the perceived values using a 5-point rating system, ranging from 1 (strongly disagree) to 5 (strongly agree).

The value dimensions observed are presented in Table 5.

Table 5. Value dimensions studied through qualitative research (authors own research)

Value category	Explanation
Development values	Items assessing training opportunities, feedback, autonomy, career growth support
Relational values	Items assessing respect, collaboration, communication, community
Leadership values	Items assessing integrity, vision, empathy, clarity
Ethical values	Items assessing transparency, fairness, ethical decision-making, accountability
Performance values	Items assessing standards, recognition, contribution, motivation
Work-life balance values	Items assessing workload management, flexibility, psychological support
Purpose and mission	Items assessing meaningful work, mission alignment, societal impact
Spirituality - workplace	Items assessing inner life nourishment, meaningful work, sense of community
Spirituality	Items assessing holistic wellbeing, compassion authenticity

Items are adapted from established scales including Milliman et al's (2003) workplace spirituality scale, Cameron and Quinn's (2011) organizational culture assessment, with modifications to ensure alignment with the research objectives.

4. Results and discussion

Through the coding method the study revealed eight thematic questions area, each of them with multiple secondary themes that capture employees experiences organizational values and workplace spirituality.

These eight thematic questions derived from the open coding phase.

Thematic question 1 – Professional development support revealed themes as:

- training opportunities – respondents described access to training programs, courses as central to professional development. Examples included being sent to courses and participation to professional development courses- communication training.
- Feedback – regular feedback from managers was identified as contributing to professional growth. Respondents appreciated supportive and actionable feedback.
- Autonomy and responsibility- opportunities to assume responsibilities and exercise autonomy were seen as confidence building and developmental.

- Organizational barriers – some respondents noted resources constraints, limited budget and organizational inertia as barriers to development.
- Commitment impact – respondents linked development support to organizational commitment.

Development support is a versatile value domain that reveals that is not only about training programs but about a broader organizational commitment to employee growth. Barriers to professional development generate frustration.

Thematic question 2 – Interpersonal relations revealed themes as:

- Respect and dignity – mutual respect and treatment with dignity were identified as foundational
- Authentic collaboration and support – respondents value genuine collaboration and willingness to help colleagues
- Open communication – transparent, honest communication was seen as essential
- Constructive conflict management - ability to address conflicts constructively without damaging relationships
- Sense of community and belonging – respondents described feeling part of a community with shared identity and mutual care.

Relational values are a core dimension in the contemporary workplace. Respondents shared that the quality of their relations is not about the absence of conflicts but about mutual support and positive relational practices. Relational values are foundational to workplace spirituality based on communities.

Thematic question 3 – Leadership qualities revealed themes as:

- Integrity and consistency – leaders who demonstrate integrity and keep commitments are highly valued.
- Inspirational vision – ability to articulate and inspire commitment to a compelling vision was seen important to effective leadership.
- Prioritization of people – leaders who prioritize employee wellbeing were valued.
- Active listening and empathy – capacity to listen actively and understand employees' perspectives was seen as an important aspect.
- Clear communication of direction – providing clear direction and expectations was valued by respondents.

Leadership integrity is seen as vital to value – experience congruence, as leaders' behaviors signal whether organizational values are genuine and enacted. Effective leadership means relational and ethical qualities that inspire trust and commitment.

Thematic question 4 – Ethical values revealed themes as:

- Decision making transparency- participants valued transparency with clear rationales and consultations.
- Congruence between declared and practiced values – alignment between stated and enacted values was appreciated.
- Ethical reporting mechanisms – availability of reporting mechanisms for ethical concerns without retaliation was considered important by respondents.
- Loyalty impact – respondents linked integrity to loyalty, ethical values violation can lead to workforce loss.
- Observed ethical dilemmas- some respondents described situations where ethical values were compromised, often due to resource pressures.

Respondents saw ethical violations as perceived hypocrisy that undermines trust and commitment. Ethical values are seen as daily practices and standard leadership behaviors. The theme of congruence between declared and practiced values directly addresses the research focus on value- experience congruence.

Thematic question 5 – Authentic performance revealed themes as:

- Intrinsic engagement – performance driven by intrinsic motivation versus external obligation.
- Clear and realistic standards – clarity about performance expectations and realistic standards were appreciated.
- Recognition and appreciation – respondents appreciate the acknowledgment of good work and consider that encourages engagement.
- Significant contribution – participants valued feeling that their work makes a meaningful contribution. This was especially revealed in the healthcare sector.
- Organizational culture as motivator – a good organizational culture that fosters intrinsic motivation, autonomy and meaning was seen as driving performance.

This thematic question connects directly to workplace spirituality meaningful work dimension, suggesting that performance values, when authentically enacted, foster spirituality.

Thematic question 6 –Work–life balance revealed themes as:

- manageable work – respondents talked about the importance of workload that can be managed within reasonable hours without chronic overload.
- flexible policies – availability of flexible work arrangements, remote work options and accommodating personal needs were appreciated.
- psychological support resources – access to counseling, stress management programs and other types of mental health support were seen as very valuable.
- negative effects of overload – respondents described how their life is negatively influenced by excessive workload.

Respondents revealed significant challenges in achieving work-life balance, with many describing workload pressures that influence personal life. Work -life balance represents a theme that is linked to value-experience incongruence, where organizational stated values (wellbeing) diverge from the enacted ones (excessive demands). The incongruence undermines workplace spirituality and have negative effects on the entire team.

Thematic question 7 –Organizational purpose and meaning revealed themes as:

- Meaning beyond financial benefits – respondents revealed that organizational purpose meaning transcends economic compensation.
- Mission identity – strong identification with organizational mission – patient care, guest satisfaction.
- Intrinsic motivation amplified by purpose – the sense of purpose amplifies intrinsic motivation.
- Positive community – societal impact – respondents valued organizations that contribute positively to community and society.
- Personal – organizational value alignment – congruence between personal values and organizational mission fosters commitment and meaning.

Respondents stated that purpose is not an abstract concept but a lived experience that shapes daily motivation and engagement. Purpose is central to workplace spirituality's meaningful work dimension, suggesting that organizations with clear, compelling socially missions foster higher spirituality.

Thematic questions 8 and 9 – Organizational spirituality revealed themes as:

- Fulfillment beyond compensation – respondents described experiences of fulfillment and satisfaction that transcend financial compensation.
- Whole-person treatment – valuing of employees as complete human beings with personal lives, emotions and needs beyond work roles.
- Care, compassion and deep understanding – organizational practices characterized by care and compassion were appreciated.
- Authenticity and space for self – ability to express genuine emotions and be authentic at work while maintaining personal identity.
- Solidarity and collective meaning – sense of shared purpose and mutual support.

Spirituality is experienced through concrete organizational practices and relational qualities and is not treated like an abstract concept. Spirituality is fostered when organizations enact values that create conditions for meaningful, authentic work and honor employees full humanity.

Axial coding organized the themes from open coding into three higher order dimensions by examining relationships, conditions, proprieties and consequences. That phase represented moving from descriptive themes to analytical categories.

Axial coding results are presented in the following table:

Table 6. Axial coding results (authors own research)

Dimension	Subcategories
Instrumental work values	Development values
	training, feedback, autonomy, barriers, commitment impact
	Performance values
	intrinsic engagement, standards, recognition, contribution, culture
Relational and ethical values	Work-life balance –
	Workload, flexibility, disconnection, support, overload effects
	Relational values
	Respect, collaboration, communication, conflict management, community
Transcendent values and spirituality	Leadership values
	Integrity, vision, people- centeredness, empathy, clarity
	Ethical values
	Transparency , value congruence, reporting mechanisms, loyalty impact
Transcendent values and spirituality	Purpose and mission
	Meaning beyond finance, mission identity, intrinsic motivation, community impact , value alignment
	Spirituality work
	Inner life nourishment , meaningful work , sense of community
Transcendent values and spirituality	Spirituality
	Wellbeing, compassion, authenticity , transcendence, collective meaning

Instrumental work values encompass the functional, task – oriented aspects of work that enable employees to perform effectively. These values are “instrumental” in that they serve as means to individual and organizational goals. Instrumental values appears to be necessary but insufficient for workplace spirituality in the sense that they create conditions for effective work but do not directly generate meaning and transcendence.

Relational and ethical values appear to be foundational to workplace spirituality community dimension and the construct of value – experience congruence. They create the relational and moral context within which work becomes meaningful.

The study revealed that transcendent values constitute the core of workplace spirituality, addressing its dimensions of meaningful work, sense of community and alignment with organizational values.

Selective coding identified the core category integrating all dimensions and explaining the central phenomenon: "Value–Experience Congruence as Foundation of Organizational Spirituality." Definition: Value–experience congruence is defined as the degree to which organizational values declared across instrumental, relational, ethical, and transcendent domains are perceived by employees as authentic and consistently lived in daily organizational practices, leadership behaviors, and cultural norms. This congruence constitutes the foundational condition for organizational spirituality and employee wellbeing. Theoretical Narrative: Employees enter organizations with expectations shaped by organizational communications, recruitment processes, and societal norms. Organizations articulate core values across multiple domains: instrumental values (development, performance, work-life balance), relational and ethical values (respect, integrity, transparency), and transcendent values (purpose, meaning, care). These espoused values create expectations about organizational character and employee experience.

Qualitative analysis of Likert scale responses across nine value dimensions reveals patterns of perceived value enactment, with notable variations across dimensions and implications for value experience congruence. Mean scores demonstrate generally positive perceptions of organizational value enactment, with all dimensions exceeding the neutral midpoint (3.0), but with meaningful variations.

Table 7. Mean scores (authors own research)

Value dimension	Mean score	SD
Spirituality	4,554	Not reported
Relational values	4,342	Not reported
Spirituality work	4,291	Not reported
Performance values	4,178	Not reported
Ethical values	4,119	Not reported
Purpose and mission	4,103	Not reported
Leadership values	3,944	Not reported
Development values	3,937	Not reported
Work-life balance	3.776	Not reported

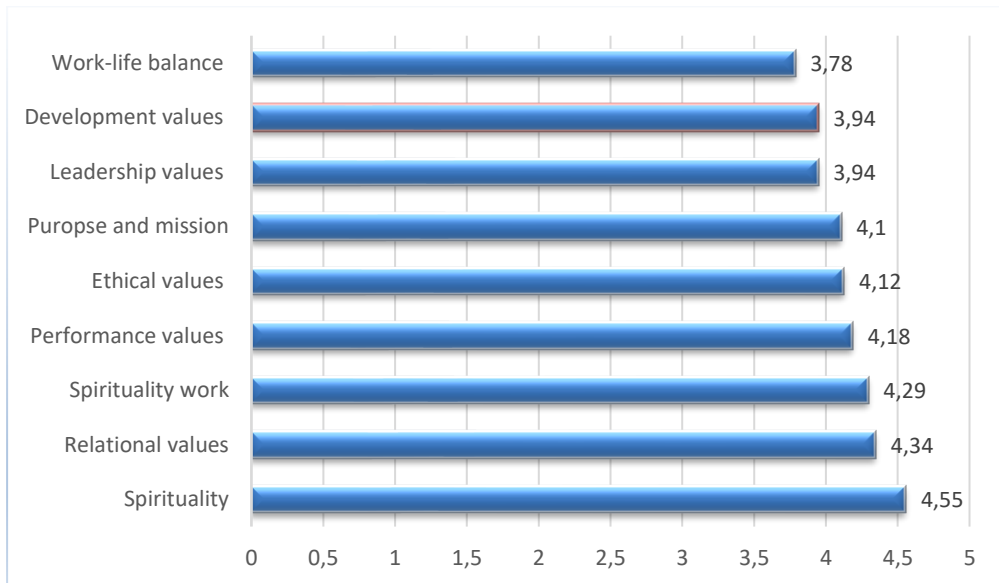


Figure 2. Mean scores across value dimensions(authors own research)

The elevated mean scores for Spirituality ($M = 4.554$), Relational Values ($M = 4.342$), and Spirituality -work ($M = 4.291$) show a strong employee perception of how transcendent and interpersonal values are actively expressed. The leading position of Spirituality implies that employees view their organizations as genuine and caring spaces committed to whole-person and overall well-being. Likewise, the high rating of Relational Values reflects a positive interpersonal atmosphere shaped by teamwork, open dialogue, and mutual respect. In addition, the solid scores for Spirituality confirm that staff members find deep meaning in their work and experience a real sense of shared connection and inner fulfillment.

These quantitative patterns align closely with the qualitative themes emphasizing care, empathy, and community in the workplace. They suggest that, in these particular areas, organizations are quite effective at turning abstract values into actions that support workplace spirituality. Still, this strong spiritual orientation might partly stem from the dominance of the medical sector in the research sample, since healthcare missions are naturally rooted in compassionate service, care, and meaningful public commitment.

Performance Values ($M = 4.178$), Ethical Values ($M = 4.119$), and Purpose and mission ($M = 4.103$) receive moderately high ratings, suggesting generally positive but not entirely consistent perceptions. Performance Values, which include intrinsic engagement, clear standards, and recognition, receive favorable ratings, showing that employees usually experience clear expectations and acknowledgment. Ethical Values, covering transparency and value congruence, also receive positive ratings, implying

that employees tend to perceive ethical integrity, though qualitative data pointed to some concerns about value congruence. Purpose and mission, involving meaningful work and mission alignment, receive positive ratings as well, showing that employees generally identify with organizational missions, especially within the medical sector.

These middle ratings suggest areas of relative strength but also potential variability and room for improvement. The moderate rating for Ethical Values is particularly noteworthy given their search focus on value–experience congruence; while generally positive, it suggests that some employees perceive gaps between espoused and enacted ethical values.

The pattern of mean scores offers early quantitative evidence about value–experience congruence. High ratings in spirituality and relational dimensions indicate relatively strong congruence in transcendent and relational value areas. In contrast, lower ratings for work-life balance, development, and leadership point to weaker congruence in these instrumental and leadership areas.

This pattern aligns with the grounded theory idea that value–experience congruence differs across domains, and that incongruence in foundational domains (instrumental, leadership) might limit workplace spirituality even when transcendent values are positively expressed.

The quantitative results also reinforce the qualitative themes. The lowest score for work-life balance quantitatively supports qualitative accounts of workload strain and overload effects. The high score for relational values quantitatively supports qualitative themes of respect, collaboration, and community. The moderate score for ethical values quantitatively reflects qualitative findings that show both ethical integrity and occasional value mismatches.

Integration of qualitative grounded theory findings with quantitative patterns reveals a coherent, multifaceted picture of value–experience congruence as the foundation for organizational spirituality. The convergence and complementarity of qualitative and quantitative findings strengthen confidence in the core theoretical framework while clarifying nuances and underlying mechanisms.

Quantitative findings showing Spirituality ($M = 4.554$) and Spirituality-work ($M = 4.291$) as the highest-rated dimensions align with qualitative themes emphasizing fulfillment beyond compensation, whole-person treatment, care, compassion, authenticity, and collective meaning. Employees' narrative descriptions of feeling fulfilled when their work is appreciated, valuing organizations that treat them as complete persons, and emphasizing care and compassion correspond with high quantitative ratings. This convergence indicates that workplace spirituality is genuinely experienced and valued in this sample, not merely viewed as an abstract concept.

Quantitative findings showing Relational values ($M = 4.342$) as the second-highest dimension align with qualitative themes emphasizing respect, collaboration, communication, and community. Employees' depictions of healthy work environments characterized by respect and communication, and their emphasis on belonging to a

community, correspond with high quantitative ratings. This convergence suggests that relational quality represents a genuine organizational strength and serves as a foundation for workplace spirituality's community dimension.

Quantitative findings showing Work-Life balance ($M = 3.776$) as the lowest-rated dimension align with qualitative themes emphasizing workload pressures, overload effects, and challenges in achieving balance. Employees' accounts of personal life being affected by heavy workloads and professional demands significantly influencing their personal lives correspond with low quantitative ratings. This convergence identifies work-life balance as a key area of value–experience incongruence, where organizationally stated values (supporting wellbeing) diverge from enacted practices (excessive demands).

Quantitative findings showing Development values ($M = 3.937$) and Leadership values ($M = 3.944$) as lower-rated dimensions align with qualitative themes identifying barriers to development (resource constraints, limited training) and leadership inconsistencies. While qualitative data also revealed positive development and leadership experiences, the identification of barriers and inconsistencies corresponds with moderate quantitative ratings, suggesting variability and room for improvement.

The core category of value–experience congruence provides an integrative framework for understanding both qualitative and quantitative findings. High ratings for spirituality and relational values indicate relatively strong congruence in these domains: organizations are enacting transcendent and relational values fairly consistently with espoused values. Lower ratings for work-life balance, development, and leadership indicate weaker congruence in these domains, where gaps exist between espoused and enacted values.

This pattern of differential congruence across domains supports the grounded theory proposition that value–experience congruence is multidimensional and that incongruence in some domains can coexist with congruence in others. It also supports the idea that incongruence in foundational domains (instrumental, leadership) may constrain or weaken spirituality despite positive enactment of transcendent values. The relatively high spirituality ratings despite work-life balance challenges suggest either resilience (employees maintain spirituality despite instrumental challenges) or vulnerability (spirituality may erode if instrumental challenges intensify).

The medical sector predominance (69.4%) likely influences findings, particularly the high ratings for purpose, mission, and spirituality dimensions. Healthcare's inherently meaningful mission (patient care, healing, alleviating suffering) provides a strong foundation for workplace spirituality. Qualitative themes frequently referenced patient impact and meaningful service, suggesting that medical sector employees derive spirituality partly from their profession's intrinsic purpose.

However, the medical sector also faces distinctive challenges that may explain low work-life balance ratings: high patient demands, staffing shortages, emotional labor, and life-or-death responsibilities create workload pressures that strain balance. The

coexistence of high spirituality and low work-life balance in this sample may reflect medical sector dynamics where meaningful mission sustains commitment despite instrumental challenges, but also creates vulnerability to burnout if work-life balance incongruence continues.

The execution-level predominance (69.4%) ensures that findings reflect frontline employee experiences, where value–experience congruence is most directly felt through daily work conditions, supervisory relationships, and organizational practices. The moderate ratings for leadership values may reflect execution-level employees' experiences of variable leadership quality or limited access to senior leadership. The low ratings for development values may reflect limited development opportunities for execution-level employees compared to professional or managerial staff.

The integrated findings support the grounded theory of value–experience congruence as the foundation for organizational spirituality. They show that workplace spirituality is not merely an individual trait or abstract concept but is shaped by organizational value enactment across multiple domains. They reveal that value congruence is multidimensional, with differential enactment across instrumental, relational, ethical, and transcendent domains. They suggest that transcendent values (purpose, spirituality) depend on foundational instrumental and relational values, with incongruence in foundational domains creating vulnerability even when transcendent values are strongly enacted.

5. Conclusion

This research addresses a key gap in organizational scholarship by linking organizational values research with workplace spirituality literature through the unifying concept of value–experience congruence. Using grounded theory methodology and mixed-methods data from 36 employees in medical and hospitality sectors, the study develops and provides initial empirical support for a theoretical framework proposing that the alignment between declared organizational values and lived workplace practices forms a foundational mechanism shaping workplace spirituality, employee wellbeing, and organizational commitment.

The three-step grounded theory analysis—open coding identifying eight thematic question areas, axial coding synthesizing three higher-order dimensions (instrumental work values, relational and ethical values, transcendent values and spirituality), and selective coding revealing the core category of value–experience congruence as the basis for organizational spirituality—offers a rich, empirically grounded theoretical framework. This framework advances understanding by clarifying how organizational value enactment across multiple domains shapes employees' experiences of meaningful work, authentic community, and holistic wellbeing.

Quantitative findings show generally positive perceptions of organizational value enactment, with the highest ratings for spirituality and relational dimensions (Spirituality -work $M = 4.554$, Relational values $M = 4.342$, Spirituality $M = 4.291$) and

the lowest ratings for work-life balance, development, and leadership dimensions (Work-Life balance $M = 3.776$, Development values $M = 3.937$, Leadership values $M = 3.944$). This pattern indicates differential value–experience congruence across domains, with relatively strong congruence in transcendent and relational domains but weaker congruence in instrumental and leadership domains. The notably low rating for work-life balance highlights a key area of value–experience incongruence that requires organizational attention.

Integration of qualitative and quantitative findings reveals convergence and complementarity, strengthening confidence in the theoretical framework. High spirituality ratings are explained by qualitative themes of meaningful work, authentic community, and organizational care. Low work-life balance ratings are explained by qualitative accounts of workload pressures and overload effects. The pattern of differential congruence across domains supports the grounded theory proposition that instrumental and relational or ethical values provide essential foundations for transcendent values and workplace spirituality.

The research makes several theoretical contributions. First, it connects previously separate literatures on organizational values and workplace spirituality, showing that organizational value enactment serves as a foundational mechanism shaping spirituality. Second, it introduces and operationalizes value–experience congruence as a central construct capturing organizational authenticity and integrity. Third, it identifies a hierarchical, interdependent structure of value domains, revealing that workplace spirituality depends on foundations of instrumental and relational or ethical values. Fourth, it emphasizes leadership's central role in signaling and modeling value congruence.

Practically, the research offers actionable guidance for organizations aiming to strengthen workplace spirituality and employee wellbeing. Findings indicate that spirituality cannot be cultivated through isolated programs or inspiring rhetoric but requires comprehensive, authentic enactment of organizational values across instrumental, relational, ethical, and transcendent domains. Organizations should assess value–experience congruence, address work-life balance issues, invest in development, build leadership integrity, use relational and transcendent strengths, and monitor value congruence consistently.

The research also faces limitations, including small sample size, cross-sectional design, self-report bias, and sector specificity, which point to directions for future research. Larger, longitudinal, multi-source, multi-organization studies are needed to test the framework's propositions, examine mediating and moderating mechanisms, assess outcomes and consequences, and evaluate interventions. Scale development, multi-level modeling, comparative sector studies, and leadership research would deepen understanding and application.

In conclusion, this research shows that workplace spirituality is not merely an individual trait or abstract ideal but an emergent property of organizational value enactment. When organizations genuinely practice the values they profess,

supporting development, fostering respectful relationships, demonstrating ethical integrity, enabling work-life balance, articulating meaningful purposes, and treating employees as whole persons, they create conditions for workplace spirituality characterized by meaningful work, authentic community, and holistic wellbeing. When organizations fail to live by their stated values, creating value–experience incongruence, they weaken spirituality, leading to cynicism, disengagement, and reduced wellbeing.

This insight shifts attention from individual spirituality practices or organizational spirituality programs to the fundamental integrity of organizational value enactment. It suggests that fostering workplace spirituality is ultimately about organizational character: being true to stated values, honoring commitments to employees, and creating workplaces where human dignity, meaning, and connection are not only expressed but genuinely lived.

As organizations face contemporary challenges such as technological disruption, workforce diversity, mental health crises, and deficits in meaning and purpose, workplace spirituality offers a framework for sustainable, humane, and effective organizing. This research contributes to that vision by showing how organizations can nurture spirituality through authentic value enactment, creating workplaces where employees not only perform effectively but also flourish as whole human beings, experiencing work as meaningful, relationships as genuine, and organizational life as spiritually sustaining. The path forward requires not just articulating inspiring values but embodying those values consistently, authentically, and comprehensively, turning organizational rhetoric into lived reality.

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SINHA, A. A. S. / *Embracing Humanity in the Age of AI: People and Culture Linked to Purpose in the New Organization*

Embracing Humanity in the Age of AI: People and Culture linked to Purpose in the `New Organization`

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Abstract

In the current AI era, the strategic necessity for organizations is to move beyond technology adoption and change the way the organizations operate and evolve. There will be a need to change the existing organizational frameworks and bring in agility, efficiency, continuous learning and innovation. Roles, skills, workflows, and structures are being redefined to adopt and effectively use the new technologies.

The objective of the research is to study the approach of strengthening human capacities called the `Human Magic` and its role in transforming through adoption of Digital and AI technologies. Creation of a strong, human-centric company culture with focus on collaboration, knowledge creation, learning, and adaptability is a critical enabler for early adoption. Mindset or values, norms, attitudes, and behaviors, is needed to evolve into an `AI-digital mindset`. This is an essential requirement to fuel transformation and evolve with strong technology (AI) foundation. There is also a need to have collaborative leadership, democratized skill-building, flatter hierarchies, dismantled organizational divides, and less traditional supervision. The new organization in the age of Digital and AI need to be Innovative organizations characterized by entrepreneurial spirit, risk acceptance, and having a behavior model of a `Start-up` ecosystem. The employees are at the heart of business, creating and nurturing authentic relationships both within the company and with all the company's stakeholders, customers, vendors, partners, and shareholders—in a way that contributes to the company's purpose and creates great outcomes. When a company's purpose aligns with the employees' own individual search for meaning and benefits all the stakeholders, it can unleash the kind of human magic that results in an exceptional performance. Focus on `Ikigai` will be crucial i.e., aligning purpose and vision by integrating and converging business strategy, passion, and social impact.

Keywords: Human capability, Culture, Mindset, Organization Purpose, Ikigai

JEL Classification: M14, M12, M15, O33, D23

1. Introduction

There is a significant change in organizational behavior and practices in this age of Digital and AI; and it is important to reflect on how an organization becomes early adopters and create value by recognizing and implementing the sifting organizational practices. In the new age of Digital and AI, organizational designs should enable more agile, open, collaborative work practices and encourage innovative behavior.

As organizations evolve in this age of Digital and AI, it is important to look at how organization structure, design and culture change to enable effective use of AI technologies and resultant practices. These would be the Framework which can be referred for operating in this new age. The modern organizations build an organizational structure that enables a cross-functional sharing of resources and knowledge, promote effective communication and collaboration, as well as bring focus on driving innovation.

Organizational structures can be designed in a way that encourages its capacity to adapt to change, learn, innovate, and generate business value. The most common model of organizational structures in the current changing organizational design is the matrix form promoting flexibility in which teamwork is emphasized, bring coordinated, multidisciplinary activity, and have broad participation in making decisions and exchange of information and knowledge. The modern organization which can leverage the power of AI is ideally an integrated networked enterprise, which is capable of self-organization and transformative change.

A common theme across different organizational design factors promoting AI adoption is the human element. The success of AI adoption is dependent on the critical human factors, and these would be around people, purpose, culture and leadership. Some of the examples of successful adoption of digital and AI bringing transformative change has laid emphasis on the human factors.

- Under the title 'In the era of AI and robotics - How a 133-year-old company innovates by using a startup mentality', Betsabeh Madani Hermann (Global Head of Research at Philips) spoke during the ICT & health World Conference 2024 about importance of entrepreneurial mindset and agility of startups.
- In a landmark book, 'The Heart of Business: Leadership Principles for the Next Era of Capitalism': Hupert Jolly (2021) describes Human Magic with a sense of Purpose in transformation journey of Best Buy
- There are players like Uber and Amazon which brought new business models (largely leveraging the evolving Digital and AI technologies) and one of the focuses was being resilient and establish the culture and mindset of being experimental and having iterative approaches

2. The `Human Magic`

The objective of the research is to look at the approach of strengthening human capacities called the `Human Magic` and its role in organization transformation leveraging the emerging technologies - Digital and AI. Creation of a strong, human-centric company culture with focus on collaboration, knowledge creation, learning, and adaptability is a critical enabler for early adoption. Mindset or values, norms, attitudes, and behaviors, are needed to evolve into an `AI-digital mindset`

2.1. Themes

There are 4 key themes which describe the aspects of human capacity and its role in transforming through the adoption of Digital and AI technologies–

Culture - Cross function collaboration, learning, knowledge sharing, experimental and iterative.

Leadership – Inclusive, adaptive and democratized with flatter hierarchies and dismantled divides

People – Employee engagement, talent and developing mindset which are in line with AI based transformation

Purpose - Focus on core purpose of the organization, and employees and stakeholders drive outcomes based on core purpose useful.

Table 1. Themes of `Human Magic`

Organization Culture	Leadership	People	Purpose
• Cross function collaboration • Continual learning and Knowledge sharing • Experimental and Iterative approaches	• Adaptive and inclusive • Democratized skill-building, flatter hierarchies • Dismantled organizational divides	• Talent transformation • Learning Organization • Mindset change	• Focus on Purpose • Empowered employees and network of stakeholders drive outcomes based on core purpose

3. Culture

Organizational culture represents a system of values, beliefs and behavior of members of the organization. It is characterized by the attitude towards risk, the speed of response, focus on purpose, and a level of autonomy and experimentation in the tasks. The new organization in the age of Digital and AI need to be Innovative organizations characterized by entrepreneurial spirit, risk acceptance, and having a behavior model of a `Start-up` ecosystem. *John M. Bremen (2025)* described how

culture can drive effective AI adoption in an organization. He plays emphasis on culture of purpose, culture of learning, culture of risk management, culture of engagement, culture of innovation.

In the age of AI, the organization model is evolving to bring focus on flexibility and efficient exchange of information and knowledge, as well as the development of the organizational culture whose values encourage the innovative behavior of individuals. Some of the core principles or culture of the new organization would be that of a resilient enterprise which continuously adapt and reconfigure.

The modern organization which can leverage the power of AI is ideally an integrated networked enterprise, which is capable of self-organization and transformative change - supported by transformational learning with alternate maps/mental model in a complex adaptive system. The concept of complex adaptive systems is ability to learn and adapt in a changing environment.

3.1. Complex Adaptive System

The new AI focused organization is a kind of complex adaptive system composed of many individual agents that interact with each other to produce complex behavior. These systems are constantly changing and evolving, as the agents within them learn and adapt to their environment.

The key aspects of the design of complex adaptive system include managing and organizing the integration of people's intelligence and artificial intelligence, in an agile and lean environment, with structures promoting collaboration and innovation and the ability to adapt to rapid change. This can be done through extraordinary management focusing on change and creativity using informal structures. The informal structures may include workshops, multidisciplinary teams, multi-unit teams, and multi-level teams. The structures and actions of a routine stable management must coexist with the informality and unpredictability of the extraordinary form of management that is needed to address the unknown.

What is needed, says *Stacey (2003)*, 'is an approach that frankly acknowledges the nature of human organizations as complex, adaptive nonlinear-feedback networks'. Creativity in adaptive systems occurs in a special zone between the unstable disorder of chaos and the stability of no change—"at the edge of chaos, in the space for novelty."

4. Leadership

There is a shift in leadership style with the integration of AI in workplace, from rigid, hierarchical structures towards a collaborative, improvised, and highly adaptive environment. As AI enables larger companies to adopt many of the characteristics of smaller, more disruptive or like a 'start-up' organizations, they will need to adapt their leadership style accordingly.

TCS and the Peter Drucker Society Europe (2025), carried out survey and discussions with prominent executives and explored about 'New leadership for the perpetually adaptive enterprise.' The new way of working in the modern AI era is having an enterprise-wide teamwork and the new style of leadership is that of Orchestrators. The decision making is to be distributed and needs to be close to business, customers and be most contextual. Success lies in their ability to motivate teams to be in a perpetual state of readiness, and embrace change which feeds into opportunities

4.1. 'Jazz leadership'

A new form of leadership was observed in *BCG survey* of 160 Chinese executives (*The new age of jazz leadership in China, Oct 2025*). It is also called as 'jazz leadership' with jazz style attributes that promote improvisation, collaboration and creativity. It is a significant shift from rigid, hierarchical structures and what is emerging is democratized skill building with flatter hierarchies and dismantled organizational divides. The survey provides an insight into jazz-style attributes that promote improvisation, collaboration, and creativity. The jazz leadership model is an ensemble approach which is free-flowing, collaborative and communicate dynamically, support each other, and adapt to changes in real time – having an ability to continuously evolve.

4.2. Agentic Organization

The Agentic Organization: Contours of the next paradigm of AI era (McKinsey & Company, 2025) described about enabling humans and AI agents working together leading to an organizational paradigm shift. The article explains how early adopters are successfully building the Agentic organization which is a decentralized network of outcome focused agentic networks. The leadership team would need to adapt to the new organization paradigm and replace functional silos with cross functional autonomous agentic teams. The 'new organizational' is still emerging and early adopters will have a competitive advantage.

5. People

One of the critical factors for enabling change and transformation through adoption of AI technologies would be the focus on preparing people or the employees for a new organizational paradigm through right talent, culture and mindset.

5.1. Learning

Talent transformation, and how organizations develop and enable talent is key to bringing People focus. In this transition phase – to the Age of AI – what is important to consider is how we upskill, bring right technical skills, infuse human judgment & analytics and push for managerial transformation into that of an orchestrator.

The second updated edition of *Rewired: McKinsey's Playbook on How Leading Companies Win with Technology and AI* (2026), gives guide and practical details on digital and AI transformations with a significant focus on talent transformation. There are clear actions identified for talent transformation.

- The first focus is to make the business leaders 'AI literate'
- The second lever is to build AI and Data expertise in the organization to enable AI-first operating model
- The third big focus is to transform the IT talent and enhance the AI enabled tech force.
- And fourth, what is important is to bring the human-agent collaboration working and implement complex workflows with orchestration as the managerial focus. And having a focus on 'human judgement' will be crucial

What is important is to not simply focus on upskilling, reskilling but strengthen the organizational framework of a 'learning organization'. This concept was popularized by Peter Senge, and pertains to continuous collaboration, knowledge sharing, knowledge processing, and creating a condition for continuous invention and innovation. It is defined as the 'state' or 'condition' of an organization, as described above, implying certain behavior and practices necessary to build the 'state' of a learning organization (Sinha, A. Amitabh S. 2012).

5.2. Mindset

Mindset change is an important element for People led transformation. It is about doing new with new working practices and adapting to new processes & technology focusing on clear outcomes. It is all about building the AI culture. Individual actions are both explicit (aware of) and tacit (not aware of) and changes in mental models are both tacit and explicit. Individual actions are influenced by his or her mental model and learning, collaboration, knowledge sharing are the actions which can change the mental model and resultant action. Having an 'AI-digital mindset' is essential

requirement to fuel transformation needed to continuously evolve and change with strong technology (AI) foundation (Sinha, A. Amitabh S., 2026).

6. Purpose

Every company will need to focus on its core purpose, of creating value for all stakeholders and serving society. In this model, products and services provide value to their customers, generate sustainable returns for their investors, and become the force for good needed to transform society. Companies must be viewed as human organizations made of individuals working together in support of an inspiring noble purpose. This can energize all employees and stakeholders associated with the company and results in extraordinary performance, also called as 'human magic'. *'People often think you can either drive profit or purpose, but if you hold it together as a leader and say, 'How could I do both?' That creates a new pathway and a new model for the future. That's the kind of leaders we need for the future'* Niren Chaudhary, Former CEO Panera Brands, quote in the joint report by TCS and the Peter Drucker Society Europe (2025), New leadership for the perpetually adaptive Enterprise.

We can look at examples of 2 organizations having focus on core purpose and how it creates the 'human magic' and influences their transformation journey. This is an important 'human' aspect to be considered while building AI-led transformation strategy.

6.1. Best Buy

Best Buy, electronic retail chain store, undertook a transformation journey at the start of current decade, while facing disruptions in the market with new retail environment influenced by Amazon and other online e-commerce channels. Best Buy leveraged new technologies such as Digital and AI and transformed by incorporating digital-enabled services providing more personalized experiences and tech help, all aimed at meeting the core purpose to **enrich lives through technology**.

The focus had been to have a clear sense of Purpose, foster autonomy and unleash 'Human Magic'. The employees are considered to be the heart of business, nurturing interdependent relationships within the company and with the company's stakeholders including customers, vendors, partners — with a drive on meeting outcomes for all the stakeholders while focusing on the core purpose.

The whole philosophy is captured in 'The Heart of Business: Leadership Principles for the Next Era of Capitalism': Hupert Jolly (2021) which describes *'People are the creative engine of innovation and change and putting People and Purpose at the helm is a powerful driver for change and growth'*.

6.2. Olympus

Another relevant example is that of Olympus, who has undertaken a transformation journey and moving from a diverse manufacturer into a medical technology focused company, with a strategy to bring together imaging platforms, therapeutic devices, digital solutions, and Artificial Intelligence to create a seamless ecosystem of intelligent technologies which deliver holistic support for patients, customers and hospital systems. Olympus released a corporate strategy paper in November 2025, titled, *'Where Purpose meets performance'* and Purpose defined for the company is, **Making people's lives healthier, safer and more fulfilling**

Olympus is building future of endoscopy-enabled care, which focuses on meeting the purpose of extending life and making it more fulfilling. The entire transformation of Olympus, driven by the new era of AI and Robotics, and the change of its operating model, leadership, and culture is driven by this core purpose.

6.3. Ikigai

In the article, *Ikigai: A Powerful Framework for Senior Business Owners*, (Kieth Grinstead, Nov 2024), has applied Japanese principle of Ikigai in business while coaching business leaders of finding Purpose. Aligning business strategies with Ikigai will foster sustainable success of organizations.

7. Conclusion

We have explored how change and transformation, though adoption of Digital and AI technologies, need focus on preparing people or the employees for a new organizational paradigm though right talent, culture and mindset. There is a need to enable the 'human centric' practices and set up for promoting continuous change and transformation. Some of the core principles that would support the journey of transformation include:

- Focus on Purpose
- Talent Transformation
- Build Learning Organization Practices
- Mindset change
- Collaborators, Orchestrators as leaders
- Collaborative leadership and flatter hierarchies
- Networked enterprise with self-organizing, informal networks and transformative and complex adaptive system

Below are some of the recommendations which are necessary and key principles of embracing humanity in the age of AI with focus on People, Culture and Purpose playing a crucial role in growth and transformation.

1. Focusing on the core purpose, establishes an organization vision of serving society and this could be the driving force for all the stakeholders including the employees and a positive force towards organization change and transformation. The organization's purpose not only defines the strategic focus but also binds together the culture, talent, organization design and model around this Purpose with a clear plan and roadmap for growth and transformation.
2. Mindset or the mental model determines how we see the world and influences our vision and actions. Mindset is a set of attitudes and behaviors, and what is needed is change in values, norms, attitudes, and behaviors or having an 'AI-digital mindset'. It is important that mindset evolve and change (tacit and explicit) and there is a clear view of how to grow and transform with a strong technology (AI) foundation
3. For successful adoption and leverage of the digital and AI technologies, there is a need to have a strong, human-centric company culture with focus on collaboration, knowledge creation-sharing, learning, adaptability and have characteristics of an entrepreneurial spirit and risk acceptance. There is an emphasis on
 1. culture of purpose
 2. culture of learning
 3. culture of risk management
 4. culture of engagement, culture of innovation.
4. With process redesign/changes and reorganization, there will be new roles and responsibilities, and new collaborative networks will open up within the organization. There needs to be a focus on talent transformation and have a drive for upskill and bringing right technical skills. The AI literacy is needed to spread across all levels in the organization and use of AI across the organization processes, workflows would require upskilling with right knowledge and ability to make AI real.
5. What is important is to not to simply focus on upskilling, reskilling but strengthen the organizational framework of a 'learning organization'. This would be creating the condition for continuous learning and innovation and require a setup of knowledge management and learning environment with growth, experimentation and innovation focus.
6. AI first working model is evolving into flat networks of empowered, outcome aligned network teams. This requires a new form of leadership for those who need to focus on orchestration across the enterprise networked teams. What is also needed is decentralized leadership and collaboration with flatter hierarchies

and less organizational divides. The new leaders must also promote agility, flexibility, risk taking and adaption to change.

7. Establishing a complex adaptive system with self-organizing groups and informal structures and diversified leadership and multi-disciplinary teams. What is needed as a focus for an organization in the AI era is to establish the working of a Complex adaptive systems which would be highly resilient enterprises, which are able to reconfigure themselves in response to changes and disruptions. For a complex adaptive system, the principles of extraordinary management are applied such as new learning, emergent strategy, self-organization, informal networks and distributed leadership

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Examining Gender Differences in the Perceived Importance and Organizational Benefits of Workplace Diversity

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Abstract

The aim of the paper is to examine the relationship between employees' gender and their attitudes toward workplace diversity in the Slovak Republic. The research was conducted on a sample of 201 employees. The analysis focused on two dimensions: the perceived importance of workplace diversity and the perception of diversity as a benefit to organizational culture. Given the nominal and ordinal nature of the variables, the chi-square test of independence was applied, and the strength of association was assessed using Cramer's V coefficient. The results revealed statistically significant relationships between gender and both examined variables. Compared to men, women attributed greater importance to workplace diversity and were more likely to perceive diversity as beneficial to organizational culture. The findings suggest the existence of gender-based differences in the perception of diversity initiatives, which may have important implications for diversity management policies and practices. The study contributes to the existing literature by providing empirical evidence from a Central European context.

Keywords: Workplace diversity, Gender differences, Diversity management, Employee attitudes, Human resource management

JEL Classification: J16, M12, M14

1. Introduction

Workplace diversity, equity, and inclusion (DEI) have become central themes in contemporary organizational research, reflecting broader societal shifts and increasing expectations placed on organizations to promote fairness, equality, and sustainable performance. Over the past decades, research in management has increasingly focused on understanding how diversity influences organizational processes and outcomes, resulting in a rapidly expanding body of literature that addresses various dimensions of diversity, including gender, culture, and identity (Park

et al., 2025). This growing interest highlights the recognition that diversity is not only a normative or ethical concern but also a strategic organizational resource.

Recent research emphasizes that diversity and inclusion are closely linked to key organizational outcomes, particularly innovation and competitiveness. Empirical evidence suggests that organizations characterized by stronger diversity and inclusion practices tend to achieve higher levels of innovation, as inclusive environments enable the effective utilization of diverse perspectives and knowledge (Covington et al., 2025). In this context, diversity is increasingly perceived as an organizational asset that contributes to improved decision-making, creativity, and long-term performance.

At the same time, the effectiveness of diversity initiatives depends largely on how they are perceived and implemented within organizations. Employees' perceptions of diversity climate and inclusion practices play a critical role in shaping their attitudes and behaviors. As demonstrated by Platania et al. (2025), diversity climate and inclusive leadership significantly influence employees' responses to organizational conditions, mediating the relationship between organizational identification and both positive and negative behavioral outcomes. These findings underscore the importance of understanding diversity not only as a structural characteristic of the workforce but also as a subjective and perceptual phenomenon.

The role of organizational culture in shaping diversity-related outcomes has also been widely recognized. Organizations with strong and inclusive cultures are better positioned to leverage the benefits of workforce diversity, resulting in higher levels of employee engagement, satisfaction, and overall performance (El-Khatib et al., 2025). In such environments, diversity is more likely to be viewed as a source of strength rather than a challenge, reinforcing its perceived value within the organization. Conversely, the absence of inclusive cultural practices may limit the positive effects of diversity and reduce its perceived importance among employees.

From a broader theoretical perspective, diversity-related practices can also be interpreted through the lens of symbolic management, whereby organizations use policies, practices, and communication strategies to shape stakeholders' perceptions and signal commitment to certain values (Schnackenberg et al., 2019). In this sense, diversity initiatives may serve not only as functional mechanisms but also as symbolic tools that influence how employees interpret organizational priorities and intentions. As a result, employees' perceptions of diversity may reflect both the substantive and symbolic aspects of organizational practices.

Despite the growing body of international research, there remains a need to better understand how diversity is perceived in specific national contexts. While global studies provide valuable insights, the perception and significance of diversity may vary depending on cultural, institutional, and socio-economic conditions. In particular,

research focusing on Central and Eastern European countries, including the Slovak Republic, remains relatively limited. This gap highlights the importance of examining diversity perceptions within this context to determine whether existing theoretical assumptions hold or whether distinct patterns emerge.

Therefore, the aim of this study is to examine the relationship between employees' gender and their attitudes toward workplace diversity in the Slovak Republic. Specifically, the study focuses on two key dimensions: the perceived importance of workplace diversity and the perception of diversity as an asset to organizational culture. By addressing these aspects, the study seeks to contribute to the existing literature by providing empirical evidence from an under-researched context and by enhancing the understanding of how gender influences diversity perceptions in contemporary organizations.

2. Literature review

Workplace diversity and gender-related differences in employee attitudes have become central topics in contemporary organizational research, particularly in the context of increasing emphasis on inclusion, equality, and organizational performance. A substantial body of recent literature highlights that gender plays an important role in shaping employees' perceptions of diversity management practices and their broader workplace experiences.

Research consistently shows that women tend to perceive diversity management initiatives more positively than men. For instance, Mousa et al. (2020) found that female employees reported more favorable evaluations of diversity management practices compared to their male counterparts, suggesting gender-based differences in how organizational policies are interpreted. However, the same study indicates that gender differences in workplace happiness are less pronounced, implying that attitudes toward diversity and general job-related well-being may not always align. Similarly, Mousa (2021) demonstrated that while gender diversity itself may not directly influence organizational inclusion, diversity management practices and inclusive climates significantly predict workplace happiness, emphasizing the importance of managerial approaches rather than demographic composition alone.

The role of diversity management as a determinant of employee attitudes and behavior has been widely confirmed across different sectors. Empirical evidence from the hospitality industry indicates that effective diversity management is associated with improved employee engagement, job performance, and innovative behavior (Mistry et al., 2023). These findings align with broader research suggesting that diversity management is positively associated with perceived employee performance (Mahdi et al., 2023). However, the effectiveness of such initiatives depends heavily on

contextual and organizational factors, including leadership practices and organizational justice (McCarthy et al., 2021).

Gender diversity at the workplace has also been linked to various dimensions of employee well-being and job evaluation. Clark et al. (2021) found that gender-balanced workplaces are associated with higher perceived job quality, although the effects differ between men and women. Similarly, Olafsdottir and Einarsdottir (2024) showed that gender-balanced environments contribute to higher job satisfaction and organizational commitment, particularly among male employees. These findings suggest that gender composition not only affects perceptions of fairness but also shapes overall workplace attitudes.

Despite the recognized benefits of gender diversity, significant challenges persist in achieving genuine gender equality in organizations. Andrade (2022) highlights that, although many organizations implement diversity policies, progress in closing gender gaps remains slow, particularly in areas such as compensation and career advancement. This observation is further supported by Son Hing et al. (2023), who emphasize that gender inequalities are embedded across multiple organizational processes, including recruitment, evaluation, and promotion systems. From a social psychological perspective, these inequalities are often rooted in deeply ingrained stereotypes and social norms, which continue to influence workplace interactions and decision-making (Hanek & Garcia, 2022).

The effectiveness of diversity-related interventions has been widely debated in the literature. A systematic review by Furtado et al. (2021) indicates that employees' attitudes toward gender equality initiatives, such as affirmative action, are shaped by their prior experiences and perceptions of fairness. At the same time, Zhao et al. (2025) show that diversity and inclusion interventions produce mixed outcomes, with some initiatives improving awareness but having limited impact on actual behavioral change. These findings highlight the complexity of diversity management and the need for more nuanced approaches that go beyond formal policies.

Organizational context plays a critical role in shaping diversity perceptions. Research demonstrates that economic inequality within organizations can negatively affect perceptions of diversity climate and reduce expectations regarding the presence of minority groups (Moreno-Bella et al., 2022). Similarly, organizational culture has been identified as a key factor influencing the effectiveness of diversity management practices. Leadership also plays a crucial role, as inclusive leaders can mitigate conflicts and enhance team cohesion in gender-diverse environments (Santos et al., 2022).

Another important aspect of diversity research relates to employees' subjective experiences of inclusion. Dhanani et al. (2024) found that employees define inclusion primarily in terms of equal treatment, participation in decision-making, and the ability

to express themselves authentically. However, experiences of inclusion may vary depending on social identity and work context. For example, women often report lower levels of influence in organizational decision-making processes compared to men (Plückelmann et al., 2024). Moreover, minority groups, including LGBTQ+ employees, frequently encounter discrimination, microaggressions, and exclusion, which negatively impact their well-being and career outcomes (Maji et al., 2024), while organizational and managerial practices play a critical role in shaping inclusive environments for gender-diverse individuals (Ladwig, 2023).

Recent studies also emphasize that diversity management approaches can unintentionally produce adverse outcomes. For instance, identity-blind diversity strategies may increase perceptions of tolerance rather than genuine inclusion, leading to less favorable experiences among minority employees (Mor et al., 2025). Additionally, social desirability bias may distort employees' expressed attitudes toward diversity policies, resulting in discrepancies between declared support and actual beliefs (Boring & Delfgaauw, 2024).

The relationship between diversity and organizational performance has also received considerable attention. Empirical studies suggest that workforce diversity can influence organizational performance, although the effects may vary across specific diversity dimensions and may involve mediating mechanisms such as leadership expertise (Turi et al., 2022; Sofi et al., 2025). Similarly, employees' perceptions of gender equality have been found to positively influence firm innovation, mediated by factors such as job satisfaction and psychological well-being (Li et al., 2026). These findings highlight the strategic importance of fostering inclusive workplaces that support diverse employees.

At the same time, diversity can also create challenges related to identity and group dynamics. Calderón-Orellana and Berríos (2025) demonstrate that diversity, particularly in terms of socioeconomic status, may lead to intraindividual identity conflict, especially in highly homogeneous environments. This suggests that diversity initiatives must be carefully managed to avoid unintended psychological consequences.

The literature also underscores the importance of organizational identity and policy frameworks in shaping diversity outcomes. Freeman and Koçak (2023) argue that organizations can strengthen inclusion by embedding diversity into their identity and core values. Similarly, Ciuk et al. (2022) propose that effective diversity management requires a shift in how organizations conceptualize and approach diversity, emphasizing flexibility and reciprocity. Furthermore, workplace policies, such as gender quotas, have been shown to influence employees' gender ideologies and promote more egalitarian attitudes (Peters & Abendroth, 2025).

Finally, recent reviews highlight the evolving nature of diversity research and the need for more integrative approaches. Chen et al. (2023) emphasize the rapid development of diversity research and identify emerging trends, while Fletcher and Beauregard (2022) emphasize the need to better account for contextual and multi-level influences in diversity research. Similarly, Ryan (2023) warns against common pitfalls in gender equality initiatives, such as focusing on individual deficits rather than systemic barriers.

Overall, the reviewed literature demonstrates that gender differences in workplace diversity perceptions are influenced by a complex interplay of individual, organizational, and societal factors. While diversity management and inclusive practices can generate positive outcomes, their effectiveness depends on employees' perceptions, organizational culture, and broader contextual conditions. These findings highlight the importance of examining gender-based differences in diversity perceptions, particularly in specific national contexts, such as the Slovak Republic, where empirical evidence remains limited.

3. Methodology

The aim of the paper is to examine the relationship between employees' gender and their attitudes toward workplace diversity in the Slovak Republic. To achieve this objective, the study adopts a quantitative research approach based on a cross-sectional and exploratory design. The analysis focuses on identifying statistically significant associations between the examined variables rather than establishing causal relationships.

The study is guided by two research questions:

- **Research question 1 (RQ1):** Is there a statistically significant relationship between employees' gender and the perceived importance of workplace diversity in the Slovak Republic?
- **Research question 2 (RQ2):** Is there a statistically significant relationship between employees' gender and the perception of diversity as an asset to organizational culture in the Slovak Republic?

In line with these research questions, the following hypotheses were formulated:

- **H1:** There is a relationship between employees' gender and the perceived importance of workplace diversity.
- **H2:** There is a relationship between employees' gender and the perception of diversity as an asset to organizational culture.

Data were collected through an online questionnaire distributed among employees in the Slovak Republic. A convenience sampling method was applied, allowing for the

inclusion of respondents from various organizational contexts without restrictions related to sector or job position. A total of 201 valid responses were obtained and included in the analysis. Participation in the survey was voluntary and anonymous, which contributed to reducing potential response bias and supported the collection of more reliable data.

Gender was treated as the independent variable and operationalized as a binary categorical variable (1 = female, 2 = male). Two dependent variables were examined, both representing distinct dimensions of workplace diversity attitudes. The first variable, perceived importance of workplace diversity, was measured using the question "How important is workplace diversity to you?". The second variable, perception of diversity as an asset to organizational culture, was measured using the question "Do you consider diversity to be an asset to your company's organizational culture?". Both variables were originally measured using a 5-point Likert scale. For the purposes of statistical analysis, the responses were recoded into three categories representing low, moderate, and high levels.

The statistical analysis was conducted using IBM SPSS software. The relationships between gender and the selected attitudinal variables were examined using the chi-square test of independence. In addition to assessing statistical significance, adjusted residuals were analyzed to identify specific categories contributing to significant differences. Values lower than -1.96 indicate significantly fewer observed frequencies than expected, whereas values higher than 1.96 indicate significantly more observed frequencies than expected. The strength of the identified associations was evaluated using Cramer's V coefficient. All statistical tests were assessed at the significance level of $\alpha = 0.05$.

4. Findings

This section presents the empirical findings of the study focusing on the relationship between gender and selected dimensions of workplace diversity attitudes. The analysis was conducted using the chi-square test of independence, which is appropriate for examining associations between categorical variables. In addition to assessing statistical significance, the strength of the identified relationships was evaluated using Cramer's V coefficient.

The results are reported in a structured manner for each examined variable. First, descriptive statistics and contingency tables are presented, including adjusted residuals to identify specific categories contributing to statistically significant differences. Subsequently, the results of the chi-square tests are interpreted, followed by an assessment of the strength of the associations. The section concludes with a conceptual model that visually summarizes the key empirical findings.

Table 1. Case Processing Summary (source: own elaboration)

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender * How important is workplace diversity to you?	201	100,0%	0	0,0%	201	100,0%
Gender * Do you consider diversity to be an asset to your company's organizational culture?	201	100,0%	0	0,0%	201	100,0%

The case processing summary indicates that the analysis was conducted on a complete dataset comprising 201 respondents, with no missing values recorded for any of the examined variables. Specifically, all 201 cases (100.0%) were valid for both relationships under investigation: (1) gender and the perceived importance of workplace diversity, and (2) gender and the perception of diversity as an asset to organizational culture.

The absence of missing data ensures the robustness of subsequent statistical analyses, as no cases were excluded due to incomplete responses. Consequently, the results of the chi-square tests and related measures can be interpreted without concerns regarding potential bias arising from data omission.

Table 2. Crosstab – Importance of the Diversity (source: own elaboration)

			How important is workplace diversity to you?			Total
			1	3	5	
Gender	1	Count	6	52	88	146
		Expected Count	10,2	51,6	84,3	146,0
		Adjusted Residual	-2,6	0,1	1,2	
	2	Count	8	19	28	55
		Expected Count	3,8	19,4	31,7	55,0
		Adjusted Residual	2,6	-0,1	-1,2	
Total	Count		14	71	116	201
	Expected Count		14,0	71,0	116,0	201,0

Table 2 presents the distribution of respondents' answers regarding the importance of workplace diversity by gender, including observed and expected frequencies as well as adjusted residuals.

From a descriptive perspective, the majority of respondents in both gender groups considered workplace diversity to be highly important (category 5). Specifically, 88 out of 146 respondents in gender category 1 (women) and 28 out of 55 respondents in gender category 2 (men) selected this option. Moderate importance (category 3) was also relatively frequent, reported by 52 respondents in gender category 1 (women) and 19 respondents in gender category 2 (men). In contrast, only a small proportion of respondents perceived workplace diversity as having low importance (category 1), with 6 respondents in gender category 1 (women) and 8 respondents in gender category 2 (men).

The analysis of adjusted residuals reveals where the observed frequencies significantly deviate from the expected values. A statistically significant difference was identified in the lowest importance category (category 1). Specifically, respondents in gender category 1 (women) were underrepresented in this category (adjusted residual = -2.6), indicating significantly fewer observations than expected. Conversely, respondents in gender category 2 (men) were overrepresented (adjusted residual = 2.6), suggesting significantly more observations than expected.

For the remaining categories (3 and 5), the adjusted residuals did not exceed the critical thresholds of ± 1.96 , indicating that the differences between observed and expected frequencies were not statistically significant.

Overall, these results suggest that the primary gender-based difference lies in the perception of low importance of workplace diversity, which is significantly more characteristic of respondents in gender category 2 (men), while respondents in gender category 1 (women) are less likely to consider diversity unimportant.

Table 3. Chi-Square Tests (source: own elaboration)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.867 ^a	2	0,032
Likelihood Ratio	6,087	2	0,048
Linear-by-Linear Association	4,004	1	0,045
N of Valid Cases	201		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.83.

The results of the chi-square test of independence indicate a statistically significant relationship between gender and the perceived importance of workplace diversity. Specifically, the Pearson chi-square statistic reached a value of 6.867 with 2 degrees of freedom, and the associated p-value ($p = 0.032$) is below the conventional significance threshold of 0.05. This finding suggests that the distribution of responses regarding the importance of workplace diversity differs significantly across gender categories.

In line with the research design, the following hypotheses were formulated:

- **H₀:** There is no statistically significant relationship between employees' gender and the perceived importance of workplace diversity.
- **H₁:** There is a statistically significant relationship between employees' gender and the perceived importance of workplace diversity.

Given that the p-value is lower than the established significance level ($\alpha = 0.05$), the null hypothesis (H_{01}) is rejected, and the alternative hypothesis (H_{11}) is supported. This confirms the existence of a statistically significant association between the examined variables.

The likelihood ratio test provides consistent evidence, yielding a value of 6.087 ($df = 2$, $p = 0.048$), which further supports the conclusion of a statistically significant association between the variables. Additionally, the linear-by-linear association test ($\chi^2 = 4.004$, $df = 1$, $p = 0.045$) indicates the presence of a significant trend, suggesting that the relationship between gender and perceived importance of workplace diversity follows an ordinal pattern.

It should be noted that one cell (16.7%) had an expected count lower than 5, with a minimum expected frequency of 3.83. However, this does not exceed the commonly accepted threshold (i.e., no more than 20% of cells with expected counts below 5), and therefore the assumptions of the chi-square test can be considered sufficiently met.

Overall, these results confirm the existence of a statistically significant association between gender and the perceived importance of workplace diversity.

Table 4. Symmetric Measures (source: own elaboration)

		Value	Approximate Significance
Nominal by Nominal	Phi	0,185	0,032
	Cramer's V	0,185	0,032
N of Valid Cases		201	

To assess the strength of the association between gender and the perceived importance of workplace diversity, Cramer's V coefficient was calculated. The results indicate a value of 0.185, with an associated significance level of $p = 0.032$.

This value suggests a weak association between the examined variables, according to commonly accepted interpretation thresholds for Cramer's V. Although the relationship between gender and the perceived importance of workplace diversity is statistically significant, its practical strength is relatively limited.

The Phi coefficient, which in this case attains the same value ($\Phi = 0.185$), confirms the consistency of the result. Overall, while gender appears to play a role in shaping attitudes toward the importance of workplace diversity, the magnitude of this effect can be considered small.

Table 5. Crosstab – Diversity as an Asset to the Company's Organizational Culture (source: own elaboration)

			Do you consider diversity to be an asset to your company's organizational culture?			Total
			1	3	5	
Gender	1	Count	13	47	86	146
		Expected Count	18,9	48,7	78,4	146,0
		Adjusted Residual	-2,8	-0,6	2,4	
	2	Count	13	20	22	55
		Expected Count	7,1	18,3	29,6	55,0
		Adjusted Residual	2,8	0,6	-2,4	
Total	Count		26	67	108	201
	Expected Count		26,0	67,0	108,0	201,0

Table 5 presents the distribution of respondents' perceptions of diversity as an asset to organizational culture by gender, including observed and expected frequencies as well as adjusted residuals.

From a descriptive standpoint, the largest proportion of respondents in both gender categories considered diversity to be a strong asset (category 5). This response was selected by 86 respondents in gender category 1 (women) and 22 respondents in gender category 2 (men). Moderate agreement (category 3) was reported by 47 respondents in gender category 1 (women) and 20 respondents in gender category 2 (men). The least favorable perception (category 1) was relatively less frequent, with 13 respondents in each gender category.

The analysis of adjusted residuals reveals statistically significant differences in two response categories. In the lowest category (1), respondents in gender category 1 (women) were significantly underrepresented (adjusted residual = -2.8), while respondents in gender category 2 (men) were significantly overrepresented (adjusted residual = 2.8), indicating that individuals in gender category 2 (men) were more likely than expected to perceive diversity as not being an asset.

Conversely, in the highest category (5), respondents in gender category 1 (women) were significantly overrepresented (adjusted residual = 2.4), suggesting that they were more likely than expected to perceive diversity as a strong asset to organizational culture. In contrast, respondents in gender category 2 (men) were significantly underrepresented in this category (adjusted residual = -2.4).

No statistically significant deviations were observed in the middle category (3), as the adjusted residuals remained within the ± 1.96 interval.

Overall, these findings indicate clear gender-based differences in the perception of diversity as an organizational asset. Respondents in gender category 1 (women) are more inclined to perceive diversity positively, whereas respondents in gender category 2 (men) are more likely to express less favorable attitudes.

Table 6. Chi-Square Tests (source: own elaboration)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.569 ^a	2	0,008
Likelihood Ratio	8,993	2	0,011
Linear-by-Linear Association	8,991	1	0,003
N of Valid Cases	201		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.11.			

The results of the chi-square test of independence indicate a statistically significant relationship between gender and the perception of diversity as an asset to

organizational culture. The Pearson chi-square statistic reached a value of 9.569 with 2 degrees of freedom, and the associated p-value ($p = 0.008$) is well below the 0.05 significance threshold. This confirms that the distribution of responses differs significantly across gender categories.

In line with the research design, the following hypotheses were formulated:

- **H₀:** There is no statistically significant relationship between employees' gender and the perception of diversity as an asset to organizational culture.
- **H₁:** There is a statistically significant relationship between employees' gender and the perception of diversity as an asset to organizational culture.

Given that the p-value is lower than the established significance level ($\alpha = 0.05$), the null hypothesis (H_{02}) is rejected, and the alternative hypothesis (H_{12}) is supported. This confirms the existence of a statistically significant association between the examined variables.

The likelihood ratio test further supports this conclusion, yielding a value of 8.993 ($df = 2$, $p = 0.011$), which also indicates a statistically significant association. In addition, the linear-by-linear association test ($\chi^2 = 8.991$, $df = 1$, $p = 0.003$) reveals a significant ordinal trend, suggesting that the relationship between gender and the perception of diversity as an organizational asset follows a systematic pattern across response categories.

Importantly, the assumptions of the chi-square test are fully satisfied in this case, as no cells (0.0%) have expected counts below 5, and the minimum expected frequency is 7.11. This strengthens the reliability of the test results.

Overall, these findings provide strong evidence of a statistically significant association between gender and the perception of diversity as a benefit to organizational culture.

Table 7. Symmetric Measures (source: own elaboration)

		Value	Approximate Significance
Nominal by Nominal	Phi	0,218	0,008
	Cramer's V	0,218	0,008
N of Valid Cases		201	

To evaluate the strength of the association between gender and the perception of diversity as an asset to organizational culture, Cramer's V coefficient was calculated. The results show a value of 0.218, with an associated significance level of $p = 0.008$.

This indicates a weak to moderate association between the variables, based on commonly accepted interpretation guidelines for Cramer's V. Compared to the previous analysis, the strength of the relationship is slightly higher, suggesting that gender differences are more pronounced in the perception of diversity as an organizational asset than in the perceived importance of workplace diversity.

The Phi coefficient ($\Phi = 0.218$) confirms the consistency of this finding. Overall, although the association is not strong, it is both statistically significant and substantively more meaningful than in the prior case, indicating that gender plays a somewhat more important role in shaping perceptions of diversity as a benefit to organizational culture.

To provide a more comprehensive and integrative overview of the empirical findings, the statistically significant relationships identified through the chi-square tests are summarized in the form of a conceptual path model. This visualization captures the associations between gender and the two examined dimensions of workplace diversity attitudes, namely the perceived importance of workplace diversity and the perceived organizational benefit of diversity. The model is based on the results of independent chi-square analyses and is intended as a descriptive and illustrative synthesis of the findings rather than as a causal or structurally estimated model.

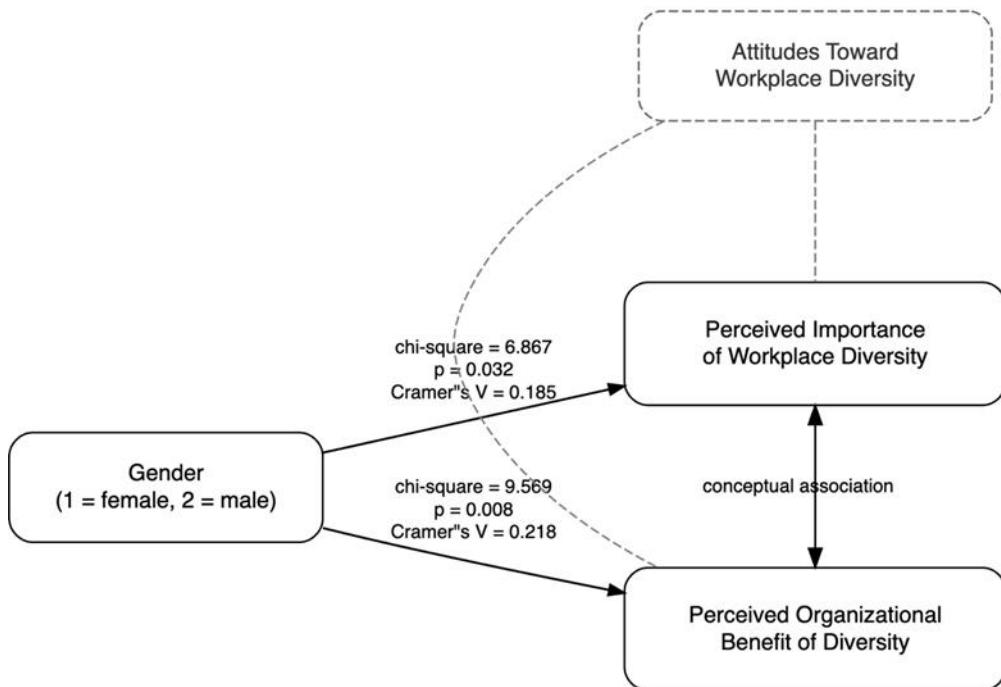


Figure 1. Conceptual model of the relationship between gender and attitudes toward workplace diversity (source: own elaboration)

As illustrated in Figure 1, gender is significantly associated with both examined dimensions of workplace diversity attitudes. Specifically, the analysis revealed a statistically significant relationship between gender and the perceived importance of workplace diversity ($\chi^2 = 6.867$, $p = 0.032$, Cramer's $V = 0.185$), as well as between gender and the perception of diversity as an organizational benefit ($\chi^2 = 9.569$, $p = 0.008$, Cramer's $V = 0.218$).

In both cases, the strength of association can be interpreted as weak, although the relationship is somewhat stronger for the perception of diversity as an organizational benefit. These findings suggest that gender differences are more pronounced in how employees evaluate the contribution of diversity to organizational culture than in how they assess its general importance.

The bidirectional link between the two attitudinal variables reflects their conceptual relatedness within the broader domain of attitudes toward workplace diversity. This connection is included for illustrative purposes and does not represent a statistically estimated relationship within the present analysis. Rather, it acknowledges that the

perceived importance of diversity and its perceived organizational benefits are likely to be interconnected dimensions of employees' overall attitudes.

Overall, the model provides a structured visual summary of the findings, highlighting that gender is a relevant factor in shaping employees' perceptions of workplace diversity, while also indicating that these effects are modest in magnitude.

5. Discussion

The aim of the paper is to examine the relationship between employees' gender and their attitudes toward workplace diversity in the Slovak Republic. The results indicate that statistically significant relationships exist in both cases. However, the strength of these relationships is weak, suggesting that while gender plays a role in shaping diversity perceptions, it is not the dominant determining factor.

Regarding RQ1, the findings revealed a statistically significant association between gender and the perceived importance of workplace diversity, with women more likely to assign higher importance to diversity compared to men. This result is consistent with prior research indicating that women tend to hold more favorable attitudes toward diversity-related initiatives and practices. One possible explanation lies in the differential experiences of men and women in organizational contexts. As highlighted by Son Hing et al. (2023), gender inequalities are embedded across multiple organizational processes, which may increase women's sensitivity to issues related to fairness, representation, and inclusion. Consequently, women may perceive diversity as more important because it directly relates to addressing structural disadvantages they are more likely to encounter.

Additionally, research suggests that employees' perceptions of diversity are shaped by organizational climate and leadership practices. Platania et al. (2025) demonstrate that a positive diversity climate and inclusive leadership significantly influence employees' attitudes and behavioral responses within organizations. From this perspective, gender differences in perceived importance of diversity may reflect variations in how men and women interpret and respond to organizational environments. Women, who may be more affected by inequities, could be more attuned to the presence or absence of inclusive practices, thus attributing greater importance to diversity.

At the same time, the relatively weak strength of the relationship observed in this study suggests that gender alone does not fully explain differences in diversity perceptions. This aligns with the argument that diversity attitudes are multidimensional and influenced by broader factors such as organizational culture, diversity beliefs, and contextual conditions (Turi et al., 2022). Therefore, while gender

differences exist, they should be interpreted within a broader framework that includes both individual and organizational determinants.

With respect to RQ2, the results also confirmed a statistically significant relationship between gender and the perception of diversity as an asset to organizational culture. Again, women were more likely than men to perceive diversity as beneficial. This finding is in line with studies emphasizing the positive organizational outcomes associated with diversity and inclusion. For example, Covington et al. (2025) show that organizations with stronger diversity and inclusion practices exhibit higher levels of innovation, highlighting the strategic value of diversity for organizational success. Similarly, Navjeet and Pallvi (2021) argue that gender diversity contributes to improved creativity, decision-making, and overall organizational performance, reinforcing the perception of diversity as a valuable organizational asset.

The gender-based differences identified in this study may also be interpreted through the lens of experiential and social factors. Women, who are more likely to face barriers in career advancement and workplace inclusion, may perceive diversity initiatives as mechanisms that enhance fairness and opportunity, thereby contributing positively to organizational culture. In contrast, some may perceive diversity initiatives as less personally relevant or may respond more neutrally depending on context. This interpretation is supported by research on team diversity suggests that it may function as a “double-edged sword,” simultaneously offering benefits while also generating tension or resistance depending on the context and individual perspectives (Verwijfs & Russo, 2023).

Furthermore, the findings can be linked to research on diversity beliefs and workplace outcomes. Islam et al. (2024) demonstrate that gender diversity positively influences workplace happiness through its interaction with diversity beliefs, suggesting that employees who value diversity are more likely to perceive its benefits. This indicates that perceptions of diversity as an asset are not only shaped by demographic characteristics but also by underlying beliefs and attitudes toward diversity. In this context, gender differences may reflect variations in these beliefs, rather than purely demographic effects.

Despite these significant relationships, the weak effect sizes observed in both RQ1 and RQ2 highlight the importance of avoiding overgeneralization. Gender differences in diversity perceptions, while present, are relatively modest. This finding supports the view that diversity attitudes are shaped by a complex interplay of factors, including organizational context, leadership, and individual experiences. For instance, Dagunduro et al. (2024) emphasize that organizational policies, mentoring systems, and inclusive practices play a crucial role in shaping employees' perceptions of gender

equality and diversity, suggesting that well-designed organizational interventions can reduce gender-based differences in attitudes.

Finally, it is important to consider the broader implications of these findings. The results suggest that organizations operating in the Slovak Republic should not assume homogeneous perceptions of diversity across employees. Instead, they should recognize that gender-based differences, although not strong, may influence how diversity initiatives are perceived and accepted. Promoting inclusive leadership, fostering a positive diversity climate, and addressing structural inequalities may help align employee perceptions and enhance the perceived value of diversity across all groups.

Despite the contributions of this study, several avenues for future research emerge that could further enhance the understanding of gender differences in workplace diversity perceptions.

First, given the relatively weak strength of the relationships identified, future studies should explore additional variables that may influence diversity perceptions more substantially. Factors such as age, education level, organizational position, tenure, and prior experience with diversity initiatives may provide a more comprehensive explanation of employees' attitudes. In particular, examining the role of diversity beliefs and personal values could help clarify why individuals differ in their perceptions of diversity importance and its organizational benefits (Turi et al., 2022; Islam et al., 2024).

Second, future research could adopt a multilevel approach, incorporating organizational-level variables such as diversity policies, leadership styles, and organizational culture. Prior studies suggest that inclusive leadership and a positive diversity climate significantly shape employee attitudes (Platania et al., 2025). Therefore, combining individual-level and organizational-level data would provide deeper insight into how structural and contextual factors interact with gender in shaping diversity perceptions.

Third, further studies should consider cross-cultural comparisons. Since this study is limited to the Slovak Republic, it remains unclear whether the observed gender differences are culturally specific or generalizable across different national contexts. Comparative research across countries with varying levels of gender equality and diversity maturity could reveal important contextual differences and contribute to the broader international literature.

Another important direction involves the use of longitudinal research designs. The present study is based on cross-sectional data, which limits the ability to draw conclusions about causality. Longitudinal studies would allow researchers to examine

how diversity perceptions evolve over time, particularly in response to organizational changes, diversity initiatives, or broader societal developments.

Additionally, future research could benefit from incorporating qualitative methods, such as interviews or focus groups, to capture deeper insights into employees' subjective experiences. While quantitative data identify patterns and relationships, qualitative approaches can reveal underlying reasons, motivations, and interpretations that shape diversity perceptions, especially in relation to gender.

Finally, it would be valuable to expand the scope of research beyond binary gender categories and incorporate a more intersectional perspective. As highlighted in recent studies, workplace experiences and perceptions of diversity are shaped by multiple, overlapping identities, including ethnicity, age, sexual orientation, and socioeconomic background (Chakraborty & Baltes, 2025). Exploring these intersections would provide a more nuanced understanding of diversity perceptions and better reflect the complexity of contemporary workplaces.

In summary, future research should move beyond single-factor explanations and adopt more comprehensive, multi-method, and context-sensitive approaches. Such efforts would contribute to a deeper understanding of how diversity is perceived and experienced across different employee groups and organizational settings.

6. Conclusion

This study aimed to examine the relationship between employees' gender and their attitudes toward workplace diversity in the Slovak Republic. Based on data collected from 201 employees and analyzed using chi-square tests of independence, the findings revealed statistically significant relationships in both examined dimensions.

The results indicate that women are more likely than men to attribute greater importance to workplace diversity and to perceive diversity as a beneficial component of organizational culture. These findings are consistent with existing research suggesting that gender influences how employees perceive diversity-related issues, likely due to differences in workplace experiences and exposure to structural inequalities. At the same time, the strength of the identified relationships was weak, as indicated by Cramer's V coefficients, suggesting that gender represents only one of several factors shaping diversity perceptions.

From a theoretical perspective, the study contributes to the growing body of literature on workplace diversity by providing empirical evidence from a Central and Eastern European context, which remains underrepresented in diversity research. The findings support the view that diversity perceptions are not solely determined by

demographic characteristics but are influenced by a complex interplay of individual experiences, organizational context, and broader socio-cultural factors.

From a practical standpoint, the results highlight the importance for organizations to adopt a nuanced approach to diversity management. Although gender-based differences in perceptions are not strong, they may still influence how diversity initiatives are received and implemented within organizations. Therefore, organizations should focus on fostering inclusive leadership, promoting a positive diversity climate, and designing diversity strategies that resonate with diverse employee groups. Such efforts can enhance the perceived value of diversity and support the development of inclusive organizational cultures.

At the same time, the study is subject to several limitations that should be acknowledged. The use of a convenience sample and a cross-sectional research design limits the generalizability of the findings and does not allow for causal interpretations. In addition, the operationalization of gender as a binary variable may not fully capture the complexity of gender identity in contemporary workplaces.

Overall, this study provides important insights into gender differences in workplace diversity perceptions and underscores the need for further research that incorporates additional variables, adopts multi-level and longitudinal approaches, and considers broader contextual influences. By advancing the understanding of how diversity is perceived in the Slovak Republic, the study contributes to both academic discourse and practical efforts aimed at fostering more inclusive and effective organizational environments.

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BAŠA, K. & MACHOVÁ, R. / *Organizational Practices and Generational Differences in Women's Return to Work After Childbirth*

The Organizational Practices and the Generational Differences in Women's Return to Work After Childbirth

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Abstract

Over the past decades, women's return to the work after childbirth has emerged as a key topic in the research on work-family reconciliation, driven by the rising labour market participation of younger generations and the evolving nature of employment arrangements. The timing and pathways of returning to work are not solely determined by individual choices, but are closely shaped by organizational practices and corporate policies. This study investigates the role of organizational practices in supporting post-childbirth workforce reintegration and examines generational differences between women from Generations Y and Z. Using an empirical approach, the research evaluates the planned duration of leave, intended pathways for returning to paid employment, as well as the expectations of programs designed to facilitate reintegration. The data analysis was conducted with mathematical and statistical methods in IBM SPSS Statistics. The findings reveal generational differences in the reintegration strategies adopted, highlighting the importance of tailored organizational practices. These results contribute to the academic literature and provide practical insights for employers and decision-makers seeking to develop sustainable career paths and align workplace policies with the expectations of younger generations.

Keywords: childbirth, generational differences, return to work, working mothers

JEL Classification: J13, J16, J22, M12

1. Introduction

If we compare the labor market situations of women and men, we can conclude that women's situation differs from men's in almost every respect. Employment rates, job opportunities, earnings, working conditions, and access to employment support services are all more favorable for men (and this is without even considering child-rearing). The main results of gender inequalities in the labor market are unequal treatment, unequal pay, and horizontal and vertical segregation in the labor market (Vajda, 2014). Similarly, Haasler (2014) notes that women with low or medium-level skills are more likely to advance only horizontally in their careers, rather than vertically. Another common challenge in women's careers is the overlap between role expectations, family needs, their partner's career, and, in many cases, the low return on the time and energy invested in education.

Tímár (2017) emphasizes that the roots of the differences in the employment structures of men and women lie in motherhood, as women generally leave the labor market more frequently and for longer periods due to child-rearing, and their professional development is not always guaranteed during this time. Having children also exerts a significant influence on women's economic activity because the return of mothers with young children to the labor market is either impossible or very difficult to achieve (Kállai 2022; Hrubá 2016, based on Křížková 2011). Fedor and Toldi (2017) also drew attention to the marginalization of women in the labor market, noting that as a result of being absent from work for years, mothers are unable to accumulate as much work experience as men or their childless female counterparts, and that a long period away from the labor market can lead to exclusion. According to Casarico and Lattanzio (2023), having children increases the likelihood of unemployment, reduces the chance of holding a leadership position, and increases the likelihood of working in jobs with lower productivity, sales volume, capital, and wages.

It is important to emphasize, however, that having children is beneficial at both the individual and societal levels; therefore, the solution lies in creating opportunities for integration for individuals who have been involuntarily excluded (Fedor, 2015; Koncz, 2016). Chan (2013) also points out that, due to the parent-child relationship, it is definitely worthwhile to spend some time with the child, away from the labor market.

From the perspective of female employees, the question arises: if timing is a factor, is it advisable to consciously plan when to have children? If this occurs shortly after starting a career, it jeopardizes future employment and career advancement; conversely, if a woman has children after building a career over several years, her age may negatively impact the success of having children.

In this study, we examine the topic of labor market reintegration from a generational perspective by studying mothers who are raising children under the age of 3 and are about to return to the workforce. In the theoretical section of the study, we summarize the factors that influence the success of labor market reintegration and demonstrate how this can be supported at the organizational level. From the employers' perspective, we consider it important to highlight several best practices that can positively impact mothers' reintegration. The chapter on methodology outlines the process of the primary research, research questions, and hypotheses. Following the presentation of the results, the study will conclude with a summary of our findings.

2. Theoretical background

If a certain activity is suspended for several years, returning to it often poses challenges. This is no different for mothers of young children when it comes to work.

Marošiová and Šumšalová (2006) describe working mothers as employees who are considered an efficient workforce, highly motivated and loyal to their workplace, and eager to develop their professional knowledge and skills. Childcare requires responsibility, perseverance, and resourcefulness, which also become part of these women's personalities. These are factors that, in theory, could place mothers in a favorable position in the labor market; however, in many cases, the reality is quite the opposite: due to childbearing or child-rearing, mothers constitute a vulnerable group within the workforce.

Demeter and Nagy (2008) categorized the factors that can either facilitate or hinder reintegration into two groups: structural factors (economic environment, tools available for job search, prevalence of alternative work arrangements and family-friendly workplaces, assistance provided by the public welfare system when having a child) and individual-related factors (professional skills, self-assessment, self-presentation, extent of the family support network, values regarding child-rearing). Successful or unsuccessful reintegration into the labor market greatly influences the well-being of the individual concerned, as work and the income derived from it contribute to an improvement in quality of life as well as to a strengthening of individuals' self-esteem (Fedor, Fónai, 2013; Fedor, 2015; Fedor, Toldi, 2017).

Reintegration into the labor market is positively influenced by whether mothers have previously been able to build a career, as they tend to have greater confidence in returning to the labor market because they know they are capable of performing well (Demeter, Nagy, 2008). According to Győrvári-Tumpek and Kenderfi (2022), the following factors are also important for successful reintegration: family support, self-care, childcare, employers, skills and continuing education.

An appropriate reintegration strategy is crucial for the return of mothers with young children to the labor market, as they may face numerous challenges in its absence. A potential problem during labor market reintegration is that a prolonged absence from work may erode women's workplace skills and opportunities for promotion or professional development, and may also alter their career ambitions (Del Boca et al., 2009; Evertsson, Duvander, 2011). An additional challenge is that returning to work results in a much tighter schedule, which significantly complicates a mother's ability to balance work and home responsibilities (Drjenovszky, Sztáray Kézdy, 2022). Turning to reintegration strategies, it can be said that prior experiences serve as the starting point when implementing specific strategies (Demeter, Nagy, 2008). Demeter and Nagy (2008) identified three major groups of mothers with young children based on the labor market reintegration strategies they choose:

- specialist – they frequently ask family members and acquaintances if they know of any open positions; when job hunting, they send their CV's to only a few specific places; they have a strong desire for professional development;
- sector-independent – they search for work intensively, sending their resumes to multiple places at once; they are interested in a wide variety of jobs and do not have a specific field of expertise;
- drifter – most often do not look for work because of their husband's or partner's job, though they might be able to take on a part-time position.

The success of reintegration into the labor market can be enhanced if mothers receive some form of assistance, such as through reintegration programs or projects. We believe that programs supporting the labor market reintegration of women with young children play an important role in economic and social development, as they help promote mothers' participation in the labor market and thereby support families as well. Such programs also contribute to reducing gender inequalities in the labor market, improve families' financial situations, and help achieve a better work-life balance. However, we consider it important that these programs truly align with the needs of women with young children and are implemented in accordance with the target group's requirements, as childcare options and the workplace environment are not always supportive. It is not enough to simply help people find jobs; those designing government reintegration programs should also consider, among other things, expanding daycare capacity or ensuring flexible working conditions.

Successful labor market reintegration can be supported not only by the government but also by employers. According to Kaszás Korén (2012), female employee satisfaction and the family-friendly nature of the workplace are moderately correlated. Her research indicates that flexible working hours, the achievement of work-life balance, and the possibility of atypical employment are the factors that most

contribute to making a workplace family-friendly in the eyes of female employees. Employers and childcare institutions (nurseries, kindergartens, after-school programs) play a crucial role in successful reintegration.

Hirsch (2006) identified three key processes necessary for the successful labor market reintegration of mothers with young children:

- sustainable entry strategies – it is necessary to support women in seeking better working conditions rather than accepting precarious, low-wage, casual jobs;
- support for new entrants – providing training opportunities, career counseling, and mentoring;
- improving workplaces – offering better wages, working conditions (including family-friendly work arrangements), and stronger job security (Baxter, Renda, 2011).

Even today, there are numerous (mostly multinational) companies that serve as good examples of contributing to easier labor market reintegration (Trexima, 2020):

- ExxonMobil has a family counselor who provides assistance in numerous family-related areas, such as: parental leave, planning a return to work, family law, taxation and social security as a parent, and the local education system;
- Vodafone's monthly newsletter, titled "Mamma Mia," informs mothers on maternity or parental leave about company news, changes, work and development opportunities, as well as corporate events, so that mothers do not completely lose touch with their team, and their colleagues;
- Hennlich has its own on-site daycare center; the Hennlich Baby Club is open to employees' children aged 1–4, operates based on Montessori principles, and its success is best measured by the fact that 100% of employees return to the company after maternity or parental leave;
- Avast has a children's corner where childcare and all-day programs are available for them;
- Pursuit Marketing allows its employees who are raising children to work during the school year and spend time with their children during school breaks.

Based on the above, we can see that employer support for mothers with young children is of paramount importance for successful reintegration into the labor market, and this is beneficial for both parties in the long term. From the employer's perspective, key benefits include lower turnover, higher employee satisfaction, and better workplace performance, not to mention that family-friendly measures make the workplace more attractive and inclusive, thereby contributing to long-term competitiveness. From the employee's perspective, support provided before, during, and after parental leave clearly facilitates a smooth return to work, reduces stress during the transition, and builds trust in the employer.

3. Methodology

The main objective of the research was to determine whether there are differences between Generations Y and Z regarding issues related to the labor market reintegration of mothers with young children. A large proportion of both generations are already active in the labor market, and most mothers today who are raising children under the age of 3 fall into these two age groups.

Mothers raising children under the age of 3 were chosen as the subjects of our research (in cases with multiple children, the age of the youngest child was considered) because this allowed us to ask all of them about their plans for reintegration into the labor market. In their case, reintegration into the labor market is expected to occur within a few years, so their insights and opinions on the matter are considered current.

The two main research questions were as follows:

- RQ1: Do different generations differ in the number of years they remain out of the labor market while raising children?
- RQ2: Do different generations differ in the labor market reintegration strategies they employ?

An online questionnaire survey was chosen as the research method because the target participants are currently difficult to reach in person due to parental leave. The sampling method used was the snowball method, through which the questionnaire was distributed to 50 mothers raising children under the age of three. They were asked to forward it to 10 another mother raising children under the age of three. The number of valid responses received was 306. Of these, 140 respondents belong to Generation Y, and 166 to Generation Z.

In the questionnaire, mothers of young children were asked for example about how up-to-date they feel their professional knowledge is, whether they could start working immediately, whether they are concerned about reintegrating into the labor market, whether they would participate in reintegration programs, and what their expectations are regarding these programs.

Based on the research questions, two hypotheses were formulated:

- H1: The planned duration of staying at home before returning to work differs significantly across generations among mothers of young children.
- H2: Labor market reintegration strategies differ significantly across generations among mothers of young children.

For both hypotheses, the null hypothesis implies the absence of a relationship between the variables. Since all of the variables examined are measured on a non-metric scale (i.e., they are nominal or ordinal variables) a cross-tabulation analysis and a chi-square test were performed to examine the relationship due to the dependency between variables. The diagrams were created and the data were coded using Microsoft Excel, while the hypothesis testing was performed using IBM SPSS Statistics 25 statistical software.

The results of this research may be useful for policymakers, companies, and mothers of young children.

4. Results

An important step in generational analysis is defining each generation: determining the age range within which individuals belong to a given generation. To determine this, we used Steigervald's (2021) categorization, which places Generation Y between 1980 and 1994 and Generation Z between 1995 and 2010 (year of birth). Respondents were asked to provide their exact age, and we used this information to create the two groups. The average age of the respondents was 30.3 years. 140 mothers belonged to Generation Y, and 166 to Generation Z.

Regarding reintegration into the labor market, first respondents were asked whether, if given the opportunity, they would be able to start working immediately and whether they felt their knowledge in their own profession was up to date (Figure 1.).

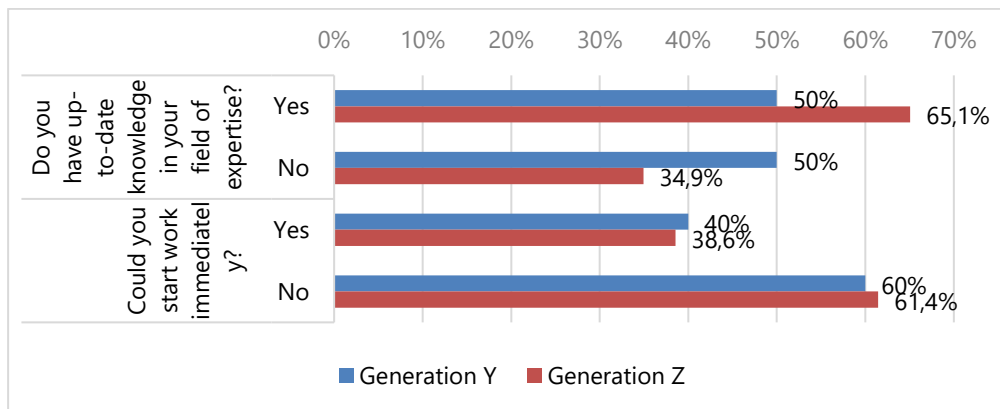


Figure 1. Willingness for immediate labor market re-entry and the up-to-dateness of knowledge among Generations Y and Z. (source: own editing)

Regarding immediate employment, the difference between the generations was less than 2%, but when it came to assessing the up-to-date nature of their knowledge, the difference was more striking. Generation Y split their responses 50-50 between "yes" and "no," whereas nearly two-thirds of Generation Z feel their professional knowledge is up to date. We can assume that the reason for this is that the younger generation is more likely to be raising only one child, whereas in the case of Generation Y, if a mother is away from the labor market due to raising a second or third child, her professional knowledge has not been used for several years and thus becomes outdated more easily. For Generation Z, a favorable factor regarding this issue is that, due to their young age, they graduated from high school or college in previous years, so they may feel their knowledge is more up-to-date.

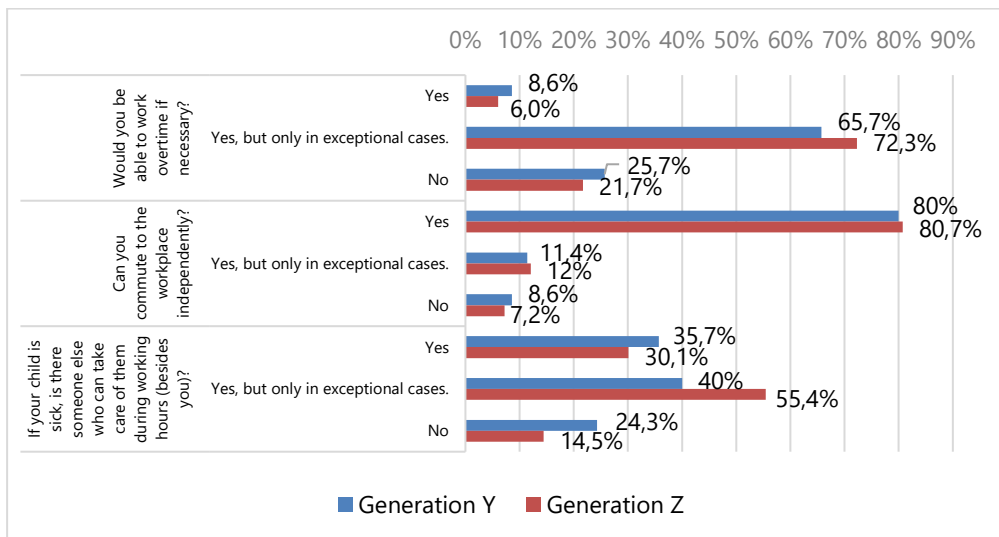


Figure 2. Willingness to work overtime, to commute to the workplace, and to managing childcare for a sick child among Generations Y and Z. (source: own editing)

Regarding the question (Figure 2.) of whether respondents would be willing to work overtime, the proportion of those who answered "no" was again higher among Generation Y (25.7%). The majority of both generations would be willing to do so, but only in special cases, rarely. Regarding commuting to work, 80% of both generations responded that this would not be a problem for them. The proportion of negative responses was again higher among Generation Y (8.6%). An important question from the employer's perspective is whether an employee can arrange childcare if their child is sick, or whether the child's illness always results in the mother of a young child being absent from work. More than half of Generation Z could arrange childcare in special cases. Among Generation Y, the proportion of those who answered yes or indicated

they could arrange this in special cases was similar. Nearly a quarter of this generation indicated that they would be unable to arrange childcare if their child were sick, which means this would result in them missing work.

In our country, Slovakia, paid parental leave lasts for 3 years (in certain cases, primarily for health reasons, up to 6 years). The research examined whether mothers of young children plan to fully utilize this time or would prefer to return to the workforce sooner. If someone indicated an earlier return, we also asked about the specific reason, as there may be numerous other motivations behind this besides financial ones.

More than two-thirds of Generation Y respondents and nearly three-quarters of Generation Z respondents would like to fully utilize the three-year period of paid parental leave. Returning to the labor market when the child is 2 years old or 2.5 years old is characteristic of 12% of Generation Y and 10.2% of Generation Z. Reintegration into the labor market before the child is 1.5 years old was indicated by a low percentage of both generations.

Hypothesis H1 examined whether there is a significant difference between the two generations regarding the length of parental leave they plan to take. We hypothesized this difference because, due to Generation Z's younger age, they may wish to return to the labor market sooner to begin building their careers. In the analysis, the independent variable was the respondents' age (generation), and the dependent variable was the time of return to work. Both variables are measured on a non-metric scale, so we performed a chi-square test to test the hypothesis (Table 1.). The number of valid cases was 290.

Table 1. Chi-square test – H1 hypothesis (source: own editing in IBM SPSS Statistics 25)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.423 ^a	3	.489
Likelihood Ratio	2.424	3	.489
Linear-by-Linear Association	.003	1	.955
N of Valid Cases	290		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.34.

Based on the results of the analysis, the chi-square test did not reveal a significant association between the variables examined, $\chi^2(3) = 2.423$, $p = 0.489$. Therefore, the alternative hypothesis H1 was rejected and the null hypothesis was accepted, which states that there is no significant relationship between the two variables.

When asked what the reason would be if they decided to reintegrate into the labor market sooner (Figure 3.), the majority in both generations cited improving their family's financial situation (Y: 61.7%; Z: 59%). In both generations, around 13% would start working sooner than three years due to a feeling of isolation at home. Also notable is the proportion of Generation Z regarding the need for their own income, as 14% of them would return to the labor market earlier due to a lack of a sense of equality in their relationships.

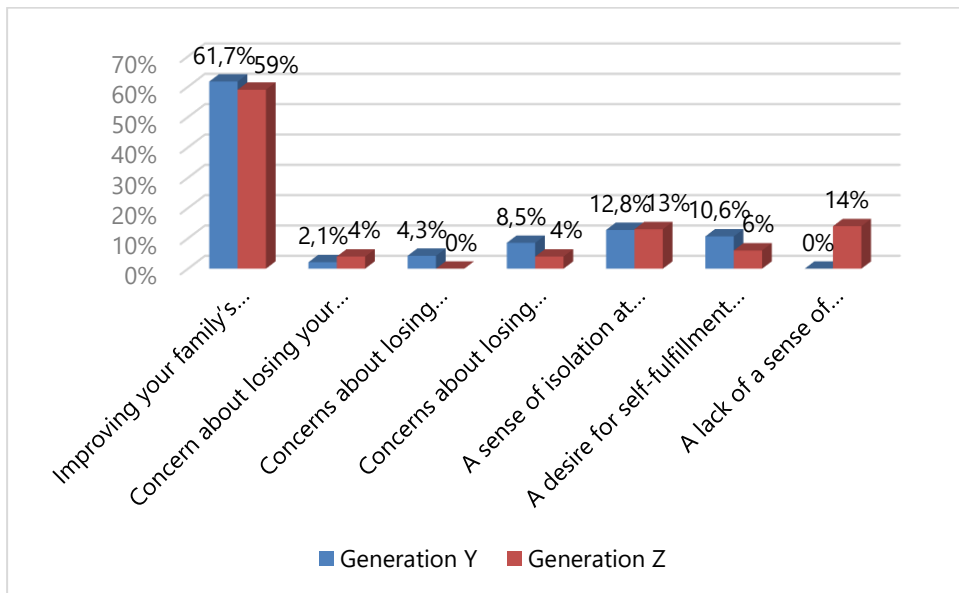


Figure 3. Reasons for earlier labor market reintegration among Generations Y and Z. (source: own editing)

The next question (Figure 4.) asked to what extent mothers of young children fear that they will not find a job or be unable to return to their previous workplace after their childcare leave ends (1 – not at all, 7 – completely).

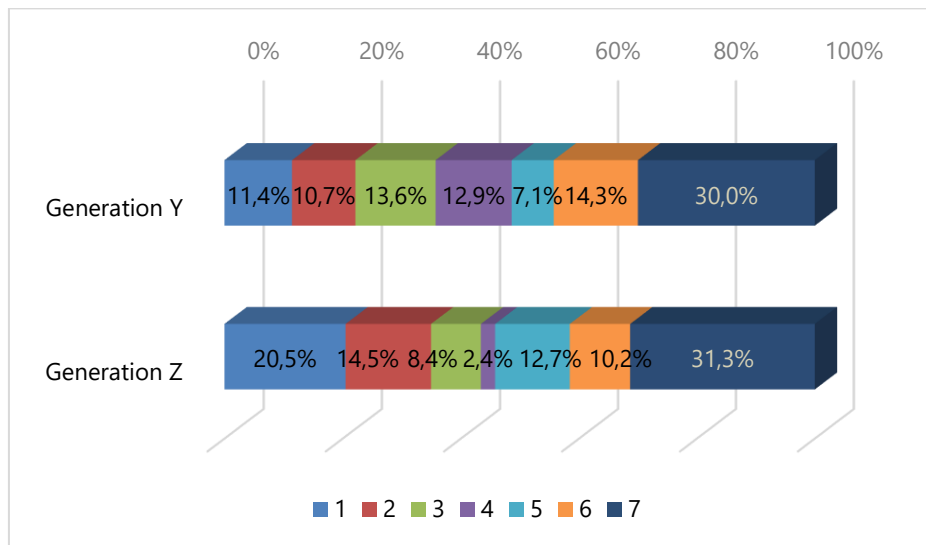


Figure 4. Level of concern regarding unsuccessful labor market reintegration among Generations Y and Z. (source: own editing)

The proportion of those who selected the three highest values is similar across generations. Combining the first two values, 22.1% of Generation Y respondents do not really fear unsuccessful reintegration into the labor market. For Generation Z, this proportion is 35%. The average for Generation Y is 4.56, and for Generation Z, 4.28. Based on the results, therefore, the level of concern regarding unsuccessful labor market reintegration is higher among Generation Y mothers with young children.

Regarding the method of labor market reintegration, we based our analysis on labor market reintegration strategies. Based on this, three categories were identified: sector-independent, specialists, and drifters. The mothers of young children participating in the study read the descriptions of each group in the questionnaire and had to decide which one applied to them more. Those for whom none of these applied could select the "other" option. In total N=249 responses were received to this question (Generation Y: 112; Generation Z: 137). Among Generation Y, 22.9% are sector-independent. The proportion of drifters is not far behind (18.6%), but most fell into the specialist category. Among Generation Z, specialists (42.2%) were also the most numerous. One-third (33.1%) are sector-independent, while the proportion of drifters is only 7.2%.

Table 2. Chi-square test – H2 hypothesis (source: own editing in IBM SPSS Statistics 25)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.903 ^a	2	.004
Likelihood Ratio	10.991	2	.004
Linear-by-Linear Association	8.976	1	.003
N of Valid Cases	249		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.09.

Table 3. Cramer's V – H2 hypothesis (source: own editing in IBM SPSS Statistics 25)

		Value	Approximate Significance
Nominal by Nominal	Phi	.209	.004
	Cramer's	.209	.004
N of Valid Cases		249	

The second hypothesis examined whether a significant relationship could be demonstrated between the two generations in terms of the labor market reintegration strategies they employ. Based on the results of the chi-square test, the difference between the generations examined is significant (Table 2.): $\chi^2(2) = 10.903$, $p = 0.004$. Therefore, Hypothesis H2 was accepted and the null hypothesis was rejected, which states that there is no relationship between the variables.

The analysis of the strength of the relationship indicates a statistically significant but weak association between the variables. The value of Cramer's V is 0.209 (Table 3.).

The theoretical section of the study mentioned various labor market reintegration programs. Respondents were also asked whether they would take advantage of the opportunity to participate in such a program if given the chance (Figure 5.).

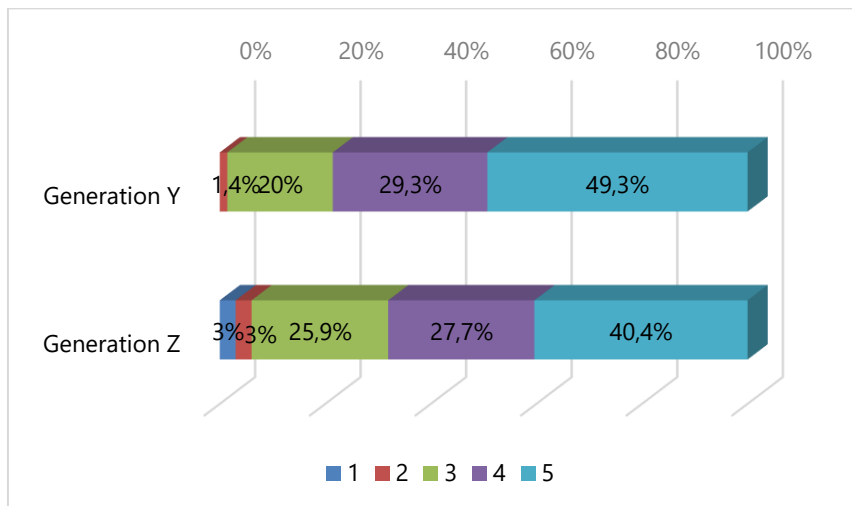


Figure 5. Willingness to participate in labor market reintegration programs among Generations Y and Z. (source: own editing)

It is encouraging to note that the proportion of those who indicated the strongest willingness was very high for both generations (Y: 49.3%; Z: 40.4%). In the case of Generation Y, more than three-quarters of respondents selected a rating of 4 or 5, while in the case of Generation Z, more than two-thirds of respondents did so. The proportion of those who would not like to participate in labor market reintegration programs is very low for both generations.

More than half of the mothers of young children surveyed responded that their main expectation regarding such programs is that they help them achieve a better work-life balance (54.2%) and assist with childcare outside of kindergarten or school hours (50.3%). Mothers of young children could select multiple options for this question. 44.4% indicated skill development in their profession, while 39.9% cited establishing contact with employers. An additional 32% would expect labor market reintegration programs to help them learn a new profession, while 22.9% would expect assistance in updating and making their CV-s and cover letters more appealing.

5. Discussion and Conclusion

The focus of our study was on organizational practices and generational differences related to the labor market reintegration of mothers with young children. From an organizational perspective, the theoretical section of the study presented several steps and best practices that can have a significant positive impact on women's return to the labor market after having children. From this perspective, we identified sustainable entry strategies, support for new entrants, and workplace development as the most

important factors (Hirsch, 2006). Corporate practices cited as examples also play a significant role, such as company-run daycare centers, child care areas, creating conditions to align work hours with daycare or school hours, having a family counselor within the company, and regularly informing mothers about company updates.

The purpose of the primary research was to determine whether there are differences between Generations Y and Z regarding issues related to the labor market reintegration of mothers with young children.

When asked whether they could start working immediately if necessary, approximately 60% of both generations answered no; however, a higher proportion of Generation Z responded yes regarding the up-to-date nature of their professional skills. We attribute this to their young age; we assume that most of them have only one child and have not been away from the labor market as long as those in Generation Y who already have multiple children. Similar response rates were received for questions regarding overtime, commuting to work, and childcare during a child's illness. For every question, the highest proportion consisted of those who could manage the three activities, but only in special cases, not on a regular basis.

Hypothesis H1 examined whether there is a significant difference in the amount of time mothers of young children participating in the study plan to spend away from the labor market. The chi-square test did not yield a statistically significant result; Hypothesis H1 was rejected and the null hypothesis was accepted. The majority of mothers with young children in both generations would like to take full advantage of the three years of paid parental leave provided by the state. Leitheiser and Veroszta (2021) note that women who do not plan to return to work for a long time after having children tend to choose jobs and professions from which it is easy to leave and later return. Mothers who do not plan to take the full three years of parental leave, however, prefer workplaces that support the participation of mothers with young children.

If mothers were to return to the labor market sooner than three years after giving birth, the main motivation for both generations would be to improve the family's financial situation. This confirms the findings of research conducted by the Slovak market research and consulting firm Trexima and the Institute of Sociology at the Czech Academy of Sciences (Trexima, 2017; Bottánková, 2021). Fourteen percent of Generation Z respondents also cited a desire for a sense of equality in a relationship/marriage.

The extent to which our respondents fear the failure of reintegration into the labor market was also examined. Based on the results, the level of concern is higher among older, Generation Y mothers. This may also be influenced by the fact that older women already have more children, so absences from work due to various family reasons or illnesses may be potentially more frequent. Furthermore, if reintegration occurs after having more children (and consequently more years) professional skills may also erode.

Hypothesis H2 examined the strategies employed during re-entry into the labor market. Based on the chi-square test, a significant difference can be identified between the generations; thus, the generation to which mothers with young children belong influences the strategy they employ during labor market reintegration.

Willingness to participate in labor market reintegration programs was very high for both groups. The most important expectations regarding such programs from both generations are that they help achieve a better work-life balance and provide childcare solutions outside of kindergarten or school hours.

Based on the results, we can conclude that while certain differences regarding labor market reintegration can be identified among Generation Y and Z mothers with young children, in most cases the differences are small. A statistically significant difference was found regarding labor market reintegration strategies.

A limitation of the research was the difficulty in reaching mothers with young children; since these were non-working individuals staying at home with their children, we could only rely on online sampling methods. A possible future direction for the research could be to examine not only the situation prior to labor market reintegration, but also the conditions during and after it, potentially expanding the study internationally to include multiple countries.

The labor market reintegration of mothers with young children has long posed a significant challenge. With this study, we sought to highlight the most important issues and thereby contribute to enabling employers and policymakers to develop sustainable career paths and workplace practices that, by taking into account the needs of both generations examined, can support the long-term successful labor market participation of mothers with young children.

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HÚŽEVKA, M. & ŠRÁMKA, M. / *Crisis Communication in the Context of New Threats: The Perspective of Students at a Slovak University*

Crisis Communication in the Context of New Threats: The Perspective of Students at a Slovak University

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Abstract

The aim of this paper is to examine the communication behavior and level of information preparedness of students and employees of a selected university in the Slovak Republic in the event of a sudden crisis situation and in the context of new security threats. The research was conducted in the form of a questionnaire survey on a sample of 358 respondents, predominantly students of Alexander Dubcek University in Trencin. The study focuses on four areas: experiences with disinformation during crisis situations, preferred sources of initial information, subjective perception of preparedness to respond to crisis events, and the evaluation of social media as a tool of crisis communication. Methods of descriptive statistics were used for data analysis, and the study constituted a micro-survey conducted within a specific university. The results showed that a significant majority of respondents (74.6%) had witnessed the spread of disinformation, panic, or alarmist messages on social media during crisis events. As a primary source of information, respondents would most often use the university's official communication channels, especially university Microsoft accounts (37.7%) and websites (32.4%), while a smaller proportion would prefer social media (20.4%). In terms of preparedness to respond to crisis situations, a feeling of insufficient information prevailed, as nearly half of the respondents disagreed with the statement that they know how to behave in such situations. Nevertheless, most respondents consider social media to be a potentially effective tool in addressing threats and crisis events. The findings highlight the importance of systematic, rapid, and trustworthy communication by universities and the need to increase awareness and preparedness of the academic community for crisis situations, particularly with regard to the potential of previously underutilized communication channels. The presented paper complements existing research with insights from the Central European university environment.

Keywords: university security, information preparedness, crisis communication, crisis management, Slovak Republic

1. Introduction

In today's dynamic and rapidly evolving environment, societies are increasingly exposed to a wide range of unexpected situations, disruptions, and crisis events that are becoming a constant feature rather than isolated occurrences. These developments highlight the growing importance of crisis management and, in particular, crisis communication as key components of effective response at both macro (societal and institutional) and micro (organizational and individual) levels. The ability to anticipate, manage, and communicate during crises has therefore become essential for ensuring stability, resilience, and informed decision-making across different sectors.

Crisis communication has become an essential component of managing contemporary threats, which are increasingly complex, dynamic, and shaped by information flows. In such environments, the availability of timely, accurate, and credible information plays a crucial role in shaping public perception and guiding individual and collective responses. At the same time, the growing influence of digital media and social platforms has transformed the way information is produced, disseminated, and consumed, creating new challenges related to misinformation, information overload, and source credibility.

University environments represent a specific context within this broader landscape, as they bring together diverse groups of individuals who rely on multiple information channels during crisis situations. Students and university employees are not only recipients of information but also active participants in its dissemination, particularly within digital networks. Their information behavior, trust in sources, and perceived level of preparedness therefore play an important role in the overall effectiveness of crisis communication within academic settings.

The following section provides an overview of relevant literature on crisis communication, misinformation, social media, and information behavior in order to establish the theoretical framework for the analysis.

The paper is structured as follows. The following section provides an overview of relevant literature on crisis communication, misinformation, social media, and information behavior in order to establish the theoretical framework for the analysis. This is followed by a separate section describing the research methodology, including data collection procedures. Subsequently, the paper presents the analysis of the collected data and their interpretation. The final section summarizes the key findings and outlines their implications for crisis communication in higher education contexts.

2. Literature review

Crisis communication is a fundamental component of crisis management, particularly in situations characterised by uncertainty, urgency, and high information demand. It is closely linked to risk and disaster communication and extends beyond protecting organisational reputation to influencing public behaviour and supporting effective response and recovery processes (Houston et al., 2015). In contemporary contexts, crisis communication is increasingly shaped by digital environments, where social media enables real-time information dissemination and contributes to situational awareness among both institutions and the public (Abboodi et al., 2023; Shahbazi and Bunker, 2024) .

Effective crisis communication depends on the provision of timely, accurate, and transparent information, as a lack of reliable information can increase uncertainty and facilitate the spread of misinformation (Liu and Yang, 2022; Muhammed and Mathew, 2022) . This is particularly relevant in modern crises, which are often described as "information crises", where the flow and interpretation of information directly influence crisis outcomes (Xie et al., 2020) . While social media plays a key role in enabling rapid communication and public engagement, it also introduces risks related to misinformation, which can have harmful consequences and undermine trust in official sources (Tran et al., 2021; Terry et al., 2023) . At the same time, these platforms remain essential tools for crisis communication, supporting information dissemination and interaction during emergency situations (Stolero et al., 2024; Stimpson et al., 2025).

Contemporary crisis situations are increasingly accompanied by the rapid spread of misinformation, which poses a serious challenge to effective crisis communication within organisations. Misinformation, understood as false, incomplete, or misleading information related to ongoing crises, can take various forms such as rumors or unverified claims and significantly affect public safety, trust, and organisational response processes (Mehta et al., 2021) . According to Shahbazi and Bunker (2024), crises in the digital age are often accompanied by an infodemic, where an overabundance of information complicates the development of shared situational awareness between institutions and the public.

Jungblut et al. (2024) highlight that social media have become essential tools for crisis communication, enabling organisations, particularly public institutions to provide information, communicate with relevant publics, and monitor stakeholders' reactions. In line with this, Shi et al. (2023) emphasize that public sector and nonprofit organisations use social media not only to provide information and interact with citizens, but also to manage public emotions and enhance community resilience during crises. This perspective is further complemented by Koli (2024), who highlights the dual nature of social media as both an effective communication channel and a potential source of misinformation, which can contribute to public panic and confusion during crises. Trust in information sources plays a key role in crisis communication, as individuals tend to rely more on sources they perceive as credible.

Research shows that official institutional sources, such as government websites, are generally considered more trustworthy, while social media are perceived as less reliable despite their widespread use (Buturoiu et al., 2022). This indicates a gap between trust and actual information use, where individuals combine official sources with faster but less reliable channels.

From a broader organisational perspective, Akturan (2025) identifies misinformation management as a core component of modern crisis communication, highlighting practices such as real-time monitoring, fact-checking, and transparent communication as essential for sustaining institutional legitimacy and resilience. Elfattah (2024) adds that effective crisis communication in digital environments requires integrated strategies that combine clear messaging, real-time engagement, and trust-building mechanisms to enhance communication effectiveness and address the challenges of complex information environments.

In the specific context of higher education institutions, Motwani and Singh (2020) highlight that social media plays a significant role in crisis communication by enabling universities to communicate with stakeholders and respond to rapidly spreading information within campus environments. This is further supported by Schwarz et al. (2024), who emphasize the importance of timely and effective communication in universities, noting that crisis messages often fail to reach essential audiences, thereby limiting their overall effectiveness.

Crisis communication in higher education institutions requires structured, timely, and stakeholder-oriented approaches, as universities operate in complex environments with diverse audiences that depend on accurate and consistent information. Ahmad Kamil et al. (2025) emphasize that crisis communication in higher education is often conceptualized across different phases, including pre-crisis preparation, crisis response, and post-crisis recovery, with particular importance placed on transparency, consistent messaging, and regular updates to maintain stakeholder trust. In this context, universities must not only provide information but also ensure consistent and well-coordinated communication across channels to prevent confusion and anxiety among students and staff.

From the perspective of student behavior, Ye and Liu (2022) identify that college students play a crucial role in the dissemination of online public opinion during crisis events, acting as active participants in information sharing processes characterized by rapid dissemination, unpredictability, and strong emotional dynamics. Their findings suggest that factors such as social motivation, level of involvement, and trust in information sources significantly influence students' willingness to share information in crisis-related contexts. This behavior becomes particularly relevant in situations where unverified or emotionally charged content can spread quickly and shape public perception. This is further supported by Petrović et al. (2025), who point out that despite access to credible academic sources, students frequently rely on general online platforms and social media, where information is not always verified, and often fail to sufficiently evaluate the credibility of the information they encounter. As a result,

the risk of spreading misinformation increases, especially in crisis situations where the demand for immediate information is high. These findings highlight the importance of understanding students' information behavior and preparedness, as their role in information dissemination can significantly influence the effectiveness of crisis communication within university environments.

In terms of information-seeking behavior, Tonmoy and Islam (2023) show that students' information needs increase significantly during crisis situations, which is associated with increased use of diverse information sources, particularly online platforms and social media, where challenges related to misinformation and information overload are frequently reported. Similarly, Bak et al. (2022) highlight the importance of digital health literacy, showing that while many students are able to find information online, a considerable proportion experience difficulties in evaluating the reliability and quality of that information, which may limit their ability to make informed decisions during crises.

Taken together, the existing literature highlights the importance of understanding information behavior, preparedness, and exposure to misinformation in digital environments, particularly within higher education institutions. However, limited attention has been paid to these issues at the level of specific university contexts, especially in Central Europe. This study addresses this gap by examining how students and employees at a selected Slovak university perceive and respond to crisis communication, with a focus on their information sources, experiences with misinformation, and perceived preparedness.

3. Aim, methodology and data

The principal aim of this paper is to examine the communication behavior and level of information preparedness among students and employees of a selected higher education institution in the Slovak Republic in the event of the sudden emergence of a crisis situation and within the context of new security threats. As part of the micro-research, a questionnaire survey was first designed and implemented as the starting point of the investigation. The data obtained were subsequently processed using the Survio platform and MS Excel tools, analyzed and evaluated through contingency tables and basic descriptive mathematical-statistical methods. The relevant findings were interpreted by means of standard scientific methods, namely analysis, synthesis, induction, and deduction, while the final phase of the micro-research involved their comparison with the findings of other authors presented in the preceding section of this study.

This paper is based on data collected within a pilot research project conducted under an internal grant scheme of the Alexander Dubček University of Trenčín. The pilot study was designed to provide initial empirical insights into students' information behavior and preparedness in crisis situations, as well as to identify key variables and relationships for further investigation. The findings serve as a foundation for future,

more extensive research, including larger-scale studies and potential research projects focused on crisis communication in higher education.

The questionnaire survey was conducted online via the Survio platform. Data collection took place from 27 February 2024 to 11 May 2024, with 96.04% of all responses already recorded by 24 March 2024. The research sample consisted exclusively of students and employees of Alexander Dubček University of Trenčín (Slovak Republic). Given the relatively low representation of employees (29 respondents, representing 8.10% of all respondents), this group did not constitute the primary focus of the present research, and the results are therefore reported exclusively for student respondents. A total of 329 students participated in the questionnaire survey (91.90% of all respondents). Although the data collection was carried out in 2024, the data obtained cannot be considered outdated, as the research was conducted as an immediate response to the incident at the Faculty of Arts of Charles University in Prague and captures the authentic attitudes of respondents in the period shortly after this extraordinary event.

Respondents were granted access to the questionnaire through a hyperlink or QR code, and it could be completed using any type of device. The questionnaire was distributed via institutional email accounts. It contained 12 questions, of which 11 allowed the selection of a single response, while only one question permitted multiple answers. The most common completion time ranged between 2 and 5 minutes. The response rate reached 86.06%, corresponding to 358 responses out of 416 recorded accesses.

As a pilot study, the results should be interpreted with caution and primarily as an exploratory basis for further research.

4. Results

The research component of the paper is based on a questionnaire survey conducted on a sample of 358 respondents, with students of Alexander Dubček University of Trenčín constituting the dominant respondent group. Owing to their low number and in line with the stated objective of the paper, responses provided by employees (29) were not included in the analysed dataset. This section analyses exclusively the responses to questions focused on crisis communication, information preparedness, and the use of digital communication channels within the university environment. Table 1 presents the absolute frequencies of respondents by age and gender.

Table 1: Number of respondents with age and gender aspect (source: own processing)

	men	women	total
up to 28 years (included)	58	171	229
29-44 years	11	68	79

45-59 years	5	16	21
total	74	255	329

The largest group of respondents consisted of female students aged up to 28 years (Generation Z), numbering 171 individuals. By contrast, the least represented group comprised male students aged 45 to 59 years (Generation X), of whom only five participated in the research. From an aggregate perspective without gender distinction, students aged up to 28 years constituted the largest share of respondents, with a total of 229 individuals, representing 69.60% of all responses. The second largest group consisted of respondents belonging to Generation Y (Millennials), numbering 79 and accounting for 24.01% of responses. The remaining share comprised members of Generation X, with 21 respondents, representing 6.38% of all responses.

One of the significant indicators of any community's preparedness for emerging threats is the ability to identify manipulative or false content (Figure 1). When asked whether they had ever witnessed the spread of disinformation, panic, or false alarm messages on social media during a crisis event, more than three quarters of respondents (75.68%) answered affirmatively. By contrast, fewer than one fifth (19.15%) reported "no." The remaining respondents (5.17%) selected "I do not know / I prefer not to answer." This finding suggests that the phenomenon of information chaos is strongly present among respondents. In crisis situations, social media appear not only as a communication tool, but also as an environment associated with a heightened risk of spreading unverified information.

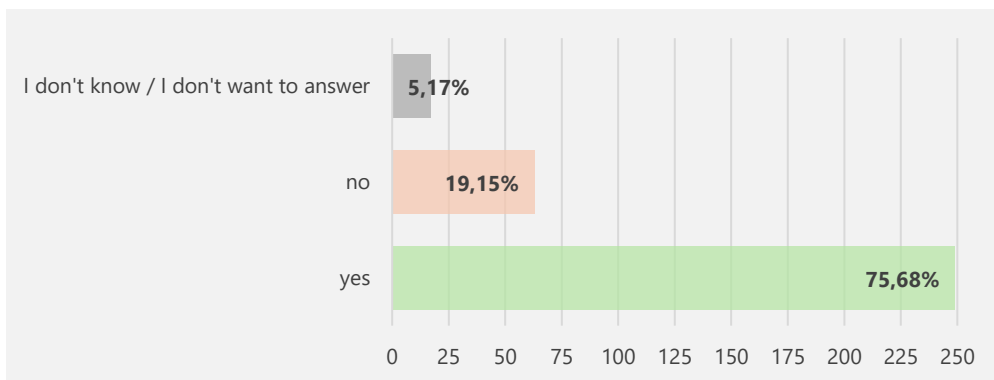


Figure 1. Respondents' statements to the question „Have you ever witnessed the spread of misinformation, panic or alarmist messages on social networks during any crisis event?“ (in % and in absolute terms) (source: own processing)

From an overall perspective, these findings indicate that most respondents have already had negative experience with the dissemination of unverified, false, or panic-inducing information (249 out of 329 students). However, it is also noteworthy to examine these responses from the perspective of age groups, where statistically significant differences are evident (Table 2).

Table 2: Respondents' statements to the question „Have you ever witnessed the spread of misinformation, panic or alarmist messages on social networks during any crisis event?“ by age group (in absolute terms and in %) (source: own processing)

	yes	yes (in %)	no	no (in %)	I don't know / I don't want to answer	I don't know / I don't want to answer (in %)
up to 28 years (included)	180	78,60	36	15,72	13	5,68
29-44 years	56	70,89	21	26,58	2	2,53
45-59 years	13	61,90	6	28,57	2	9,52

The highest proportion of affirmative responses was recorded among respondents aged up to and including 28 years, where 78.60% reported experience with the dissemination of disinformation, panic, or false alarm messages. Among respondents aged 29 to 44 years, this proportion was 70.89%, while in the oldest observed group, aged 45 to 59 years, it reached 61.90%. The results therefore indicate a gradual decline in personal experience with this phenomenon (16.70 percentage points) as respondents' age increases. This trend may primarily be associated with differences in the intensity of social media use across generations, as younger respondents are generally more active in the online environment and more frequently exposed to digital content.

The opposite pattern can be observed in negative responses. While 15.72% of respondents in the youngest age category reported no such experience, the proportion rose to 26.58% in the 29–44 age group and to 28.57% among respondents aged 45 to 59 years. Higher age may therefore correlate with a lower reported level of contact with disinformation content during crisis events. These findings confirm that age represents a significant factor influencing individuals' experience with information-related risks in the online environment, which should also be taken into account when designing university communication strategies during crisis situations. For completeness, it may be added that no statistically significant differences were identified in students' responses with respect to gender.

The findings regarding the high level of respondents' experience with disinformation on social media naturally raise the question of which communication channels students would trust most in the event of a real crisis situation. The examination of preferred sources of initial information therefore builds upon the

previous results and makes it possible to assess whether negative experiences with information chaos influence the selection of communication platforms during a crisis event.

Table 3: Respondents' statements to the question „Where would you look for initial information in the event of a sudden crisis event at the university? “ by gender (in absolute terms and in %) (source: own processing)

	total	total (in %)	male	male (in %)	female	female (in %)
Microsoft university account (Outlook, Teams...)	127	38,60	29	39,19	98	38,43
university / faculty website	106	32,22	19	25,68	87	34,12
social networks	70	21,28	16	21,62	54	21,18
academic information system (AiS)	15	4,56	5	6,76	10	3,92
elsewhere (specify where)	11	3,34	5	6,76	6	2,35

Based on Table 3, in the event of a sudden crisis situation, students at the selected university would primarily seek initial information through the university Microsoft account environment (Outlook, Teams, etc.), which was identified by 38.60% of respondents in total (127 responses). The second most frequently selected source was the university or faculty website, chosen by nearly one third of respondents (32.22%), representing 106 responses. Social media would be used as the primary information channel by 21.28% of respondents (70 responses), while the academic information system AiS would be used by only 4.56% of respondents (15 responses). Other sources accounted for 3.34%; among the “elsewhere (specify where)” responses were newspaper articles, advice from a close person, advice from a lecturer, or an emergency helpline.

Although preferences of male and female respondents did not differ substantially in most responses to this question, one more pronounced difference can be identified in relation to the university or faculty website. This option was selected by more than one third of women (34.12%), whereas among men it was chosen by only approximately one quarter (25.68%). This result suggests that female respondents tend to prefer a traditional and formally established source of information, generally associated with greater credibility and clarity. Other gender-based differences were relatively minor and without major interpretative significance. It may therefore be concluded that gender does not represent a dominant factor in the selection of the primary information channel.

From the perspective of age groups, no substantial differences can be observed either, apart from respondents aged 45 to 59 years, among whom 47.60% (10 responses) identified the university or faculty website as their primary source of information. The results thus confirm that respondents generally prefer official and institutional communication channels over informal platforms. At the same time, they

demonstrate the importance of digital ecosystems that students and employees use in everyday academic life, as well as their informational potential during crisis situations.

In addition to identifying preferred information channels, the research also aimed to determine the extent to which respondents feel prepared to respond to potential crisis situations within the university environment. The availability of information alone does not guarantee an effective response if individuals are unfamiliar with the basic procedures of conduct in the event of danger. The level of subjectively perceived preparedness therefore represents an important indicator of the effectiveness of crisis communication and preventive information measures at a higher education institution. The findings of the present research in this area are presented in Figure 2.

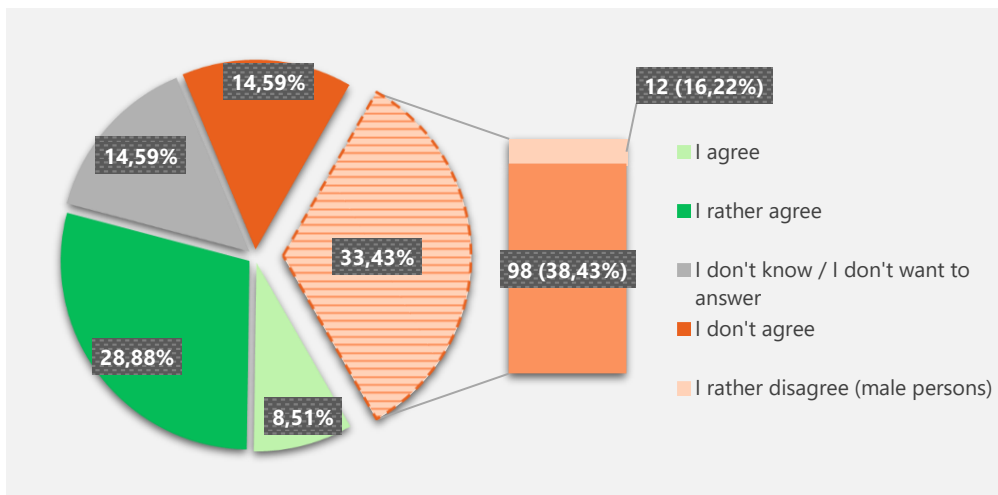


Figure 2. Respondents' statements on the statement „I am sufficiently informed about how to react in crisis events that may occur at the university.“ (in %) with emphasis on the number of answers „I rather disagree“ by gender (source: own processing)

The findings indicate a rather critical assessment by respondents of their own preparedness to respond to crisis events that may arise within the university environment. The second most prominent response was “rather agree,” with a share of 28.88%, suggesting that a portion of respondents consider themselves relatively prepared. Full agreement with the statement was declared by only 8.51% of respondents, representing the lowest proportion among the positive responses. A negative position in the form of the response “disagree” was reported by 14.59% of respondents, while the same proportion was recorded for the category “I do not know / I prefer not to answer” (14.59%). The largest share of respondents selected “rather disagree,” chosen by 33.43% of respondents. Owing to its status as the most frequent

response category, this group was further disaggregated by gender. Of the total, 98 responses were provided by women (representing 38.43% within the female respondent group), while 12 responses were provided by men (16.22% within the male respondent group). Even after accounting for the imbalance in the number of female and male respondents by recalculating proportions separately for each group, it is evident that female respondents more frequently expressed a sense of insufficient awareness regarding how to behave in a crisis situation. The differences between the responses of men and women to this question are described more precisely in Table 4.

Table 4: Combined statements of respondents to the statement „I am sufficiently informed about how to react in crisis events that may occur at the university.“ (as a share of responses by gender in %) (source: own processing)

	total	men	women
I agree / I rather agree	37,39	64,86	29,41
I don't know / I don't want to answer	14,59	10,81	15,69
I don't agree / I rather disagree	48,02	24,32	54,90

A more detailed view of the aggregated responses by gender confirms the previous findings regarding differences in the subjective perception of preparedness between men and women. After combining the positive responses "agree" and "rather agree," their overall share reached 37.39% of respondents. Among men, however, this proportion amounted to as much as 64.86%, meaning nearly two thirds of male respondents, whereas among women it was only 29.41% (less than one third of female respondents). Men therefore declared substantially more often that they felt sufficiently informed about how to respond in the event of a crisis situation at the university. In connection with this disparity, a similar difference was also identified in the negative responses "disagree" and "rather disagree." In total, these were reported by 48.02% of all respondents. Among men, however, this share represented only 24.32%, while among women it reached 54.90%. The results therefore clearly indicate that female respondents substantially more often perceive their preparedness for crisis situations as insufficient. In the neutral response category "I do not know / I prefer not to answer," gender differences were less pronounced. This option was selected by 14.59% of respondents overall, specifically 10.81% of men and 15.69% of women.

Following the preceding interpretation, it may be concluded that gender represents a significant factor in the subjective assessment of information awareness and preparedness. Findings derived from Figure 2 and Table 4 also signal the need for more targeted and tailored university communication that would consider the differing needs and levels of confidence among particular respondent groups. Within

the environment of the university under study, there is therefore room for more systematic communication informing students about appropriate procedures during crisis events.

The identified lower level of subjectively perceived preparedness among respondents also raises the question of which communication tools could improve this situation. Considering the above findings, it is therefore appropriate to analyze respondents' attitudes toward social media as a potential instrument for rapid information dissemination, prevention, and support in managing crisis situations within the university environment. For most students, social media represent a natural and regularly used platform of everyday communication, which makes them an accessible and effective channel for the dissemination of timely warnings, information, and recommendations.

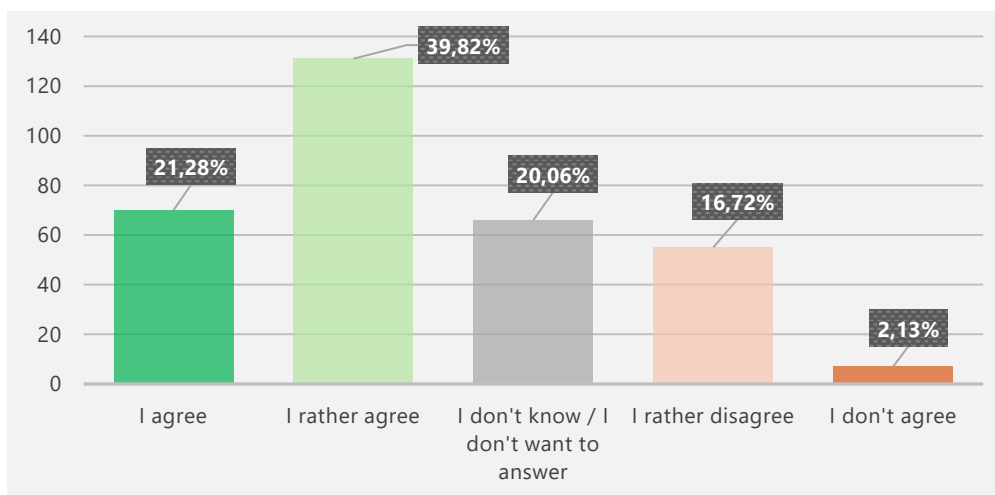


Figure 3. Respondents' statement on the statement „Social networks can be an effective tool in combating potential threats and crisis events at the university.“ (in absolute terms and in %) (source: own processing)

Figure 3 indicates a predominantly positive evaluation of social media as a tool applicable to managing potential threats and crisis events within the university environment. The highest proportion of respondents selected the response "rather agree" (39.82%), while a further 21.28% expressed clear agreement. After combining both positive categories, it may be concluded that more than 61% of respondents perceive social media as an effective means of crisis communication. The neutral response "I do not know / I prefer not to answer" was selected by 20.06% of respondents, suggesting that approximately one fifth of those surveyed have no clear opinion on this issue or are unable to assess the effectiveness of social media in crisis situations. Negative attitudes were represented to a lesser extent. The response "rather disagree" was chosen by 16.72% of respondents, while explicit disagreement

was expressed by only 2.13% of those surveyed. In aggregate, therefore, fewer than 19% of respondents presented a negative position.

The results show that, despite the risks associated with the spread of disinformation, respondents generally attribute considerable potential to social media in the rapid dissemination of information, warning messages, and the coordination of behavior during crisis events. For universities, this represents an incentive for the systematic and professional use of these platforms as a complement to official communication channels. The findings point to an interesting paradox: although respondents are aware of the risks of disinformation on social media, they simultaneously recognize their potential as a rapid and accessible communication tool.

5. Discussion

The findings of this study are broadly consistent with the literature review, which emphasizes that contemporary crises are increasingly shaped by information dynamics, misinformation, and the growing role of digital communication channels. The high proportion of respondents who reported prior exposure to disinformation, panic, or alarmist messages on social media confirms earlier observations that crises are frequently accompanied by information disorder and an “infodemic” environment (Shahbazi and Bunker, 2024; Mehta et al., 2021). In this respect, the university population appears similarly vulnerable to the wider societal risks identified in previous research.

At the same time, respondents did not reject digital platforms altogether. Despite awareness of misinformation risks, a majority perceived social media as a potentially effective tool for crisis communication. This supports studies that describe social media as a dual-use environment: a source of both rapid information exchange and potential distortion (Koli, 2024; Jungblut et al., 2024). For universities, this suggests that social media should not be viewed as a substitute for official communication channels, but rather as a complementary instrument capable of increasing the speed and reach of institutional messages.

The preference for official university Microsoft accounts and institutional websites as primary sources of information corresponds with previous findings that audiences tend to trust formal institutional sources more than informal channels (Buturoiu et al., 2022). This is an important result, as it indicates that students still expect universities to act as the primary and credible source of communication during emergencies. However, the lower preference for the academic information system (AiS) may indicate that not all institutional platforms are considered equally suitable for urgent communication.

Perhaps the most practically significant finding concerns the relatively low level of perceived preparedness among respondents, especially among female students. While subjective preparedness does not necessarily equal objective readiness, the results suggest communication gaps in preventive education and crisis awareness.

This aligns with literature stressing that crisis communication should include pre-crisis preparation, not only response messaging (Ahmad Kamil et al., 2025). Universities should therefore invest more systematically in awareness campaigns, behavioral guidance, drills, and clearly structured emergency procedures.

Overall, the study extends existing knowledge by offering evidence from a Central European university context, which remains underrepresented in current research. It demonstrates that higher education institutions face the same communication paradox visible elsewhere: stakeholders trust official sources, frequently use digital platforms, recognize misinformation risks, yet still feel insufficiently prepared for crisis situations.

6. Conclusion

The aim of this study was to examine communication behavior and the level of information preparedness among students of a selected higher education institution in the Slovak Republic in the context of sudden crisis situations and emerging security threats. The findings provide a consistent picture of how university students perceive information flows, trust communication channels, and assess their own readiness to respond to crisis events.

The results indicate that experience with misinformation, panic, or alarmist content in digital environments is highly prevalent among respondents, with more than three quarters of students reporting such encounters during crisis situations. This confirms that social media, while being a key communication tool, also represent a significant source of informational risk in the form of unverified or emotionally charged content. At the same time, respondents demonstrated a relatively strong preference for official institutional channels as their primary source of initial crisis information, particularly university Microsoft-based systems and official websites, which suggests a relatively high level of trust in formal communication structures.

A critical finding of the study is the relatively low level of subjective preparedness among students to respond to crisis situations, with a substantial proportion of respondents expressing uncertainty about appropriate behavioral responses. This indicates that the availability of information alone is not sufficient, and that informational awareness must be complemented by targeted preparedness and guidance. Gender differences were also observed in this regard, with female respondents reporting a lower level of perceived preparedness compared to male respondents.

Despite these limitations, respondents generally perceived social media as a potentially effective tool for crisis communication, particularly in terms of speed and accessibility of information. This reflects a paradoxical perception, where the same channels that are associated with misinformation are also recognized for their communicative value in emergency situations.

Overall, the findings underline the importance of systematic, timely, and credible crisis communication within higher education institutions. Universities should not only ensure the availability of accurate information across multiple communication platforms but also strengthen the information preparedness of their academic communities. This includes improving awareness of appropriate behavioral procedures during crisis situations and developing communication strategies that reflect both the advantages and risks of digital communication environments.

Future research should expand this pilot study to include multiple universities within the Slovak Republic as well as across Central European countries, to enable comparative analysis of crisis communication practices and students' information behavior. It would also be appropriate to examine the discrepancy between perceived and actual preparedness through experimental or simulation-based crisis scenarios. Furthermore, future studies should explore the underlying factors explaining why students continue to rely on social media as an information source despite their awareness of its risks and should provide a more detailed analysis of gender differences in subjective preparedness.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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Comparative Analysis of PRINCE2 7 and PRINCE2 6 Methodologies

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Abstract

The rapid development of digital technologies and increasing demands for organizational flexibility require the continuous evolution of project management methodologies. The main aim of this study is to provide a comparative analysis of the structural, conceptual, and operational differences between PRINCE2 6 and its latest version, PRINCE2 7. Using a qualitative analysis of official documentation and reference frameworks, the study systematically evaluates key architectural changes, particularly the introduction of the integrated element "People", which places greater emphasis on organizational culture, leadership, and stakeholder engagement. The paper further analyzes the transformation of themes into practices, the extension of project performance aspects to include sustainability, and the increased emphasis on the digital and data context of project management. The results indicate that PRINCE2 7 represents a shift from a strictly process-oriented model toward a more flexible and context-driven framework that reduces administrative complexity and enhances adaptability across different project environments. The increased emphasis on data and digital context also indicates the relevance of emerging technologies for future project management practice. These findings provide a theoretical foundation for understanding the evolution of PRINCE2 and offer practical insights for project managers adapting to contemporary, technology-driven project environments.

Keywords: Project Management; PRINCE2 7; PRINCE2 6; Digital Context; Comparative Analysis

JEL Classification: M15, L86, O32

1. Introduction

The rapid advancement of digital technologies and the increasing demand for sustainable practices are continuously reshaping project management standards. Among the established methodologies, PRINCE2 is widely recognized as a governance-oriented and process-structured framework grounded in best practices and applicable across diverse project environments (AXELOS, 2017).

Up to its 6th edition, PRINCE2 has been characterized by a structured architecture based on principles, themes, and processes, supported by clearly defined roles and management products. This configuration enables stage-based control, formalized decision-making, and systematic governance throughout the project lifecycle (AXELOS, 2017). Comparative studies further confirm that PRINCE2 provides strong support for controlled project environments, particularly where clear responsibilities, formal processes, and structured information flows are required (Veynberg et al., 2020; Simonaitis et al., 2023).

Despite these strengths, existing research identifies several limitations of traditional PRINCE2 implementations. Earlier versions of the methodology primarily emphasize governance and control, while aspects such as sustainability, organizational culture, and human factors are addressed only implicitly within existing structures (Silvius, 2022; Martens & Carvalho, 2017). Furthermore, digitalization and data-driven project management—key elements in contemporary project environments—are not explicitly integrated into the methodological core.

At the same time, project management standards are undergoing a broader paradigm shift toward sustainability, stakeholder-centric value creation, and system-oriented thinking. Recent studies highlight the growing importance of ethical responsibility, long-term environmental and social impacts, and adaptive management approaches in project environments (Szajczyk & Krzepicka, 2024; Aarseth et al., 2017). However, comparative analyses indicate that while methodologies such as PRINCE2 conceptually acknowledge sustainability, they often lack concrete operational guidance and implementation mechanisms (Silvius, 2022).

In response to these challenges, the PRINCE2 7th edition introduces significant methodological changes, including the integration of the People element as a core component, the transformation of themes into practices, the extension of performance dimensions to include sustainability, and an increased emphasis on digital and data-driven project contexts (PeopleCert, 2023). These changes reflect the need for a more flexible, holistic, and context-aware project management framework.

However, despite the significance of these developments, current academic literature provides only limited systematic comparison of PRINCE2 6 and PRINCE2 7. Existing studies predominantly focus on earlier versions of PRINCE2 or compare it with other frameworks, without addressing the structural and conceptual transition between these two editions (Veynberg et al., 2020; Simonaitis et al., 2023).

Therefore, the aim of this study is to conduct a qualitative comparative analysis of PRINCE2 6 and PRINCE2 7, focusing on their structural, conceptual, and operational differences.

Particular attention is given to the introduction of new methodological elements, the transformation of existing components, and the alignment of the framework with contemporary trends such as sustainability, digitalization, and human-centric project management. The remainder of this paper is structured as follows: Section 2 presents the theoretical background and literature review. Section 3 describes the research design and methodology. Section 4 presents the results of the comparative analysis. Section 5 discusses the findings and their implications. Finally, Section 6 concludes the paper.

2. Theoretical background

Project management methodologies represent structured approaches designed to support planning, governance, and control of projects in complex organizational environments. Among these methodologies, PRINCE2 is widely recognized as a process-based framework grounded in best practices and adaptable to various project types and industries (AXELOS, 2017). Its theoretical foundation is based on the integration of principles, themes, and processes, which together create a coherent system for managing project performance across dimensions such as time, cost, quality, scope, benefits, and risk (AXELOS, 2017).

From a structural perspective, PRINCE2 up to its 6th edition is consistently characterized as a governance-centric and process-oriented methodology. Its architecture is built upon clearly defined components including principles, themes, processes, roles, and management products, which together enable systematic decision-making and control (Veynberg et al., 2020; Ahola et al., 2014). The methodology emphasizes management by stages and management by exception, ensuring clear accountability and structured escalation mechanisms (AXELOS, 2017). Operationally, PRINCE2 relies on a set of predefined management products that support governance and information flow throughout the project lifecycle. This artefact-driven approach provides a high level of control and transparency, particularly in environments requiring formalized structures and clear responsibilities. However, this model is primarily oriented toward traditional performance dimensions and control mechanisms, which may limit its adaptability in dynamic and innovation-driven contexts.

Recent developments in project management theory highlight a growing emphasis on sustainability, ethical responsibility, and long-term value creation. Silvius (2022) demonstrates that while major project management standards, including PRINCE2, conceptually acknowledge sustainability, they often lack practical mechanisms for its operational integration. Sustainability is typically framed through the Triple Bottom

Line, encompassing economic, environmental, and social dimensions, but without sufficient procedural support.

Similarly, Martens & Carvalho (2017) emphasize the importance of social sustainability, including factors such as ethical behaviour, stakeholder engagement, and organizational culture. These aspects are increasingly recognized as critical determinants of project success. Szajczyk and Krzepicka (2024) further argue that sustainability is no longer an optional consideration but a fundamental requirement shaping the evolution of project management methodologies. Aarseth et al. (2017) support this perspective by highlighting the need for integrating long-term impacts, ethical responsibility, and stakeholder-oriented value into project governance.

In parallel with sustainability, digital transformation represents another key driver influencing the evolution of project management methodologies. Modern project environments are increasingly characterized by data-driven decision-making, digital platforms, and continuous technological innovation. Despite this, traditional methodologies such as PRINCE2 6 do not explicitly incorporate digital and data contexts as core methodological components. Another critical dimension is the growing importance of human-centric project management. While PRINCE2 traditionally defines roles and responsibilities within its organizational structure, recent research emphasizes broader aspects such as leadership, collaboration, communication, and organizational culture (Martens & Carvalho, 2017). These factors play a crucial role in project success, particularly in complex and interdisciplinary environments, where coordination and stakeholder engagement are essential. These trends indicate a shift from purely process-oriented models toward more adaptive, flexible, and human-centered approaches, capable of addressing the challenges of modern project environments.

Despite the increasing importance of sustainability, digitalization, and human-centric management, current academic literature lacks a systematic comparison of PRINCE2 6 and PRINCE2 7. Existing studies primarily focus on earlier versions of PRINCE2 or compare it with other frameworks such as PMBOK, without addressing the structural and conceptual transformation between these two editions (Veynberg et al., 2020; Simonaitis et al., 2023). This gap is particularly evident in the absence of research analysing key innovations introduced in PRINCE2 7, including the integration of the People element, the transformation of themes into practices, and the incorporation of sustainability and digital context as explicit components of the methodology. As a result, there is a need for a structured comparative analysis that would provide a comprehensive understanding of this methodological evolution.

The PRINCE2 7 methodology introduces a revised architectural model that integrates principles, practices, processes, people, and project context as core

elements of the framework. This represents a significant evolution of the original framework, reflecting the changing nature of project environments and the increasing importance of sustainability, digitalization, and human-centric management. One of the most fundamental innovations is the introduction of the integrated element “People”, which emphasizes leadership, collaboration, organizational culture, and stakeholder engagement as core components of project success.

Another important change is the transformation of themes into practices, shifting the methodology from a static conceptual structure toward a more dynamic and capability-oriented approach. This transformation enhances the flexibility and applicability of the framework across different project contexts. PRINCE2 7 also extends traditional performance dimensions by explicitly incorporating sustainability as an additional project performance aspect. This reflects the broader trend in project management toward integrating environmental, social, and economic considerations into project evaluation and decision-making. Furthermore, the updated methodology places increased emphasis on the digital and data context of project management. This includes a stronger focus on information management, data-driven decision-making, and the role of digital technologies in supporting project execution.

Finally, PRINCE2 7 introduces a more flexible and context-driven approach, enabling organizations to tailor the methodology more effectively to specific project environments. This shift represents a move away from a strictly process-oriented model toward a more adaptive and holistic framework aligned with contemporary project management requirements. These changes are formally defined in the official PRINCE2 7 guidance (PeopleCert, 2023).

Based on these developments, the evolution of project management methodologies can be understood through three interconnected perspectives:

1. The structural perspective, which focuses on the architecture of methodologies, including their principles, processes, roles, and artefacts.
2. The transformational perspective, which reflects the shift toward sustainability, digitalization, and stakeholder-oriented value creation.
3. The human-centric perspective, which emphasizes the importance of people, culture, and collaboration in project environments.

These perspectives provide a theoretical foundation for analysing the transition from PRINCE2 6 to PRINCE2 7, enabling a systematic evaluation of how the updated methodology responds to contemporary challenges in project management.

3. Methodology

This chapter presents the research design, methodological framework, and analytical procedures applied in the comparative analysis of the PRINCE2 6 and PRINCE2 7 methodologies. The study aims to evaluate their structural evolution, governance characteristics, and alignment with contemporary project management requirements, including sustainability, digitalization, and human-centric management. The research adopts a qualitative comparative design combining literature analysis, primary framework evaluation, mini SWOT-based synthesis, and expert-based multi-criteria assessment.

The research follows a qualitative exploratory and comparative approach and is structured into three main phases. The first phase focuses on establishing a theoretical baseline through a structured review of academic and professional literature related to PRINCE2 and project management standards. This phase enables the identification of key analytical dimensions, including governance structure, process orientation, sustainability integration, and human-centric factors. The second phase involves a conceptual and structural analysis of primary framework documentation. The PRINCE2 6 methodology is analysed based on the official publication *Managing Successful Projects with PRINCE2* (AXELOS, 2017), while PRINCE2 7 is analysed using the official updated framework documentation (PeopleCert, 2023). The analysis focuses on identifying architectural differences, including the transformation of themes into practices, the integration of the People element, and the extension of performance dimensions. The third phase consists of a structured comparative evaluation combining mini SWOT analysis and expert-based assessment, enabling the transformation of qualitative insights into measurable evaluation criteria.

The research is guided by the following research questions:

- RQ1: How is PRINCE2 6 characterized in existing literature in terms of structure, governance, and operational design?
- RQ2: What are the key structural, conceptual, and operational differences between PRINCE2 6 and PRINCE2 7?
- RQ3: To what extent do the changes introduced in PRINCE2 7 address the limitations identified in previous versions of the methodology?

RQ1 establishes the theoretical baseline, while RQ2 and RQ3 support the comparative and evaluative interpretation of framework evolution.

The research methodology integrates qualitative analysis with structured comparative evaluation and consists of three main stages:

1. **Conceptual Framework Development:** A targeted literature review was conducted to identify key characteristics, limitations, and evaluation criteria

related to PRINCE2 6. These findings provided the theoretical foundation for the analytical design.

2. **Mini SWOT-Based Analytical Synthesis:** A simplified SWOT analysis was developed for both PRINCE2 6 and PRINCE2 7, focusing exclusively on strengths and weaknesses. This mini SWOT approach enables a structured identification of internal characteristics of each methodology without extending the analysis to external factors such as opportunities and threats. The mini SWOT analysis focuses exclusively on internal characteristics (strengths and weaknesses) to ensure a consistent comparison of methodological features without external contextual influence. The results were derived from a qualitative synthesis of literature findings and primary framework documentation and were subsequently used to define evaluation criteria.
3. **Expert-Based Multi-Criteria Evaluation:** A structured expert assessment was conducted using an expert panel consisting of three PRINCE2-certified professionals with experience in project management, methodology implementation, and project governance, each with more than ten years of practical experience. The experts evaluated both methodologies across predefined criteria derived from the mini SWOT analysis. Each framework was assessed using a normalized scale from 0 to 100, where 0 represents very low capability and 100 represents very high capability. Implementation Complexity was reverse-scored, meaning that higher values indicate lower implementation complexity and easier adoption.

Each expert performed the evaluation independently, and the final results were consolidated using a consensus-based approach to ensure consistency and reduce subjective bias. The final values represent consensus-based consolidated scores derived from the independent assessments of the expert panel.

Given the exploratory nature of the study and the limited number of experts, formal statistical validation was not applied.

The evaluation criteria used in the expert assessment are defined in Table 1.

Table 1 Evaluation Criteria for Comparative Analysis (source: own work based on literature review, mini SWOT analysis, and expert evaluation)

No.	Criterion	Description
1	Structural Clarity	Clarity and coherence of the methodological architecture
2	Governance and Control	Effectiveness of decision-making and control mechanisms
3	Adaptability	Ability to adjust to different project environments
4	Sustainability Integration	Extent to which sustainability is embedded in the methodology
5	Digital and Data Orientation	Incorporation of digital and data-driven approaches
6	Human-Centric Approach	Emphasis on people, leadership, and collaboration
7	Implementation Complexity	Level of complexity and ease of adoption
8	Practical Applicability	Usability in real-world project environments

The analytical process is based on the triangulation of three data sources:

- literature findings
- primary framework documentation
- expert-based evaluation

The results of the evaluation are synthesized and interpreted across the defined dimensions. The comparative outcomes are further analysed to identify key structural and conceptual differences between PRINCE2 6 and PRINCE2 7 and their implications for project management practice.

4. Results

This section presents the results of the qualitative comparative analysis of PRINCE2 6 and PRINCE2 7. The findings are structured into three parts. First, mini SWOT analyses are presented for both methodologies, focusing only on strengths and weaknesses. Second, the main structural, conceptual, and operational differences are interpreted comparatively. Third, the results provide a basis for the expert-based multi-criteria evaluation. The mini SWOT analysis of PRINCE2 6 focuses on the internal characteristics of the methodology, particularly its strengths and weaknesses in relation to governance, structure, adaptability, sustainability, digital orientation, and people-related aspects.

Table 2 Mini SWOT Analysis of PRINCE2 6 (source: own work based on AXELOS (2017), Joslin and Müller (2015), Ahola et al. (2014), and Simonaitis et al. (2023))

Strengths	Weaknesses
Strong governance structure based on principles, themes, and processes	Higher administrative complexity due to a more artefact-driven structure
Clear roles, responsibilities, and decision-making mechanisms	Limited explicit integration of sustainability as a project performance dimension
Strong emphasis on management by stages and management by exception	Human factors are mainly addressed through roles and responsibilities rather than as a central methodological element
Well-defined management products supporting control and reporting	Limited explicit focus on digital technologies, data management, and data-driven decision-making
Proven applicability across different project types and organizational contexts	Lower flexibility in dynamic, hybrid, and innovation-driven project environments
Strong alignment with traditional performance dimensions such as cost, time, quality, scope, benefits, and risk	Less explicit support for modern delivery contexts such as hybrid project delivery and digitally enabled project governance

PRINCE2 6 demonstrates strong methodological stability and governance maturity. Its main strength lies in its clearly defined structure, which supports controlled project delivery, accountability, and formalized decision-making. The methodology is particularly suitable for environments where predictability, documentation, and stage-based control are required. However, its limitations become visible when evaluated against contemporary project management requirements. Sustainability, digital and data considerations, and human-centric dimensions are not fully integrated into the methodological core. These aspects are either implicit or addressed only indirectly through existing themes and roles.

The mini SWOT analysis of PRINCE2 7 identifies the key internal strengths and weaknesses introduced by the updated methodology. Particular attention is given to its revised architecture, the People element, practices, sustainability, digital and data context, and adaptability.

Table 3 Mini SWOT Analysis of PRINCE2 7 (source: own work based on PeopleCert International Limited (2023), Silviu and Schipper (2014), Kivilä et al. (2017), Sabini et al. (2019), and Serrador and Pinto (2015))

Strengths	Weaknesses
Introduction of the People element as an integrated part of the methodology	New terminology may require retraining for organizations familiar with PRINCE2 6
Transformation of themes into practices, making the framework more practice-oriented	Transition from themes to practices may initially create interpretation challenges
Explicit integration of sustainability as a project performance aspect	Sustainability guidance may still require further operational development in specific industries
Stronger emphasis on digital and data context	Digital and data guidance may require additional organizational maturity and technical capability
More flexible and context-driven methodological architecture	Greater flexibility may lead to inconsistent application if tailoring is not managed properly
Improved alignment with hybrid, iterative, and traditional delivery approaches	Organizations with mature PRINCE2 6 implementations may face transition costs
Stronger focus on leadership, collaboration, stakeholder engagement, and organizational culture	The expanded scope may increase conceptual complexity for less experienced users

PRINCE2 7 represents a significant methodological modernization. Its strongest contribution is the formal integration of dimensions that were either implicit or underdeveloped in PRINCE2 6. The People element strengthens the human and organizational aspects of project delivery, while the inclusion of sustainability reflects the growing importance of environmental, social, and governance-related considerations in project management. The stronger emphasis on digital and data context also aligns the methodology more closely with contemporary project environments. However, these improvements may increase the need for training, interpretation, and organizational adaptation.

The comparison indicates that PRINCE2 6 and PRINCE2 7 differ not only in terminology but also in their underlying methodological orientation. PRINCE2 6 is primarily governance-centric, process-oriented, and artefact-driven. It provides a stable and controlled environment for project management, with strong emphasis on formal roles, defined processes, and structured management products. This makes it suitable for projects requiring strong control, predictability, and accountability. In contrast, PRINCE2 7 shifts the methodology toward a more adaptive, context-driven, and human-centric model. The transformation of themes into practices indicates a move from conceptual areas of concern toward more operationally applicable project management capabilities. The introduction of the People element changes the

methodological architecture by formally positioning leadership, communication, collaboration, and stakeholder relationships as central to project success.

A key difference also concerns sustainability. In PRINCE2 6, project performance is traditionally managed through dimensions such as time, cost, quality, scope, benefits, and risk. PRINCE2 7 extends this model by formally incorporating sustainability as a project performance aspect. This change aligns the methodology with contemporary discussions in sustainable project management, where long-term environmental, social, and governance-related impacts are increasingly treated as integral to project success. Another important difference concerns the digital and data context. PRINCE2 6 provides structured information flows through management products, but it does not explicitly frame digital technologies and data-driven decision-making as core methodological concerns. PRINCE2 7 responds to this limitation by placing greater emphasis on digital and data management, reflecting the increasing role of digital platforms, analytics, and information governance in modern project environments.

Overall, the findings suggest that PRINCE2 7 does not reject the foundations of PRINCE2 6. Instead, it extends and reframes them. The core logic of project governance, stage-based control, business justification, and tailoring remains preserved, while the updated methodology strengthens areas that have become increasingly important in contemporary project management practice.

Table 4 Summary of Key Differences Between PRINCE2 6 and PRINCE2 7 (source: own work based on AXELOS (2017) and PeopleCert International Limited (2023))

Dimension	PRINCE2 6	PRINCE2 7
Core architecture	Principles, themes, processes, roles, management products	Principles, people, practices, processes, project context
Orientation	Governance-centric and process-oriented	Context-driven, adaptive, and human-centric
Human factors	Addressed mainly through roles and responsibilities	People formally integrated as a methodological element
Themes / practices	Seven themes	Seven practices
Sustainability	Mostly implicit or indirectly addressed	Explicitly included as a performance aspect
Digital and data context	Limited explicit treatment	Stronger emphasis on digital and data management
Flexibility	Tailoring supported but within a more traditional structure	Stronger emphasis on adaptation to project context
Delivery approaches	Compatible with different approaches but less explicit	Stronger support for hybrid, iterative, and traditional delivery contexts
Administrative complexity	Higher reliance on defined management products	More streamlined and practice-oriented structure
Main value	Stability, control, governance, accountability	Adaptability, sustainability, people orientation, digital relevance

The comparative findings show that PRINCE2 7 represents an evolutionary rather than revolutionary update. The methodology retains the core strengths of PRINCE2 6, especially governance, control, and business justification, while extending its relevance to contemporary project environments.

The most significant improvements are visible in four areas: the formal integration of people, the transformation of themes into practices, the inclusion of sustainability, and the stronger emphasis on digital and data context. These results provide the analytical basis for the subsequent expert-based evaluation. The expert assessment evaluates whether the identified methodological differences are perceived as practically significant across selected criteria, including structural clarity, governance and control, adaptability, sustainability integration, digital and data orientation, human-centric approach, implementation complexity, and practical applicability.

Table 5 Expert-Based Multi-Criteria Evaluation of PRINCE2 6 and PRINCE2 7 (source: own work based on expert evaluation)

Criterion	PRINCE2 6	PRINCE2 7
Structural Clarity	88	84
Governance and Control	90	88
Adaptability	68	87
Sustainability Integration	42	86
Digital and Data Orientation	45	82
Human-Centric Approach	55	90
Implementation Complexity	60	72
Practical Applicability	78	86

The expert-based evaluation shows that PRINCE2 6 achieved the highest scores in governance and control and structural clarity. This confirms its strong position as a stable, process-oriented methodology with clearly defined governance mechanisms. However, its lower scores in sustainability integration, digital and data orientation, and human-centric approach indicate weaker alignment with contemporary project management requirements. PRINCE2 7 achieved higher scores in adaptability, sustainability integration, digital and data orientation, human-centric approach, and practical applicability. These results suggest that the updated methodology better reflects current project environments, particularly in relation to people, sustainability, digitalization, and contextual flexibility. PRINCE2 6 remains slightly stronger in structural clarity and governance control, while PRINCE2 7 provides a broader and more modern methodological profile.

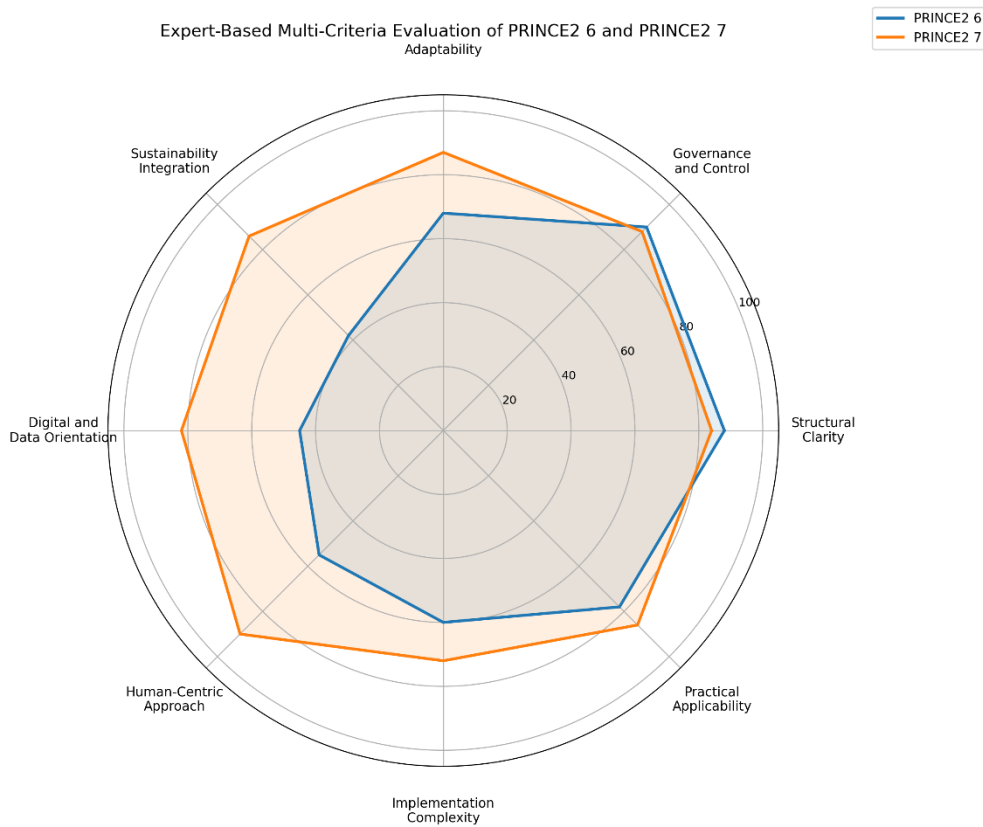


Figure 1 Expert-Based Multi-Criteria Evaluation of PRINCE2 6 and PRINCE2 7

5. Discussion

The results of the comparative analysis indicate that the transition from PRINCE2 6 to PRINCE2 7 should be interpreted as an evolutionary modernization of the methodology rather than a complete methodological replacement. PRINCE2 7 preserves the core principles of controlled project management, including continued business justification, management by stages, management by exception, product focus, and tailoring to the project context. However, it significantly extends the methodological architecture by integrating elements that respond to current changes in project environments, especially sustainability, digitalization, data-driven management, and human-centric leadership. The findings confirm that PRINCE2 6 provides a strong governance foundation. Its main strengths lie in structured decision-making, clearly defined roles, formal control mechanisms, and systematic documentation. These characteristics are consistent with the traditional

understanding of PRINCE2 as a process-oriented methodology suitable for projects requiring accountability, predictability, and formal governance. This is also consistent with studies emphasizing the relationship between project management methodology and project success (Joslin & Müller, 2015) and with research on the role of project governance in improving decision-making and control (Ahola et al., 2014).

At the same time, the analysis shows that the traditional PRINCE2 6 structure has limitations in relation to modern project environments. Its emphasis on processes, themes, and management products provides stability, but it may also increase administrative complexity and reduce flexibility in highly dynamic, innovative, or hybrid project contexts. This limitation corresponds with broader discussions in project management literature, where excessive methodological rigidity is often associated with implementation difficulty and lower adaptability in complex environments. The most visible conceptual shift in PRINCE2 7 is the formal introduction of the People element. This change moves the methodology beyond a purely structural view of project roles and responsibilities. While PRINCE2 6 addresses people primarily through the organization theme, PRINCE2 7 positions people, leadership, communication, collaboration, and stakeholder relationships as central components of project success.

This is important because contemporary project performance increasingly depends not only on formal processes but also on team capability, organizational culture, motivation, and stakeholder engagement. The shift therefore strengthens the methodological relevance of PRINCE2 in complex and interdisciplinary project settings. Another important implication concerns the transformation of themes into practices. This change is not only terminological. It reflects a broader movement from static areas of concern toward more operationally applicable management capabilities. The term practices suggests a stronger orientation toward application, integration, and continuous use throughout the project lifecycle. This supports the interpretation that PRINCE2 7 aims to be more usable and adaptable in practice, especially for organizations combining traditional, agile, and hybrid delivery approaches.

The inclusion of sustainability as an explicit project performance aspect represents another major improvement. In PRINCE2 6, sustainability was not treated as a formal performance target comparable to time, cost, quality, scope, benefits, and risk. PRINCE2 7 changes this by integrating sustainability into the performance logic of project management. This aligns the methodology with current research on sustainable project management, which emphasizes that environmental, social, and economic impacts should be considered as part of project success rather than as external or optional concerns (Silvius & Schipper, 2014; Kivilä et al., 2017; Sabini et al., 2019). However, the practical effectiveness of this sustainability integration will

depend on how organizations operationalize it. Merely adding sustainability as a performance aspect does not automatically ensure sustainable project outcomes. Organizations will need to define measurable sustainability targets, assign responsibilities, integrate sustainability into business cases and plans, and monitor related indicators throughout the project lifecycle. Therefore, PRINCE2 7 provides a stronger methodological basis, but its impact will depend on implementation maturity. The stronger emphasis on digital and data context is also significant. PRINCE2 6 provides structured information management through management products, but it does not explicitly conceptualize digital technologies, data governance, or data-driven decision-making as central methodological concerns. PRINCE2 7 responds to the needs of contemporary project environments by placing greater emphasis on digital and data-related aspects. This is relevant because project governance increasingly depends on reliable data, digital collaboration tools, real-time reporting, and analytics-based decision-making. Nevertheless, this change also creates implementation challenges. Organizations with low digital maturity may find it difficult to apply digital and data-oriented guidance effectively.

The successful adoption of PRINCE2 7 therefore requires not only methodological knowledge but also organizational capabilities in data management, digital tools, cybersecurity, and digital collaboration. In this sense, PRINCE2 7 shifts part of the implementation burden from formal project documentation toward digital capability and organizational readiness. The findings also show that PRINCE2 7 increases flexibility and adaptability. This is important in the context of modern projects, where linear, iterative, incremental, and hybrid delivery approaches often coexist. The methodology does not prescribe a single delivery model but provides a controlled management environment in which different delivery approaches can be integrated. This corresponds with wider research showing that agile and hybrid approaches can improve responsiveness and project success when appropriately governed (Serrador & Pinto, 2015). However, greater flexibility can also increase the risk of inconsistent application. If tailoring is not performed systematically, organizations may apply PRINCE2 7 superficially or inconsistently. Therefore, one of the key managerial implications is that organizations adopting PRINCE2 7 should establish clear internal guidance for tailoring, role allocation, documentation, reporting, and sustainability measurement. Without such internal adaptation, the benefits of the updated methodology may remain only theoretical.

From a practical perspective, the transition from PRINCE2 6 to PRINCE2 7 requires more than updating terminology. Organizations need to understand the deeper conceptual changes behind the new version. Training should not focus only on differences between themes and practices, but also on the integration of people, sustainability, digital context, and project context into everyday project management

work. Project managers should be prepared to use PRINCE2 7 not as a rigid checklist, but as a flexible framework that supports decision-making, governance, and adaptation. The expert-based evaluation presented in the results further supports these findings by showing that practitioners perceive the changes in PRINCE2 7 as practically meaningful. In particular, expert scoring can help determine whether PRINCE2 7 improves adaptability, human-centric management, digital orientation, and sustainability integration without significantly weakening governance and control. This is important because the value of a methodology is not determined only by its official structure, but also by its usability in real project environments.

Overall, the discussion confirms that PRINCE2 7 responds to several limitations of PRINCE2 6. It strengthens people-related aspects, introduces sustainability into the core performance logic, reflects digital and data-oriented project environments, and improves contextual adaptability. At the same time, it preserves the governance discipline that has traditionally been one of the main strengths of PRINCE2. The main challenge is therefore not whether PRINCE2 7 is more modern, but whether organizations can implement it in a way that balances flexibility with control.

The findings also suggest that future research should empirically evaluate the adoption of PRINCE2 7 in different organizational and sectoral contexts. In particular, further studies could examine how organizations operationalize sustainability, how project teams apply the People element in practice, and how digital and data management guidance affects project decision-making. Such research would help determine whether the conceptual improvements introduced in PRINCE2 7 translate into measurable improvements in project performance.

6. Conclusion

This study provided a comparative analysis of PRINCE2 6 and PRINCE2 7, focusing on their structural, conceptual, and operational differences. The results show that PRINCE2 7 represents an evolutionary modernization of the PRINCE2 methodology rather than a complete replacement of the previous version. The core principles of controlled project management remain preserved, while the updated framework extends the methodology toward greater adaptability, stronger people orientation, sustainability integration, and digital relevance. The analysis confirms that PRINCE2 6 remains a robust and governance-oriented methodology. Its strengths are mainly associated with structured decision-making, clearly defined roles and responsibilities, stage-based control, and formalized management products. These features make PRINCE2 6 suitable for project environments requiring predictability, documentation, accountability, and strong control mechanisms. However, the results also indicate that PRINCE2 6 is less explicit in addressing contemporary project management

requirements, particularly sustainability, digital and data-driven decision-making, and human-centric project leadership. PRINCE2 7 addresses several of these limitations by introducing the People element, transforming themes into practices, incorporating sustainability as a project performance aspect, and strengthening the digital and data context of project management. These changes make the methodology more flexible, context-driven, and aligned with current organizational needs. The expert-based evaluation further supports this finding, as PRINCE2 7 achieved higher scores in adaptability, sustainability integration, digital and data orientation, human-centric approach, and practical applicability. At the same time, PRINCE2 6 retained slightly stronger scores in structural clarity and governance control, confirming that the previous version remains methodologically stable and mature.

The main contribution of this study lies in providing a structured comparative perspective on the transition from PRINCE2 6 to PRINCE2 7. The findings indicate that the updated methodology does not abandon the traditional strengths of PRINCE2 but expands them to better reflect modern project environments. For project managers and organizations, this implies that the transition to PRINCE2 7 should not be understood only as a change in terminology, but as a broader shift toward more adaptive, sustainable, digital, and people-oriented project governance. From a practical perspective, organizations adopting PRINCE2 7 should focus on systematic tailoring, staff training, sustainability measurement, and the development of digital and data management capabilities. Without these supporting conditions, the benefits of the updated methodology may remain only partially realized. The implementation of PRINCE2 7 therefore requires both methodological understanding and organizational readiness.

The study has several limitations. The analysis is based on qualitative comparison, official framework documentation, literature synthesis, mini SWOT analysis, and expert-based evaluation with a limited number of experts. Therefore, the findings should be interpreted as exploratory rather than statistically generalizable. Future research should empirically examine the implementation of PRINCE2 7 in different sectors and organizational contexts. Particular attention should be given to how organizations operationalize the People element, sustainability performance targets, and digital and data management practices in real project environments. Overall, PRINCE2 7 can be considered a significant and relevant update of the PRINCE2 methodology. It preserves the governance discipline of PRINCE2 6 while extending the framework toward the requirements of contemporary project management. Its practical value will depend on how effectively organizations can balance the flexibility of the new version with the control mechanisms that have traditionally defined PRINCE2.

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Correlation Analysis as a Way for Solving a Multicollinearity Problem: A Case Study of District Towns of the Slovak Republic

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Abstract

Multicollinearity can be simply described as a defect. Its identification is an important part of econometric model or regression model construction, it is taken into account in multicriteria analysis and many others. Failure to address multicollinearity can lead to significant misrepresentations in the results of further research, which is a highly undesirable phenomenon. The purpose of our research is to present a simple method of identifying multicollinearity and then to present this method using the example of district towns in the Slovak Republic. A total of 71 local government entities (district towns) are evaluated, for which 17 criteria are monitored. These criteria are aimed at assessing their economic performance, e.g. capital budget revenues per capita (K02) or short-term liabilities per capita (K09). On the basis of the knowledge gained, it is possible to reduce the criteria monitored without a significant loss of information given by the number of criteria.

Keywords: multicollinearity, reduction of criteria, territorial self-government, Slovak Republic

JEL Classification: B23, H11, H72

1. Introduction

The multicollinearity problem is primarily related to the matrix of explanatory variables X , whose columns may be linearly dependent (either fully or partially). This violates the assumption of maximum likelihood of the matrix X in a classical (but also generalized) linear regression model. It is in this connection that multicollinearity is most widely discussed, see Disatnik and Sivan (2016), Winship and Western (2016), Singh, Singh and Paprzycki (2023). Multicollinearity itself can be viewed as an undesirable correlation between explanatory variables. Alin (2010) refers to it as a data problem that can cause serious problems with the reliability of model parameter

estimates. According to Lin (2006), It may cause some serious problems in validation, interpretation, and analysis of the model, such as unstable estimates, unreasonable sing, high-standard errors, and so on.

However, in the context of scientific research, it is desirable that each of the variables has a unique and inherent explanatory value. The simplest solution to this problem is to omit the problem variable, which has been used by, for example, O'Brien (2016), Daod (2017) and Senaviratna and Cooray (2019) in their research. The main issue is how to identify the variable that should be removed.

The aim of the presented research is to apply correlation analysis as a tool for identification of multicollinearity on real data of territorial self-government entities in the Slovak Republic.

In order to achieve the stated objective, the structure of the present paper is as follows: the first section introduces correlation analysis as a tool for identifying multicollinearity across academia. The second section presents the research set of 71 local government entities, the 17 variables (criteria) evaluated and the period of study 2016-2020. Within the third section, a partial correlation analysis is conducted in each of the five years, the results of which result in a potential reduction of the assessed variables. In the last section, the conclusion, the obtained results are summarized, complemented by the limitations of the actual research and potential continuation.

2. Literature overview

Rockwell (1975), Mansfield and Helms (1982), Vatcheva et al. (2016), Kim (2019), Senaviratna, Cooray (2019) Shrestha (2020), Chan et al. (2022), Kyriazos and Poga (2023), Seknickova (2024) report the pairwise correlation coefficient method as a tool for identifying collinearity for 2 variables (criteria). According to Rekha (2019) and Shrestha (2020), the correlation matrix can be a good indicator for multicollinearity identification and it indicates the need for further investigation. The view on the cutoff value of the correlation coefficient varies slightly across the literature as:

Rekha (2019), Duda (2022) identify an absolute value of 0.7 as the cutoff value; Mason and Perreault (1991), Bartonand Peat (2014), Young (2017) Kyriazos and Poga (2023) lean towards an absolute value of 0.8; Senaviratna and Cooray (2019), Sekničková (2024) consider an absolute value of 0.8 (or 0.9) to be the cutoff value.

For the purposes of our research, we are inclined to eliminate any collinearity across pairs of input variables. We will consider the absolute value of the correlation coefficient at the level of 0.8 and above to be problematic. In this case, collinearity is untenable from our point of view and one variable should be omitted. For this purpose, the number of other statistically significant linear correlations with other variables as

well as the strength of these correlations are used. Thus, the choice of the variable to be omitted is taken into account:

higher number of cases with confirmed collinearity with the remaining variables (criteria);

lower average absolute value of statistically significant linear relationships.

In the above studies, Pearson's correlation coefficient is used, but it assumes a normal distribution of both variables (criteria). This assumption is verified using the Shapiro-Wilk test calculated according to the formula:

$$SW = \frac{(\sum u_i x_i)^2}{\sum u_i^2 \sum (x_i - \bar{x})^2}$$

(1)

where: u_i – constant; x_i – value of the i -th statistical unit; $\bar{x}$ – average value of the variable

Depending on the results obtained, the linear correlation is then calculated using the aforementioned Pearson correlation coefficient (hereafter Pearson's coefficient) if normality of all variables is confirmed:

$$r = \frac{\bar{x}\bar{y} - \bar{x}\bar{y}}{s_x s_y} = \frac{\frac{1}{n} \sum_{i=1}^n x_i y_i - \bar{x}\bar{y}}{\sqrt{(\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2) (\frac{1}{n} \sum_{i=1}^n (y_i - \bar{y})^2)}}$$

(2)

where: n – number of observations; s_x – standard deviation of the first variable; s_y – standard deviation of the second variable; x_i – value of the i -th statistical unit of the first variable; y_i – value of the i -th statistical unit of the second variable; $\bar{x}$ – average value of the first variable; $\bar{y}$ average value of the second variable

using Kendall's rank correlation coefficient (hereafter Kendall's coefficient), which is a non-parametric alternative to Pearson's coefficient, see formula:

$$r_K = \frac{n_c - n_d}{n(n-1)/2}$$

(3)

where: n – number of observations; n_c – number of concordant pairs; n_d – number of discordant pairs

The strength of the Kendall coefficient is lower; however, it is useful in the presence of outliers that significantly affect the value of the regression coefficients and hence

the estimation of the residuals. The Kendall coefficient is automatically used in the analysis when the condition for using the Pearson coefficient, i.e. normality of all observed variables, is not met (tested by the Shapiro-Wilk test mentioned above).

3. Research methodology

The aim of the presented research is to apply correlation analysis as a tool for identification of multicollinearity on real data of territorial self-government entities in the Slovak Republic. To meet this aim, the above approach to identifying multicollinearity is applied to real data from 71 local government entities, see section 3.1. These are assessed using 17 variables (section 3.2). All analyses performed are processed in MS Office Excel, Statistica 14 and Statgraphics 19.

3.1. Research sample description

According to Act No. 221/1996 Coll. on the territorial and administrative organisation of the Slovak Republic, its territory is divided into 8 regions and 79 districts, see the following figure.

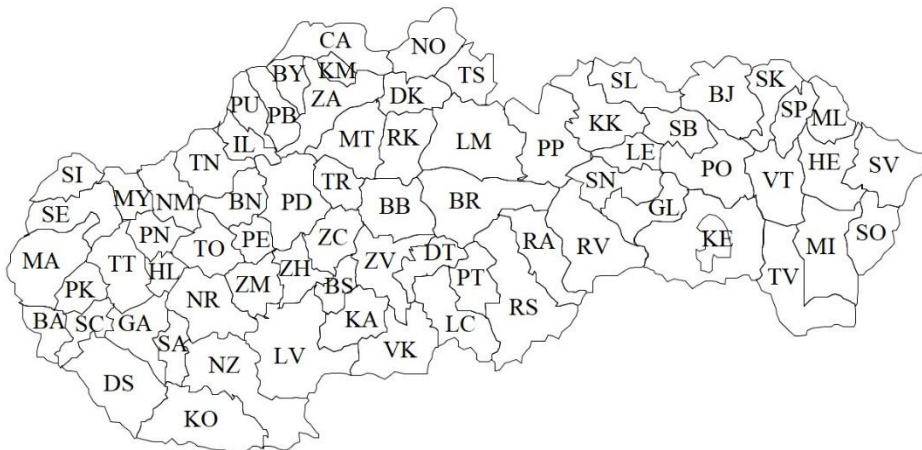


Figure 1. Territorial administrative division of the Slovak Republic (districts) (source: Own processing)

The problem of any research is the available data, its structure and homogeneity of reporting. In the neighbouring Czech Republic, these attributes are ensured by the specialised information portal of the Ministry of Finance of the Czech Republic, which allows the public free access to budget and accounting information from all levels of state and local government, the so-called MONITOR. In Slovak conditions, there is no such database, and an alternative is offered by the Institute for Economic and Social Reforms (hereinafter referred to as "INEKO"), which takes over the data from the Ministry of Finance of the Slovak Republic.

Out of 79 districts, only 69 have district towns, the exception being 5 districts located in the Bratislava self-governing region (Bratislava I, Bratislava II, Bratislava III, Bratislava IV, Bratislava V) and 5 districts located in the Košice self-governing region (Košice I, Košice II, Košice III, Košice IV, Košice-okolie). Outside of these 69 districts, the Institute for Economic and Social Reforms also assesses the financial health of the municipality of the capital Bratislava and the city of Košice, for which complete data are also available. Thus, the total number of entities evaluated in the present research is 71.

3.2. Entry criteria and their characteristics

The financial health of a district city as calculated by INEKO (2024) tells to what extent the management is sustainable and whether or not it is causing problems for the district city. This rating is 'normalized', representing a single number between 0 (worst) and 6 (best).

Our intention is not to confront this calculation, quite the contrary. The construction of a relevant set of evaluation criteria is a significant factor influencing the final evaluation in any evaluation process, as we have also had the opportunity to see in our own previous research. The present research works with the input data/criteria of this financial health, which is calculated as a weighted average of the scores achieved by each of its five components.

The homogenisation of the data by scoring individual indicators using a scale of 0 to 6 should be seen as a strength of such an assessment. This brings with it the possibility of subsequent simple use for the purposes of overall financial health (in the form of a weighted average). On the other hand, there is a certain loss of information by this data processing, as we move from a numerical variable to an ordinal variable. Thus, such a data transformation may distort the overall results to some extent. Thus, the intention of the presented research is to work with the original data, i.e. with a set of 18 input variables (criteria) in absolute terms.

In order to meet the stated aim, the basic data processed by INEKO are used, using which, from our point of view, the following is achieved:

taking into account national specificities, as the monitored indicators are typical for the subjects of territorial self-government in the Slovak Republic;
homogeneity across the assessed entities.

Table 1. Structure of the input criteria and the technique of their calculation (source: Own processing)

Criterion
K01 - Current budget revenue per capita (in EUR)
K02 - Capital budget revenue per capita (in EUR)
K03 - Current budget expenditure per capita (in EUR)
K04 - Capital budget expenditure per capita (in EUR)
K05 - Overdue liabilities per capita (in EUR)
K06 - Liabilities outstanding 60 days or more past due per capita (in EUR)
K07 - Short-term receivables per capita (in EUR)
K08 - Long-term liabilities per capita (in EUR)
K09 - Short-term liabilities per capita (in EUR)
K10 - Total debt as defined in the law per capita (in EUR)
K11 - Bank loans and advances per capita (in EUR)
K12 - Loans from the ŠFRB per capita (in EUR)
K13 - Principal repayment expenditure per capita (in EUR)
K14 - Interest payments per capita (in EUR)
K15 - Financial accounts per capita (in EUR)
K16 - Non-current assets per capita (in EUR)
K17 - Economic result for the current financial year per capita (in EUR)

4. Research methodology

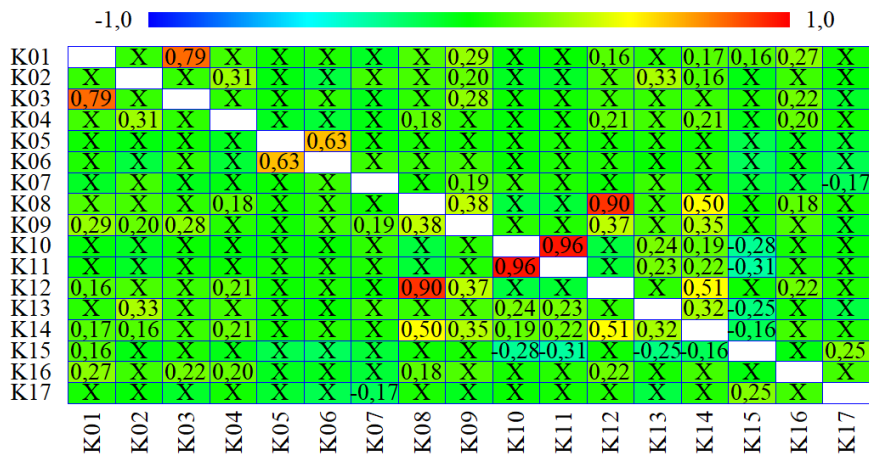
According to the above collinearity identification procedure, in the first step, the normal distribution of each criterion (variable) is tested through the Shapiro-Wilk test with the following results successively for the years 2016, 2017, 2018, 2019 and 2020.

Table 2. Results of testing the normality of the criteria using the Shapiro-Wilk test (source: Own processing)

Criterion	2016	2017	2018	2019	2020
K1	0.96 (0.287)	0.95 (<0.01)	0.95 (0.012)	0.95 (0.016)	0.95 (0.012)
K2	0.78 (<0.01)	0.78 (<0.01)	0.85 (<0.01)	0.75 (<0.01)	0.84 (<0.01)
K3	0.96 (0.0254)	0.95 (0.013)	0.96 (0.024)	0.964 (0.040)	0.96 (0.037)
K4	0.83 (<0.01)	0.84 (<0.01)	0.95 (0.009)	0.90 (<0.01)	0.79 (<0.01)
K5	0.27 (0)	0.29 (<0.01)	0.32 (<0.01)	0.24 (0)	0.39 (<0.01)
K6	0.22 (0)	0.21 (0)	0.27 (0)	0.12 (0)	0.17 (0)
K7	0.84 (<0.01)	0.87 (<0.01)	0.84 (<0.01)	0.88 (<0.01)	0.90 (<0.01)
K8	0.86 (<0.01)	0.83 (<0.01)	0.82 (<0.01)	0.84 (<0.01)	0.84 (<0.01)

K9	0.64 (<0.01)	0.64 (<0.01)	0.80 (<0.01)	0.90 (<0.01)	0.82 (<0.01)
K10	0.94 (0.002)	0.94 (0.003)	0.94 (0.003)	0.96 (0.027)	0.94 (0.005)
K11	0.94 (0.003)	0.94 (0.002)	0.93 (0.002)	0.95 (0.009)	0.95 (0.018)
K12	0.87 (<0.01)	0.86 (<0.01)	0.85 (<0.01)	0.84 (<0.01)	0.84 (<0.01)
K13	0.71 (<0.01)	0.68 (<0.01)	0.80 (<0.01)	0.60 (<0.01)	0.89 (<0.01)
K14	0.38 (<0.01)	0.68 (<0.01)	0.65 (<0.01)	0.85 (<0.01)	0.69 (<0.01)
K15	0.81 (<0.01)	0.83 (<0.01)	0.78 (<0.01)	0.79 (<0.01)	0.85 (<0.01)
K16	0.82 (<0.01)	0.81 (<0.01)	0.814 (<0.01)	0.824 (<0.01)	0.85 (<0.01)
K17	0.92 (<0.01)	0.90 (<0.01)	0.95 (0.017)	0.96 (0.067)	0.97 (0.220)

As the above results suggest, in only two cases is not possible to reject the hypothesis of a normal distribution of the variable at the set level of significance ($\alpha = 0.05$). In both cases it is the K17 criterion, i.e. for the purpose of identifying collinearity between pairs of criteria, the Kendall's coefficient is used in the next step.



X - not statistically significant at the significance level $\alpha = 0.05$

Figure 2. Correlation matrix for the identification of collinearity of variables (criteria) in 2016 (source: Own processing)

The 2016 results point to 2 pairs of variables that could be problematic in terms of collinearity and subsequent use in further research. The identified rank correlation can be described as very high, see Figure 2. Also in the following years, a statistically significant rank correlation is confirmed for the 2 pairs of criteria mentioned above, and the strength of this relationship can be described as constant across the 5 years evaluated, see the table below.

Table 3. Identified pairs of criteria with Kendall's coefficient exceeding the absolute value of 0.7 (source: Own processing)

Year	identified pairs of criteria (variables)
2016	K01 - K03 (0.79); K08 - K12 (0.90); K10 - K11 (0.96)
2017	K01 - K03 (0.74); K08 - K12 (0.92); K10 - K11 (0.99)
2018	K01 - K03 (0.75); K08 - K12 (0.84); K10 - K11 (0.94)
2019	K01 - K03 (0.74); K08 - K12 (0.87); K10 - K11 (0.90)
2020	K01 - K03 (0.72); K08 - K12 (0.88); K10 - K11 (0.94)

Based on the 2016 results, one pair (K01-K03) can be classified as problematic. However, as the strength of this rank correlation decreases slightly over time in subsequent years, both variables (criteria) will be included in the following analysis. The strength of the linear correlation of the remaining pairs is stable across the 5 observed years, i.e. the unwanted collinearity persists and thus one of the pair of criteria needs to be removed for further processing. For this purpose, the number of cases with confirmed collinearity with the remaining criteria and the average absolute value of the statistically significant linear relationships are used.

Table 4. Data for removing criteria (source: Own processing)

Confirmed collinearity			A	B
K08 vs. K12	K08	2016: K04 (0.18); K09 (0.38); K14 (0.50); K16 (0.18)	25	30.480
		2017: K02 (0.26); K09 (0.35); K13 (0.19); K14 (0.53); K16 (0.21)		
		2018: K02 (0.22); K09 (0.38); K13 (0.20); K14 (0.57); K16 (0.19)		
		2019: K02 (0.18); K04 (0.26); K09 (0.26); K13 (0.19); K14 (0.62); K16 (0.17)		
		2020: K02 (0.20); K05 (0.19); K09 (0.41); K14 (0.62); K16 (0.18)		
	K12	2016: K01 (0.16); K04 (0.21); K09 (0.37); K14 (0.51); K16 (0.22)	24	30.666
		2017: K02 (0.25); K09 (0.34); K13 (0.16); K14 (0.53); K16 (0.20)		
		2018: K01 (0.16); K02 (0.17); K09 (0.37); K13 (0.19); K14 (0.58); K17 (0.20)		
		2019: K04 (0.24); K09 (0.29); K14 (0.60); K16 (0.20)		
		2020: K02 (0.19); K09 (0.40); K14 (0.61); K16 (0.21)		
K10 vs. K11	K10	2016: K13 (0.24); K14 (0.19); K15 (-0.28)	12	27.166
		2017: K13 (0.23); K14 (0.22); K15 (-0.31)		
		2018: K13 (0.36); K15 (-0.31)		
	K11	2019: K13 (0.16); K15 (-0.32)	13	31.846
		2020: K13 (0.39); K14 (-0.25)		
		2016: K13 (0.23); K14 (0.22); K15 (-0.31)		
		2017: K13 (0.46); K14 (0.18); K15 (-0.28)		

2018: K13 (0.38); K15 (-0.29)

2019: K13 (0.48); K14 (0.16); K15 (-0.31)

2020: K13 (0.39); K14 (-0.45)

A - number of criteria with confirmed collinearity (excluding the criterion identified in the previous table)

B - average absolute value of confirmed collinearity

When comparing the criteria from the first pair (K08 vs. K12), the differences in the number of cases with confirmed collinearity with the remaining variables (criteria) and the average absolute value of the statistically significant linear relationships are minimal. In favour of criterion K08, which is long-term liabilities per capita (in EUR), is the weight assigned in another research, see Vavrek, Adamišin and Kotulič (2017), Vavrek and Bečica (2022). For the second pair (K10 vs. K11), the situation is unambiguous, as each of the observed characteristics points to the greater importance of the K10 criterion for further analysis. Based on the results described above, criteria K12 and K11 are removed for the purpose of further potential research.

5. Conclusions

Removing of a highly correlated variable(s) is one of the widely accepted approaches for dealing with the occurrence of multicollinearity used. Based on the practical application in the conditions of local government in the Slovak Republic, it can be stated that the degree of collinearity across the identified 17 criteria allows their reduction for the needs of subsequent scientific research. Within the presented case study, it is possible to remove 2 of the 17 criteria that met the conditions of the applied methodological approach.

The limitations of the presented research can be seen primarily in the specificity of the selected variables (criteria) given by the realities of local self-government in the Slovak Republic. This specificity in conjunction with the absence of data at the international level represents a perspective from which the obtained results should be interpreted. As subsequent research, this approach can be confronted with other approaches for dealing with multicollinearity such as the variance inflation factor (VIF) applied in the research of Lavery et al. (2019), Jayakumar and Sulthan (2014); eigenvalues (see the research of Roozbeh, Babie-Kafaki and Arashi (2016), Kim (2019). Another possibility is to identify the impact of this reduction of variables (criteria) on the outcome of further scientific research, primarily multicriteria analysis, which the authors' team has been engaged in for a long time. Another possibility for subsequent research is to identify the impact of this reduction of variables (criteria) on the outcome of further scientific research, primarily multicriteria analysis, which the author's team has been engaged in for a long time.

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PART III: DIGITAL TRANSFORMATION, MARKETING, AND CUSTOMER EXPERIENCE

Digital transformation is reshaping organizational structures, business processes, market relationships, and consumer behaviour. Technologies such as artificial intelligence, cloud computing, digital platforms, electronic invoicing systems, and algorithmically curated social media are no longer peripheral tools. They increasingly influence how organizations create value, interact with customers, make decisions, and develop competitive advantages.

The papers in this section examine digital transformation from both organizational and market-oriented perspectives. They discuss the conceptualization and measurement of sustainable digital transformation, the determinants of artificial intelligence and cloud technology adoption, and user satisfaction with mandatory and voluntary information systems. The section also addresses customer experience management in SMEs, relationship quality in digitally enabled automotive retail, the role of hotel websites in generating direct bookings, and the influence of TikTok food content on consumer decision-making.

Together, these contributions demonstrate that successful digital transformation requires more than the adoption of new technologies. Its outcomes depend on organizational readiness, digital capabilities, system and service quality, customer trust, meaningful digital interactions, and an understanding of how technology affects consumer cognition and behaviour. The papers consequently connect technological change with marketing strategy, customer relationships, and organizational competitiveness.

MIJAČ, T., JADRIĆ, M. & ĆUKUŠIĆ, M. / *Charting Sustainable Digital Transformation: Definitions, Measurement Methods, and Evidence Across Sectors*

Charting Sustainable Digital Transformation: Definitions, Measurement Methods, and Evidence across Sectors

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Abstract

The paper presents a comprehensive review of literature on Sustainable Digital Transformation (SDT), focusing on its definition, operationalization, and empirical evidence. Despite the growing interest in the intersection of sustainability and digital transformation, findings reveal that the concept of SDT remains inadequately defined and under-researched. Through a scoping literature review we identified a total of 214 relevant papers with only 51 meeting our strict inclusion criteria for further analysis. Significant portion of literature lacks empirical data and clear frameworks, with many studies merely addressing sustainability in a rhetorical manner rather than providing actionable insights. The analysis identifies three major themes within the SDT literature: the definition and measurement of the SDT construct, barriers to and adoption of SDT, and the impact of SDT on various sectors. The study concludes with an evidence-based call for more rigorous research to develop comprehensive operational frameworks that guide policy and practice in achieving SDGs

Keywords: sustainable digital transformation, scoping review, Sustainable Development Goals, research agenda

JEL Classification: Q01, O32, M15, L86, Q55

1. Introduction

The continual emergence of new technologies requires that organizations remain competitive by adapting to digital transformation (Ginting et al., 2022). Companies must navigate the concepts of digitalization and digital transformation, which, despite being used interchangeably, denote clearly distinct processes (Bican & Brem, 2020). The meaning and implications of these terms are especially pertinent in the industrial sector (Abdallah et al., 2022). Digitalization, spurred by technological progress, enhances connectivity, communication, services, and trade, thereby impacting economic growth and organizational efficiency (Linkov et al., 2018; Zamiri et al., 2021).

Digital transformation (DT) lacks a universally accepted definition. One perspective on DT is that it is the result of digital interactions influenced by internal and external dynamics, leading to significant organizational changes (Bican & Brem, 2020). In short, DT is characterized as a process of substantial organizational change rather than mere functional upgrades (Saraji et al., 2021). This involves leveraging digital technology to enhance existing processes while also exploring innovations that could radically transform business models (Ginting et al., 2022).

On the other hand, changes to corporate strategies have been affected by environmental issues and climate change and have intensified especially in the context of global agendas such as the Paris Agreement and the United Nations' Sustainable Development Goals (SDGs) (Saraji et al., 2021). The concept of sustainability has largely evolved to encompass not only ecological considerations but also an organization's ability to leverage digital technologies, data assets, and service-oriented frameworks to perpetually improve its financial outcomes (Chen et al., 2023).

Looking at the intersection of these two areas, it is important to note that some definitions of DE express expectation that they will accomplish substantial technical advances to increase efficiency and attain social, economic and environmental sustainability (Xianbin & Qiong, 2021), i.e. employing digital technologies creatively to meet SDGs. Namely, digital technologies are suggested to effectively resolve previously difficult sustainable development issues by enhancing the prediction, organization, and monitoring of activities to optimize outcomes for current and future needs (Geyda et al., 2021). For example, studies highlight three key areas of sustainable development within the context of digital economy (Shvakov & Petrova, 2020) as:

Sharing economy: This model emphasizes the collaborative use of resources to maximize efficiency and reduce waste.

Green and circular economy (CE): Green innovations focus on advancing technologies, such as improved treatment facilities, that support environmental protection. The CE, on the other hand, advocates for a transformative socio-economic framework designed to achieve sustainable development by minimizing resource waste and promoting reuse. The overarching goal of this approach is to meet current needs while safeguarding the ability of future generations to meet theirs, aligning with the three dimensions of sustainability: economic, social, and environmental (Fraga Lamas et al., 2021).

Energy-efficient economy: This area emphasizes developing and adopting energy-efficient technologies and practices to reduce energy consumption.

New concepts emerge such as responsible digital transformation, a term that reflects that DT requires the integration of ethical practices, environmental

sustainability, and social equity, calling for robust governance frameworks and stakeholder engagement (Sachdeva & Sharma, 2024). Extending on those lines, the concept of SDT is viewed as the process of digitizing the economy in a durable, environmentally friendly, and natural manner, leveraging its core strength – innovative companies and their interconnected business ecosystems (Rupeika-Apoga & Petrovska, 2022). While SDT focuses on integrating sustainability into digital strategies, enhancing processes and services for greater resource efficiency and environmental responsibility, an interrelated concept – green IT emphasizes the efficient use of technology to minimize environmental impact, such as energy savings and resource conservation (Winkler et al., 2023). Sustainable digital transformation aims to embed sustainability into digital initiatives, whereas green IT primarily addresses the environmental impact of technology itself (Norström et al., 2022); the findings suggest that without integration, both digital transformation and sustainability may suffer.

Defining SDT is a complex task due to the multidimensional nature of both sustainability and digital transformation. The need for clearer definitions and integrated approaches that address both technological and sustainability objectives simultaneously has been identified (Rupeika-Apoga & Petrovska, 2022) since the lack of systematic interdisciplinary efforts further complicates the understanding of how digital paradigms can enable sustainability (Del Río Castro et al., 2024). In order to fill this void, the present study intends to adopt a strategic approach to lay the groundwork for the progression of the field concerning SDT. Accordingly, we conduct a comprehensive literature mapping through a scoping review and further in-depth analysis of emerging themes. Specifically, this review emphasizes various critical dimensions pertinent to SDT by setting the following research goals (RG):

define the term SDT and examine how research in this area has evolved over the last two decades (RG1),
provide the analysis and discussion of various significant themes related to SDT (RG2),
identify gaps within the existing literature and to explore potential directions for future research in this area (RG3).

The subsequent sections of this paper are organized as follows. Section 2 offers a succinct overview of the methodologies employed to identify the relevant research included in this review. Section 3 outlines research findings by focusing on major themes identified within the SDT body of literature. Additionally, it addresses the evolution of the literature corpus, the analysis of research methodologies, and their relevance to Sustainable Development Goals (SDGs). Section 4 elaborates the findings, and suggests potential directions for future inquiry and policy implications. Conclusions and limitations are given in Section 5.

2. Methodology

To map, organize and analyze scientific literature on SDT, the authors first agreed upon keywords aligned with the paper's aims and defined the RGs stated above. We applied a series of steps as a part of scoping review (SR); the review followed the PRISMA methodology (Tricco et al., 2018), and we complemented its results with a thorough content analysis of major research themes. Aligned with the PRISMA extension for scoping reviews (Tricco et al., 2018), and in line with practices established in earlier studies of this type (e.g. Manfreda & Mijač, 2024), authors agreed upon keywords and defined the search query as: (TITLE ("sustainab* digital*") AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp")) AND (LIMIT-TO (LANGUAGE, "English))). The same search query was used for Scopus and Web of Science (WoS) databases on January 30, 2025. The second step was to establish inclusion criteria (IC). Only peer-reviewed primary studies, including journal articles and conference papers that made a clear contribution to the SDT concept, were considered for further analysis. Regarding exclusion criteria (EC), non-English language papers were excluded from this review, with no exclusions based on the publication year. Additionally, drawing from a similar SLR study, but in the higher education context (Mijac et al., 2024), we developed quality criteria (QC) to ensure that the selection of studies meets certain standards. Specifically, five quality criteria were established, detailed in Table 1, such as relevancy to contribution to SDT concept.

Table 1. SR inclusion, exclusion and quality criteria (source: authors).

Type	Description
IC1	Primary studies
IC2	Peer-reviewed studies
IC3	Conference papers and journal articles
IC4	Papers relevant to concept of SDT
IC5	All time range
EC1	Non-peer reviewed papers
EC2	Duplicate studies
EC3	Non-English written papers
EC4	Incomplete studies
EC5	Redundant papers of the same authorship
EC6	Studies out of scope
QC1	Is the paper relevant to concept of SDT?
QC2	Does the context have a sufficient and thorough description?
QC4	Related to SDG?
QC4	Is there an adequate description of the method used?

The following step was the content analysis (as in e.g. Özyurt & Özyurt, 2015). For that purpose, two datasets (from Scopus and WoS) were downloaded for further processing; duplicates were removed and a list of records was created. The studies were evaluated according to the research objectives outlined in Section 1. To maintain validity and reliability, each researcher independently assessed the classification of the papers based on the previously defined criteria. In addition, the content analysis included identifying the type of research, research domain, SDG relevance and scientific contribution. In the subsequent phase, the papers were re-evaluated to confirm the accuracy and consistency of the selection. The content analysis was finalized by reaching an agreement on a conclusive list.

3. Results

As introduced in the methodology section, seeking a relevant scientific corpus started with a search which yielded 228 papers from Scopus and 143 from WoS. After removing the duplicates, the total number of papers was 214. This search yielded more recent papers, and the peak was in 2024 (n=61).

3.1. Insights from the SR

To provide a more detailed approach and try to identify more relevant papers to SDT, we further provide results from the conducted SLR. First, we screened the 214 papers' titles and abstracts, coming to the final list limited to 104 papers. The screening was organized as follows: the authors, experts in DT, individually reviewed the list and marked each record with 1 (keep) or 0 (remove). Results were further gathered, and a total list of records that met the previously established criteria was kept after consolidation and discussion in cases of disagreement. In total, after accessing the full papers, 51 full papers were included in the SR, and categorized. The slight majority of chosen papers were journal articles (29), while 22 were conference papers. Figure 1 shows the PRISMA model flowchart applied for this SR (Page et al., 2021).

With regards to the year of publishing of the selected, reviewed papers, the results on the quantity of papers published through the time period can help in estimating the maturity of the research topic (RG1). Results show that the majority of papers chosen to include in this literature review were published in 2024 (n=14). Results are presented in Figure 2.

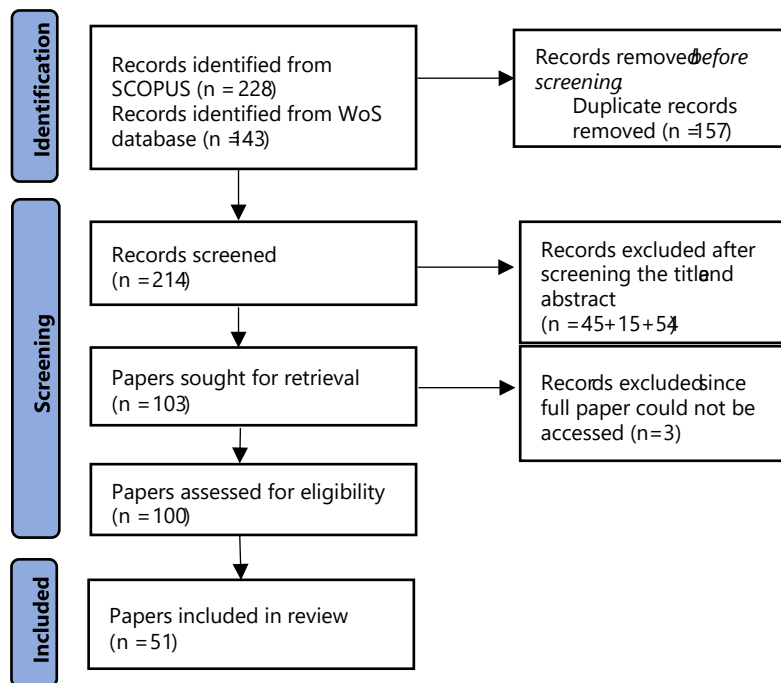
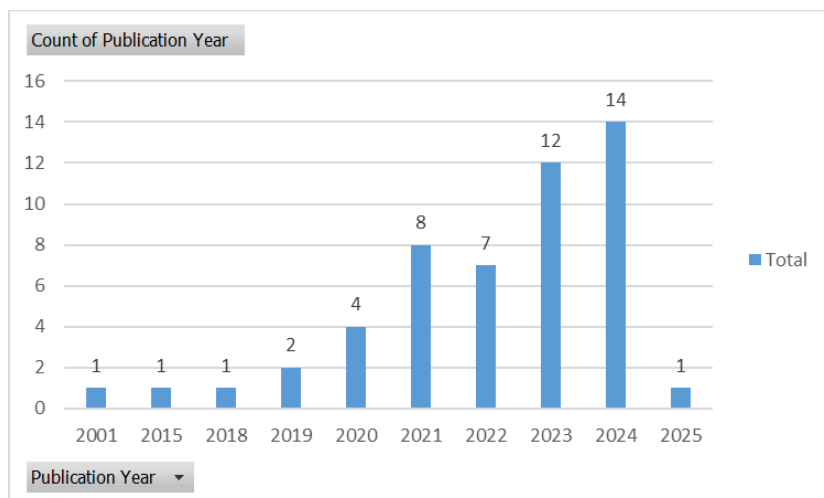
Figure 1. Search, retrieval and screening flowchart (source: authors based on Page *et al.*, 2021).

Figure 2. Papers included in SR organized by year of publication (source: authors).

3.2. Major themes in the SDT literature

To address our second research goal (i.e., the analysis and discussion of various significant themes related to SDT) we identified three major themes. Even though the query was very narrow, still only a minority of the papers examined the specific concept of SDT. The results of SR were categorized according to the domain examined. In total, three major themes were identified: (1) SDT construct definition and measurement; (2) barriers and adoption of SDT; and (3) impact of SDT. The papers are listed in Table 2. Out of a total of 51 papers included in this SR, 19 papers dealt with conceptual proposals and were only theory-based. That is, almost 40% of the papers do not have any empirical data included. In the following sub-sections, we analyze in-depth the evidence from the selected papers for the SR and organize them around the emerging themes.

Table 2. Major themes in the SDT literature (source: authors)

	SDT construct definition and measurement	Barriers and adoption of SDT	Impact of SDT (benefits and challenges)	
Qualitative research	(Bican & Brem, 2020)	(Gudmundsdottir et al., 2024)		N= 12
	(Nagano, 2019)	(B. Zhang et al., 2020)		
	(Bravo et al., 2021)	(Persson & Rydenfält, 2021)		
	(Ahmad Amouei, Valmohammadi, & Fathi, 2024)	(Zhou et al., 2022)		
		(Bourgeois et al., 2015)		
Quantitative research	(Wang, 2024)	(Park & Kim, 2022)		N= 12
		(Risdalet al., 2023)		
		(Petani et al., 2021)		
		(Shashi, 2023)		
		(Saraji et al., 2021)	(Tong et al., 2023)	
Mixed methods		(Rupeika-Apoga & Petrovska, 2022)	(Yacob & Peter, 2022)	N = 8
		(Yousaf et al., 2021)	(M. Zhang et al., 2025)	
			(Li et al., 2024)	
			(Guo et al., 2024)	
			(Yu et al., 2024)	
			(Wu et al., 2023)	
		(Verma et al., 2022)	(Vergallo et al., 2024)	
		(Martínez-Peláez et al., 2024)	(Salminen et al., 2023)	
		(Mick et al., 2024)		
		(Dossou & Tchuenmegne, 2024)		

Theoretical / literature review		(Feroz et al., 2023)		
		(Dossou et al., 2023)		
	(Vandevenne et al., 2023)	(Abdallah et al., 2022)	(Hustad & Olsen, 2021)	N= 19
	(Hajishirzi, 2023)	(Lundell & Gamalielsson, 2018)	(Gils & Weigand, 2020)	
		(Hasanova & Romanovs, 2020)	(Pendergrass et al., 2019)	
		(Shang & Zhang, 2022)	(Fraga-Lamas et al., 2021)	
		(Wallimann-Helmer et al., 2021)	(Miller & Wilsdon, 2001)	
			(Sacco et al., 2021)	
			(De Felice et al., 2024)	
			(Alrefai et al., 2024)	
			(Gerardo Acuña Acuña, 2024)	
	N=7	N=23	(Victorio et al., 2024)	
			(Vakhitova et al., 2023)	
			(Davila et al., 2023)	
			N=21	

Theme 1: Defining and measuring the SDT construct

In the paper by Bican & Brem (2020) the authors aimed to distinguish various digital related terms, such as Digital Technology, Digital Innovation, Digital Transformation, and Digital Entrepreneurship. Their goal was to examine how these terms interrelate and how they contribute to sustainability. They conducted a qualitative research study involving 12 R&D managers in a focus group, and prior to this, they pre-assessed the terms using a questionnaire with 13 respondents. Their results revealed that further research is needed. Regarding sustainability, the conclusion is often situational rather than definitive; there is no automatic correlation. For example, if a new digital method helps conserve resources - such as virtual conferences substituting in-person events with global participants - the sustainability impact would clearly be positive. On the other hand, in different scenarios, the answer might be a definite no; for instance, if a new digital solution has considerable environmental drawbacks, like cryptocurrencies that require a substantial amount of energy. Similar qualitative approach was taken by authors (Ahmad Amouei et al., 2024) with the purpose of extracting the subdimensions and dimensions of sustainable digital supply chain. The study by Nagano (2019) aims to create an integrated index for measuring a sustainable digital society. The author employed text mining analysis to identify indexes used within the business sector in Asia. Additionally, topic modelling was utilized to develop the integrated index. However, the complexity of the problem makes it difficult to grasp the overall dynamics of the system. There is no empirical evidence available, only proposed concepts that should guide the development of the integrated index. The paper by Bravo et al. (2021) focuses on higher education institutions in Peru. The authors developed a SDT model to assess maturity, which comprises four dimensions:

infrastructure, business architecture, digitalization, and people. They validated the model using one example. The proposed model facilitates sustainability, signifying that the university has the capacity to ensure its continuity and long-term positioning while contributing to the ongoing improvement of academic quality conditions. However, they do not provide any comparisons to the SDGs or specific details. Paper by (Wang, 2024) is the only paper that applied quantitative method (MCDM), providing the criteria for defining sustainable digital economy. As for theoretical papers, (Vandevenne et al., 2023) proposes green architect for SDT while (Hajishirzi, 2023) applied design science to strategically plan SDT.

Research gap: *The studies reviewed in this SR fail to offer a clear and universally accepted definition of the SDT or operationalization of the construct. Furthermore, while sustainability is partially addressed, there is a noticeable lack of explicit comparisons or alignments with the SDGs, leaving a critical gap in understanding how these frameworks interrelate. Only one quantitative research has been conducted thus far, highlighting a lack of more robust and comprehensive methodological approaches.*

Theme 2: Barriers and adoption of SDT

Qualitative research. The majority of papers included in this SR are related to identify barriers and the adoption of SDT (22 out of 51). Recent paper written by (Gudmundsdottir et al., 2024) employs semi-structured interviews with employees of municipality, trying to explore how to embrace change and conduct digital transformation focused on sustainability. This paper revealed that management support and stakeholder involvement are prerequisites. Authors, by conducting the interviews (Shashi, 2023), proposed the pharmaceutical supply chain conceptual framework for identifying the constraints and following the digital enablers. Paper has not been empirically validated. The paper of Zhang et al. (2020) investigates the construction industry, which is characterized by a low rate of innovation and slow adoption of new technologies. The authors employed a design thinking approach to create a sustainable digital solution, which facilitated the adoption of a labor resource management process. They state that technology adoption is essential in the construction industry, yet it also presents one of the industry's main challenges. This challenge could be addressed by collaborating with employees to develop a sustainable solution; however, the paper does not explain why this solution is considered sustainable. Persson & Rydenfält (2021) propose three strategies for creating a more sustainable digital work environment in healthcare by conducting a multiple-case study across four different scenarios. The text does not define a sustainable digital environment but highlights three approaches to digital transformation in healthcare. Case study has also been used by (Risdaalen et al., 2023) for detecting how can sustainability be addressed with DT in small rural business. Results indicate that it can be achieved through business process optimization, eco-

friendly feedback mechanisms, questioning the status quo, and encouraging collective engagement. Qualitative research by (Petani et al., 2021) confirmed there is not solid consensus regarding sustainable digital maturity, thus confirming the need for future research. Zhou et al. (2022) investigated the framework for SDT in elderly health services. The focus is on theoretical literature concerning digital transformation components, experiences in designing elderly services, and the operational processes of digital transformation in public health. The authors emphasize the need to account for elderly individuals' age and learning abilities in the digital transformation process. Nevertheless, the study fails to elucidate the sustainability of these services. Bourgeois et al. (2015) analyze a case study of Chevron Upstream and Gas, highlighting mutual leadership accountability among partners for project deployment, value capture, and sustainability planning. This collaborative approach fosters relevance and adaptability of solutions, facilitating ongoing innovation. Park & Kim (2022) explore a strategic framework for building trust and integrating IT infrastructure to create a sustainable digital supply chain, with CRAB as a case study. The focus remains on the digital supply chain, yet the authors' PESTEL and Porter's Five Forces analyses lack specificity regarding CRAB's supply chain sustainability.

Quantitative research. Three papers applied quantitative research. The results by Saraji et al. (2021) indicate that coordination and collaboration identified as the most significant challenges to the adoption of SDT in Industry 4.0, followed by resistance to change and governmental support. The second research from Rupeika-Apoga & Petrovska (2022) was conducted on 425 Latvian SMES, and seven barriers to SDT have been identified. Most important ones are IT security and lack of specialists in the labor market. Lastly, the research by Yousaf et al. (2021) involved a quantitative study of 397 CEOs of SMEs in Pakistan. This study found that digital orientation, the Internet of Things (IoT), and digital platforms are significant antecedents of sustainable digital innovation.

Mixed methods. The paper by Verma et al. (2022) applies mixed methods approach (SLR and AHP). They identified 30 sustainability challenges facing Industry 4.0 in smart manufacturing. Despite its promising advantages, they argue that various barriers can affect performance and hinder sustainability objectives. Two papers (Martínez-Peláez et al., 2024) and (Mick et al., 2024) propose frameworks for SDT in SMEs, validated through case studies. The first study provides a more general framework, while the second identifies specific processes and key steps needed to assess digital maturity. In their paper (Feroz et al., 2023) provide list of capabilities required for SDT but focuses exclusively on the environmental dimension of sustainability. In addition, two more papers had goal of developing the system for supporting the SDT of SMEs (Dossou et al., 2023; Dossou & Tchienmegne, 2024) but proposed tools do not fully

consider environmental, social, and economic sustainability aspects and require further real-world implementation and validation.

Theoretical papers. The paper of Abdallah et al. (2022) tackles SDT in the manufacturing sector, by discussing the role of digital culture in organizations to ensure sustainability. This research identifies four key pillars necessary for incorporating digital culture into a SDT framework: Technological Infrastructure, Leadership Support, Strategic Alignment, and Technological Development. While a theoretical framework has been proposed, the research is still ongoing. Lundell and Gamalielsson (2018) focus on aspects of Information Systems that contribute to sustainability. They examine dimensions such as lock-in, interoperability, and long-term maintenance, which are crucial for openness. The paper clarifies concepts and dimensions of openness in the software domain and explores how various practices can facilitate sustainable digitalization. The authors use SLR and find that key concepts, including open standards, open-source, and open content, are fundamental to achieving sustainability. The paper by Hasanova and Romanovs (2020) explores supply chain management (SCM) and the motivations for adopting more sustainable practices. SCM is crucial for the effectiveness of business operations and is a significant contributor to the carbon footprint of production processes. The authors differentiate Green SCM by emphasizing the use of reusable resources (input/output) and effective production methods that minimize the carbon footprint, in line with ISO14000 standards. They provide examples of technologies used, including IoT, Big Data, AI, Blockchain, and Design for Environment (DfE), which aim to reduce energy consumption, packaging, and promote recycling. While the paper discusses challenges related to the adoption of these technologies, it does not present any empirical evidence, relying instead on a review of existing literature. Shang and Zhang (2022) focus on the significance of digital technologies in manufacturing, highlighting their potential to reduce costs and enhance sustainability. They utilized bibliometric methods and literature mining in their analysis. Wallimann-Helmer et al. (2021) created an integrated framework that addresses various aspects of digital ethics by merging three categories of digital contexts: legal and regulatory issues, ethics and justice, and environmental sustainability. This main framework is referred to as FSDEF, and the authors used a SLR to develop it.

Research gap: *While significant attention has been given to identifying barriers to the adoption of SDT, more research is needed to explore strategies for overcoming these barriers, and how SDT can be integrated with broader sustainability frameworks. None of the reviewed papers provided a clear definition of the SDT concept, and quantitative research remains in the exploratory phase, primarily focused on listing and identifying adoption barriers. Additionally, there is a notable absence of comprehensive, empirically supported explanations for why certain digital transformation practices are deemed*

sustainable, as well as a lack of systematic documentation of challenges and barriers. This highlights the need for clearer definitions, operationalization of SDT, and a more structured approach to identifying and addressing its barriers.

Theme 3: Impact of SDT

Quantitative research. The study by Tong et al. (2023) investigates an automated warehouse that merges enterprise resource planning with warehouse management systems through intermediate methodologies. This exemplifies the establishment of a sustainable digital factory, proposing a holistic architecture for such facilities. Post-implementation survey data indicated notable advancements in multiple performance metrics. Specifically, production balance improved by 28%, in-process inventory decreased by 25%, and the non-performing rate fell by 33%. These improvements enhance enterprise management's data-driven, transparent, and efficient nature. Yacob and Peter (2022) conducted a survey among small and medium-sized enterprises (SMEs) in Malaysia, with a sample size of 389. Study results confirmed that perceived benefits, cost-effectiveness, and communication effectiveness positively influence the adoption of SDT. The construct of "sustainable digital technologies adoption" was measured using six items. Another interesting study (M. Zhang et al., 2025) examines the impact of technology, including blockchain, on energy efficiency. The authors employ various economic methods such as FMOLS, DOLS, FE-OLS, and MMQR to analyze how the digital economy and energy policies influence sustainability. Their analysis considers several key indicators, including the Rate of Adoption of Digital Government, the Index of Sustainable Development, the Index of Natural Resource Governance, the Index of Energy Security, Policy Effectiveness, and the Index of Digital Inclusion. To assess the impact of ICT (measured through the ICT Index) on Green Total Factor Productivity Li et al. (2024) use Data Envelopment Analysis (DEA) to quantify how ICT contributes to sustainable economic growth. Similarly, Guo et al. (2024), based on the concept of elasticity coefficients, evaluate SDT by analyzing the relationship between output and input growth. The study adopts a quantitative approach, analyzing financial data from businesses to assess the impact of different DT strategies. A comprehensive analysis of how DT influences green innovation and ESG performance (Yu et al., 2024) includes extensive definitions and an operationalization of key variables. The study examines financial and ESG data from 95 transportation companies to evaluate the impact of DT. A detailed list of variables and measurement methods is provided, with DT quantified as the natural logarithm of the total occurrences of digitization-related terms in corporate annual reports and ESG performance assessed using the Huazheng ESG rating scale. Focusing on the technological aspects of the digital economy and their positive environmental impact, Wu et al. (2023) examine technologies such as AI and IoT. They employ a quantitative approach to analyze how the digital economy influences CO₂ emissions in China.

Mixed methods. A novel methodological framework called Digital Green (DG) designed to quantitatively assess the environmental impact of digitalization is introduced by Vergallo et al. (2024). The framework has been validated through a case study and offers a broadly applicable approach for evaluating digitalization's sustainability effects. The second mixed-method paper analyses survey responses from 74 participants and insights from 7 interviews to explore the needs of the manufacturing industry in relation to sustainable digital technologies (Salminen et al., 2023). The focus is on future skills and emerging technologies required for sustainable industrial transformation in manufacturing.

Theoretical papers. The paper by Hustad and Olsen (2021) explores concepts related to digital infrastructure, service-oriented architecture (SOA), and microservices, emphasizing their benefits and challenges in terms of sustainability. The reuse of SOA is presented as a green IT approach that positively impacts environmental protection. The paper primarily focuses on IT business alignment and SOA governance, both of which are crucial for achieving sustainability. Additionally, it discusses the sustainable characteristics of SOA and the related challenges. Gils and Weigand (2020) aimed to provide a broader approach to defining SDT. They have developed a theoretical framework that should be validated through future research. The distinction is made between two concepts: "green IT," which focuses on reducing environmental impacts such as energy consumption, and "green by information systems (IS)," which positions IT as a supportive function that can help mitigate environmental issues. The authors emphasize the need to incorporate sustainability into IS design overall. Additionally, they proposed key operational directions for SDT, which include: (1) cyclical business processes, (2) resource invariants, (3) cyclical coordination processes, (4) protection by design, and (5) modularity. Another paper has tackled energy consumption, exploring how digital twins contribute to sustainability, particularly in optimizing energy consumption (Davila et al., 2023). This paper proposed a framework for implementing digital twins in industry to enhance sustainability. The paper of Pendergrass et al. (2019) discusses the application of ICT in the field of cultural heritage. The authors advocate for the use of clean energy resources and enhancing efficiency in this area. They emphasize the importance of selecting suitable storage systems for digital preservation, focusing on factors such as availability, durability, and evaluation. Additionally, they propose ways to make these activities more sustainable. Similar has been done for the manufacturing sector, where (De Felice et al., 2024) conducted SLR focused on identifying key technologies and their role in enhancing sustainability by improving efficiency, reducing waste, and optimizing resource use. Authors (Vakhitova et al., 2023) analyzed strategies and gaps in sustainable digital transition within education, with a focus on EdTech companies. An SLR-focused paper (Gerardo Acuña Acuña, 2024) explores why companies should adopt sustainable digital business management. While it does not explicitly discuss DT it concludes that firms integrating

sustainability into their strategies experience long-term improvements in financial performance and corporate reputation. Fraga-Lamas et al., (2021) argue that IoT can facilitate the transition to a CE and promote a more sustainable world by enabling the digitalization of various operations and processes, such as water distribution, preventive maintenance, and smart manufacturing. Although IoT and paradigms such as edge computing have great potential to drive DT towards sustainability, they are not currently advancing the sustainable development of the IoT sector itself. The sector still has a notable carbon footprint due to the consumption of limited raw materials and the energy used throughout manufacturing, operation, and recycling. This paper highlights the challenges related to the rising energy consumption of these devices and technologies that are meant to support sustainability, and it also discusses the technological and regulatory issues that future innovations need to address. Similarly, a paper by Alrefai et al. (2024) analyses the role of IoT in SDT, providing concrete examples of both benefits and challenges. An example of an older study is by Miller and Wilsdon (2001), focusing on how e-commerce could improve performances and make businesses more efficient, thus contribute to sustainability. Sacco et al. (2021) analyzed the relationship between digitalization and sustainability by presenting a framework to classify the impacts of material digitalization as well as the use of digital technology itself. Via SLR they identified factors that help determine whether digitalization has positive or negative impacts. Opportunities and challenges were classified according to the three pillars of sustainability: economic, environmental, and social. This paper serves as a foundation for further quantitative research. A recent paper by (Victorio et al., 2024) also provides a theoretical discussion on whether AI can be sustainable and whether its overall impact results in more benefits or harms.

Research gap: *A research gap identified from these studies is the need for more empirical evidence and comprehensive frameworks that clearly demonstrate the long-term impacts of SDT. Additionally, there is a lack of consensus on the definition and operationalization of SDT, which underscores previously identified gaps regarding the clear conceptualization and practical implementation of the construct. Also, the majority of the papers that were included employed quantitative methods to measure the impact only on the environmental dimension.*

4. Discussion

In the light of the escalating emphasis on environmental concerns and climate change, the paradigm of SDT has emerged, getting considerable attention from both the industrial sector and academic circles, resulting in a swift increase of relevant scholarly publications. However, sustainability initiatives and considerations remain separated from digital ones, both in theory and in practice, despite the novel concepts

such as the twin transition. Referring to the simultaneous integration of DT and sustainability efforts within organizations and regions, the process of twin transition involves aligning DT with sustainability goals to achieve operational efficiency and environmental responsibility (Schallmo & Jehle, 2025). EU initiatives (European Green Deal, Next Generation EU) support transitions towards more sustainable societies with digital innovation (Sánchez & Nocentini, 2024), however challenges include the need for strategic alignment, overcoming organizational and regional barriers, and ensuring that digital technologies do not worsen environmental issues. Taken together, these dynamics point to a persistent integration gap between digital and sustainability agendas, an evidence gap this review set out to map.

Although this literature review identified papers by examining the title of papers and abstracts (that should be relevant and clearly related to the paper), only a limited number of these articles employed this conceptual framework as the foundation for their analytical discourse. Based on the findings of this comprehensive study, it is evident that the concept of SDT remains inadequately defined, with a noticeable scarcity of operational frameworks and empirical data. Despite the substantial volume of scientific literature available on the topics of sustainability and digital transformation independently, there exists a significant gap in research specifically addressing their intersection. This indicates a pronounced deficiency in scholarly work dedicated to exploring and tackling the complexities of SDT. In addition to defining these concepts, future research should also focus on further operationalizing sustainability (Bican & Brem, 2020). Moreover, while the term sustainable is embedded within the concept, its application appears to be more rhetorical than substantive. More specifically, this review finds that across the corpus, SDT definitions are inconsistent and rarely operationalized; digital transformation is often treated as a generic enabler, while sustainability remains an external constraint rather than an embedded design principle. Empirical work tends to focus on isolated use cases or high-level policy narratives, with few studies measuring both digital performance and environmental outcomes in tandem. As a result, the field lacks a shared vocabulary, robust indicators, and cumulative evidence.

In discussing the definition of SDT, several critical questions arise. For example; should SDT be defined solely as the use of sustainable software, such as reusable code? The emphasis on sustainable software highlights the importance of developing applications that minimize resource consumption and environmental impact (Gils & Weigand, 2020). This perspective is indeed crucial as software development practices can significantly affect energy consumption and resource utilization throughout the software lifecycle (Hustad & Olsen, 2021). Alternatively, should SDT focus on the adoption of technologies with low energy consumption? The integration of energy-efficient technologies is essential in reducing the carbon footprint of digital

operations. For instance, the implementation of cloud computing solutions that optimize energy use can lead to substantial sustainability benefits (Fraga-Lamas et al., 2021). This approach aligns with the principles of green IT, which advocate for minimizing environmental impacts through efficient technology use (Gils & Weigand, 2020). Moreover, is it sufficient to consider the overall positive impact of transformation outcomes on sustainability when defining SDT? This broader perspective encompasses not only the technologies and software used but also the tangible benefits that arise from digital transformation initiatives, such as improved operational efficiency, reduced waste, and enhanced social equity (Sacco et al., 2021). Ultimately, the question is – should the definition of SDT encompass all of these aspects? Integrating the use of sustainable software, the adoption of energy-efficient technologies, and the assessment of positive outcomes provides a comprehensive framework for understanding SDT. Consequently, the definition of SDT should be multileveled, reflecting the complex interplay between technology, software practices, and sustainability outcomes. By adopting this comprehensive perspective, researchers and practitioners can better navigate the challenges and opportunities presented by the digital transition while advancing global sustainability efforts.

Although this review does not establish a single definition of SDT, it exposes critical gaps in practice. These gaps signal a need for targeted policy interventions. Policymakers could introduce standardized SDT reporting and benchmarking guidelines to ensure consistent measurement and transparency (Wang et al., 2025). Likewise, aligning DT policies with sustainability frameworks is crucial for coherence, as emphasized by calls to unite digital strategies with sustainability imperatives (Florek-Paszkowska & Ujwary-Gil, 2025). Finally, governments and institutions should consider directing support to sectors or regions that are underrepresented in the SDT landscape, addressing imbalances by boosting capabilities in service industries, SMEs, and developing regions that lag in digital sustainability integration (Du Toit, 2024).

5. Conclusion

Despite the evident policy momentum around the twin transition, our synthesis indicates that digital and sustainability agendas still evolve in parallel streams. To clarify what is known, we conducted a scoping review of literature on SDT, cataloguing definitions, focal domains, methods, and reported outcomes. This approach allows us to assess the degree of conceptual alignment and practical integration across the literature and to identify where scholarship and practice talk past each other. Based on the overview of the analyzed studies it is clear that the notion of SDT is still emerging, characterized by a lack of clarity and direction. This phase is marked by an urgent need for rigorous research aimed at defining and operationalizing the concept. This includes developing comprehensive models and methodologies that can bridge

the gap between theoretical discourse and practical implementation. This study has several limitations. Coverage is constrained by database selection, English language focus, and evolving terminology (e.g., SDT, twin transition, “green digital”), which may have led to omissions - especially from grey literature, standards, and industry reports. The evidence base is heterogeneous and skewed toward EU policy contexts and manufacturing case studies, limiting comparability across sectors, regions, and firm sizes. Despite a protocolized screening process, study inclusion and category assignments retain some subjectivity. Consequently, the review should be read as mapping the state of concepts and evidence rather than providing outcome evaluations.

Future research should prioritize establishing greater conceptual clarity for SDT, given the term’s varied use and the current gaps in its conceptual structure (Wang et al., 2025). Developing joint indicators that simultaneously capture digital transformation progress and sustainability outcomes is essential for advancing measurement in this field (Mick et al., 2024). Empirical studies need to incorporate social and environmental dimensions – not only technological or economic factors – to fully assess SDT outcomes. The same study emphasizes that methodologically, comparative and longitudinal studies (and mixed method designs) are encouraged to explore how SDT unfolds across different industries, regions, and time horizons. Additionally, future studies should investigate how governance models (e.g. adaptive leadership and organizational structures) and cross-sector collaborations or partnerships can foster and scale SDT initiatives.

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Determinants of Artificial Intelligence Adoption in European Enterprises

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Abstract

Artificial intelligence (AI) is increasingly reshaping business processes, innovation performance, and competitive dynamics across the European Union. This article examines the determinants of AI adoption through an integrated analytical framework combining firm-level technological readiness with country-level digital disparities. Using harmonised Eurostat data, the study employs cloud computing adoption as a proxy indicator of firms' preparedness to implement AI-related solutions and estimates multiple linear regression models for the years 2018, 2020, 2023, and 2025. The models include indicators related to digital infrastructure, ICT human capital, economic development, data-oriented technological capabilities, and firm structure. The findings reveal that the diffusion of AI-related technologies in the EU is dynamic but highly uneven. At the firm level, the share of ICT specialists emerges as the most stable determinant of cloud adoption, while big data and data analytics gain relevance as digital transformation deepens. In contrast, GDP per capita and the share of large enterprises do not display robust statistical effects. At the macro level, significant regional disparities persist between digital leaders, core EU economies, and the southern and Central and Eastern European member states. Countries with stronger institutional readiness and higher levels of digital preparedness systematically achieve higher AI adoption rates. The results suggest that the diffusion of AI in the EU is driven not only by access to technology, but also by firms' absorptive capacity, organisational readiness, and the broader institutional context. These findings carry important implications for policies aimed at fostering inclusive digital transformation and reducing structural inequalities in AI uptake across European economies.

Keywords: Artificial intelligence adoption; Big data technologies; Cloud computing; Digital transformation; European Union; ICT specialists

JEL Classification: O33, O14, L86, M15

1. Introduction

The adoption of artificial intelligence (AI) in the corporate sector has, over the past decade, become one of the key determinants of productivity, innovation performance, and the long-term competitiveness of economies (Brynjolfsson & McAfee, 2014;

Acemoglu & Restrepo, 2020; Zhang et al., 2023; Verhoef et al., 2021). In the European context, however, this process does not occur uniformly, but is characterized by significant differences between countries and regions (Bughin et al., 2019; OECD, 2021). These disparities result from a complex interaction of technological, economic, and institutional factors that influence firms' ability to implement and effectively utilize AI solutions (Andrews et al., 2018). For this reason, analyzing the determinants of AI adoption requires a multi-level approach that links firm-level microeconomic characteristics with the macroeconomic and policy environment in which they operate (Bharadwaj et al., 2020; Kraus et al., 2022).

At the micro level, the adoption of AI is closely linked to the implementation of digital technologies, with cloud computing representing one of its key infrastructural components (Armbrust et al., 2010; Mell & Grance, 2011). The extent to which firms use cloud services—measured as the share of enterprises utilizing cloud computing—is therefore often used in the literature as a proxy indicator of technological readiness for the implementation of advanced solutions, including artificial intelligence (Oliveira et al., 2014; Alshamaila et al., 2013). The determinants of this adoption primarily include the availability of digital human capital, the quality of digital infrastructure, the level of economic development, and the organizational capacities of firms (Gangwar et al., 2015; Andrews et al., 2018). However, these factors do not operate in isolation but are conditioned by a broader systemic framework that can either accelerate or, conversely, hinder the adoption of technologies.

From a macroeconomic perspective, the issue of regional disparities in AI adoption within the European Union comes to the forefront. Empirical evidence suggests a significant gap between technologically advanced countries in Northern and Western Europe and the countries of Central and Eastern Europe, which are undergoing a process of gradual but incomplete convergence (Bughin et al., 2019; European Commission, 2023). This imbalance reflects differences in historical development, institutional quality, investment in research and development, as well as the level of economic digitalization (OECD, 2021; Lešková, 2024). Despite the increasing availability of digital technologies, substantial differences in their implementation persist across regions of the European Union (European Commission, 2023). In particular, Slovakia and other Central and Eastern European countries exhibit lower levels of adoption compared to leaders such as Sweden and the Netherlands (Bughin et al., 2019). An analysis of regional disparities therefore provides an important context for understanding the heterogeneity of AI adoption and makes it possible to identify structural barriers that hinder the broader diffusion of these technologies.

To capture the broader context of artificial intelligence adoption, it is therefore appropriate to complement microeconomic analysis with composite indices that reflect the institutional and systemic readiness of countries. These indices capture various dimensions of countries' digital preparedness for AI adoption. This study focuses on three complementary indicators: the Global Index Score, which reflects the level of implementation of responsible AI principles and the quality of regulatory frameworks; the Government AI Readiness Index, which measures the capacity of the public sector to design and implement policies supporting AI development; and the

Network Readiness Index, which evaluates the overall digital readiness of the economy, including technological infrastructure, human capital, governance, and the impacts of digitalization (Oxford Insights, 2022; European Commission, 2023). The combination of these indices enables a more comprehensive understanding of the factors influencing AI adoption, as it reflects not only technological preconditions but also institutional and regulatory aspects. Such an analytical framework makes it possible to link firm-level behavior with the broader economic and regulatory environment in which technological adoption takes place.

2. Theoretical background

The theoretical grounding of the determinants of artificial intelligence (AI) adoption in firms is based on the integration of several research streams that link firms' microeconomic behavior with macroeconomic and institutional conditions. A key theoretical framework for analyzing the adoption of digital technologies is the Technology–Organization–Environment (TOE) model, which emphasizes that technology implementation is the result of an interaction between technological characteristics, organizational capacities, and the external environment (Tornatzky & Fleischer, 1990). This framework assumes that the adoption of technological innovations in organizations is influenced by three main dimensions: technological readiness, organizational characteristics, and external environmental conditions. Previous studies have applied the TOE framework to examine the determinants of cloud computing adoption across various industries and countries (Oliveira, Thomas & Espadanal, 2014). This approach is complemented by the diffusion of innovations theory, which posits that technology adoption depends on their perceived characteristics as well as on organizations' ability to absorb new knowledge (Rogers, 2003).

Cloud computing currently represents a fundamental pillar of digital transformation infrastructure, with its importance further amplified through its integration with big data technologies and advanced analytical tools that form the core technological foundation for the development of artificial intelligence (Bharadwaj et al., 2020; Verhoef et al., 2021). It enables the implementation of modern solutions such as big data analytics, artificial intelligence, and the Internet of Things (IoT). As noted by Armbrust et al. (2010), cloud computing constitutes a transformative shift in information technology, allowing organizations to reduce operational costs, enhance flexibility, and efficiently scale IT services. From the perspective of its role as a key infrastructure for artificial intelligence, numerous studies highlight its strategic importance for businesses. Cloud computing provides flexible and scalable access to computational resources and data (Armbrust et al., 2010; Mell & Grance, 2011), thereby creating the necessary conditions for deploying advanced analytics and AI solutions. The adoption of cloud technologies is influenced by a combination of technological, organizational, and environmental factors, including cost efficiency, security, infrastructure availability, and competitive pressure (Marston et al., 2011; Oliveira et al., 2014). Empirical research also emphasizes the critical role of digital human capital and organizational readiness to implement innovative technologies

(Alshamaila et al., 2013; Gangwar et al., 2015; Kraus et al., 2022). Moreover, the significance of cloud computing is reinforced by its close integration with big data technologies, which serve as an essential foundation for the advancement of artificial intelligence. Hashem et al. (2015) highlight the synergistic relationship between cloud computing and big data analytics, enabling more efficient processing and utilization of large-scale data resources. This relationship is further supported by recent studies emphasizing the role of big data analytics capabilities in enabling AI adoption (Mikalef et al., 2021; Wamba et al., 2020). This technological foundation is crucial for the implementation of AI, which is widely recognized in the literature as one of the primary drivers of contemporary economic transformation (Brynjolfsson & McAfee, 2014; Acemoglu & Restrepo, 2020; Zhang et al., 2023; Ransbotham et al., 2021). Contemporary approaches further stress the importance of developing dynamic capabilities and fostering a data-driven organizational culture to effectively leverage AI technologies (Chatterjee et al., 2024; Chaudhuri et al., 2024; Sestino et al., 2022). Equally important is the innovation orientation of firms and their ability to integrate digital technologies into business processes, which represents a key prerequisite for successful digital transformation (Upadhyay et al., 2022).

Human capital in the field of information and communication technologies (ICT) plays a crucial role in the adoption of cloud computing. Organizations with a higher proportion of ICT specialists possess greater technical capacity to implement, integrate, and manage complex digital systems. As noted by Marston et al. (2011), the effective use of cloud computing requires specialized knowledge in areas such as system architecture, cybersecurity, and data management. The availability of qualified professionals therefore significantly increases the likelihood of successful cloud implementation, and this factor is often associated in the literature with the overall technological readiness of organizations (Oliveira et al., 2014; Gangwar et al., 2015). Another important determinant of cloud computing adoption is the growing importance of data-driven technologies, particularly big data analytics. The exponential growth in the volume, variety, and complexity of digital data has created increasing demand for scalable computing environments capable of efficiently processing and analyzing large datasets. In this context, cloud computing provides the necessary infrastructure for big data analytics, enabling organizations to store, process, and analyze vast amounts of data without requiring substantial capital investments in physical IT infrastructure (Hashem et al., 2015; Mell & Grance, 2011). The relationship between cloud computing and big data technologies is mutually reinforcing. On the one hand, cloud platforms offer the computational resources required to process large volumes of data; on the other hand, the growing adoption of big data analytics drives demand for flexible and scalable cloud solutions (Armbrust et al., 2010; Hashem et al., 2015). As a result, organizations that actively implement big data technologies are more likely to adopt cloud computing as an integral component of their digital transformation strategies (Marston et al., 2011; Oliveira et al., 2014).

Firm characteristics represent an important determinant of digital technology adoption. Large enterprises typically possess greater financial resources, more advanced technological infrastructure, and higher organizational capacity, which

enables them to implement sophisticated digital solutions more effectively. At the same time, cloud computing also creates opportunities for small and medium-sized enterprises by providing cost-efficient and flexible access to advanced IT infrastructure without the need for substantial upfront investments (Gangwar, Date & Ramaswamy, 2015). Despite its considerable benefits, cloud computing adoption is still associated with several challenges and barriers. Among the most prominent are concerns related to data security, privacy protection, regulatory compliance, and dependence on external service providers (Zhang, Chen & Li, 2010). Consequently, organizations tend to carefully evaluate both the expected benefits and the potential risks when deciding whether to implement cloud-based solutions.

The macroeconomic dimension of artificial intelligence adoption is reflected in studies examining regional disparities across countries. Research indicates that the diffusion of digital technologies is driven by a combination of capabilities and incentives, which vary significantly across economies (Andrews et al., 2018). Within the European Union, substantial differences persist between technologically advanced countries and the economies of Central and Eastern Europe, as confirmed by analyses focused on AI and digitalization (Bughin et al., 2019; OECD, 2021). These disparities are closely linked to the level of economic development, the quality of institutional frameworks, and the extent of investment in research and development (European Commission, 2023; Lešková, 2024).

To bridge the micro- and macroeconomic perspectives, composite indices are increasingly employed to provide a comprehensive assessment of countries' readiness for AI adoption. For example, the Government AI Readiness Index offers insights into the capacity of the public sector to design and implement policies supporting AI development (Oxford Insights, 2022), while the Network Readiness Index captures the level of digital infrastructure, the quality of human capital, and the broader impacts of digitalization. These indicators are further complemented by assessments focused on regulatory and ethical aspects of artificial intelligence, collectively forming a multidimensional analytical framework for evaluating technology adoption at the country level. A synthesis of the existing literature suggests that AI adoption is the outcome of a complex ecosystem of factors operating across multiple levels. While microeconomic studies emphasize the importance of firm-level capabilities and technological readiness, macroeconomic analyses highlight the role of institutional environments and regional specificities. Integrating these perspectives through the combination of firm-level data and composite indices therefore represents a key approach to understanding the determinants of artificial intelligence adoption in the European context (Andrews et al., 2018; Bughin et al., 2019; Gangwar et al., 2015; OECD, 2021; Oliveira et al., 2014). Recent literature increasingly emphasizes that AI adoption is not solely technology-driven but depends on the development of complementary organizational and analytical capabilities (Mikalef et al., 2021; Kraus et al., 2022).

3. Research methodology

This study is based on a quantitative research design that combines econometric analysis of the determinants of technology adoption at the firm level with a comparative analysis of regional disparities among European Union member states. The aim is to examine the determinants of artificial intelligence adoption in European enterprises by integrating a microeconomic approach—based on cloud computing adoption—with a macroeconomic perspective focused on regional disparities and the comparative analysis of selected indices. Particular attention is given to the comparison of neighboring regions and the identification of differences among groups of EU countries. This analytical framework enables not only a deeper understanding of the mechanisms underlying AI adoption, but also the formulation of policy implications aimed at supporting digital transformation and reducing regional inequalities within Europe and reflects contemporary approaches to digital transformation and data-driven decision-making (Verhoef et al., 2021; Bharadwaj et al., 2020).

The methodological approach builds on the theoretical foundations presented in the previous sections and reflects the multidimensional nature of the research problem. The study combines two analytical levels:

- (1) econometric analysis of the determinants of technology adoption at the firm level,
- (2) comparative analysis of regional disparities at the level of European Union countries.

This approach makes it possible to link the micro level (firm behavior) with the macro level (institutional and technological environment), thereby creating a comprehensive framework for analyzing the adoption of artificial intelligence. The empirical analysis is based on a series of multiple linear regression models estimated for four time points—specifically the years 2018, 2020, 2023, and 2025—in order to capture the evolution of the determinants of cloud computing adoption over time. To test the research hypotheses, multiple linear regression analysis was employed. The models were estimated using the ordinary least squares (OLS) method. The statistical significance of individual coefficients was tested using t-tests, while the overall model quality was assessed using the coefficient of determination (R^2), the adjusted coefficient of determination, and the F-test. The first regression model analyzes the determinants of cloud computing adoption using four explanatory variables, while the second model extends the analysis by incorporating the influence of data-oriented technologies:

$$\text{Baseline model: Cloud} = \beta_0 + \beta_1\text{ICT} + \beta_2\text{Broadband} + \beta_3\text{GDP} + \beta_4\text{Large} + \varepsilon$$

(1)

$$\text{Second model: Cloud} = \beta_0 + \beta_1\text{ICT} + \beta_2\text{Broadband} + \beta_3\text{GDP} + \beta_4\text{Large} + \beta_5\text{BigData} + \varepsilon$$

(2)

$$\text{Third model: Cloud} = \beta_0 + \beta_1\text{ICT} + \beta_2\text{GDP} + \beta_3\text{DataAnal.} + \beta_4\text{Large} + \varepsilon$$

(3)

$$\text{Fourth model: Cloud} = \beta_0 + \beta_1\text{ICT} + \beta_3\text{GDP} + \beta_4\text{DataAnal.} + \varepsilon$$

(4)

The dependent variable in the econometric analysis is the rate of cloud computing adoption, defined as the percentage of firms using cloud services. This variable is used as a proxy indicator for the adoption of artificial intelligence, as cloud infrastructure constitutes the foundation for implementing AI solutions. Based on theoretical frameworks (the TOE model and the diffusion of innovations theory), the following independent variables were included in the model:

- ICT specialists (ICT) – the share of ICT specialists in total employment. This variable represents the level of digital human capital in the economy.
- Broadband connectivity (Broadband) – the percentage of enterprises with access to high-speed broadband internet. This indicator reflects the level of digital infrastructure.
- GDP per capita (GDP) – gross domestic product per capita, expressed in euros, representing the level of economic development.
- Large firm share (Large) – a variable capturing the proportion of large enterprises in the total business population, typically measured as the percentage of firms with 250 or more employees, representing organizational capacity and the structure of the enterprise population.
- Big data utilization (Big Data) – the percentage of enterprises using big data analytics technologies. This variable was included in the second model to capture the growing importance of data-driven technologies in the process of digital transformation.
- Data analytics (DataAnal.) – a variable capturing the extent of data analytics usage in enterprises, expressed as the percentage of firms that use tools or technologies for data analysis.

These variables represent the technological, organizational, and economic determinants of digital technology adoption. All statistical calculations were conducted using Microsoft Excel.

Research hypotheses. Based on a combination of theoretical foundations and previous empirical findings, the following hypotheses are formulated:

- H1:** A higher level of digital human capital (ICT specialists) has a positive effect on the adoption of cloud computing and AI.
- H2:** Economic development (GDP per capita) positively influences AI adoption through higher investment capacity.
- H3:** A higher share of large firms promotes AI adoption due to greater organizational and financial resources.
- H4:** Countries with higher scores in the Global Index Score, Government AI Readiness, and Network Readiness Index achieve higher levels of AI adoption.
- H5:** There are significant regional differences among groups of countries (leaders, core EU, South, CEE) in the determinants of AI adoption.

At the macroeconomic level, three composite indices were included in the analysis: the Global Index Score, the Government AI Readiness Index, and the Network Readiness Index. These indicators enable the examination of the impact of regulatory, institutional, and systemic factors on the level of AI adoption, while complementing the econometric analysis with a broader comparative framework. The Global Index Score measures the level of implementation of responsible AI principles and the quality of regulatory frameworks. The Government AI Readiness Index evaluates the preparedness and capacity of the public sector to implement AI. The Network Readiness Index (NRI) captures a country's digital readiness, including technology, people, governance, and impact dimensions. Together, these indices make it possible to analyze the influence of institutional and systemic factors on AI adoption.

4. Research findings

This chapter addresses the following subchapters: Econometric analysis of the determinants of technology adoption at the firm level, comparative perspective: comparison of four models, comparative analysis of regional disparities at the level of European Union countries, and comparative analysis based on neighboring regions.

4.1 Econometric analysis of the determinants of technology adoption at the firm level

The empirical analysis examines the determinants of cloud computing adoption using multiple linear regression models estimated for four time periods, reflecting the evolution of digital capacities and the diffusion of technologies. The models include indicators related to digital infrastructure, ICT human capital, economic development, and firm structure. The model assumes that cloud computing adoption is influenced by three main groups of factors: technological factors (broadband connectivity, big data utilization), human capital (ICT specialists), and economic and organizational factors (GDP per capita, share of large enterprises).

Regression results for the year 2018

The baseline model, representing the situation in 2018, includes four explanatory variables: ICT specialists, broadband connectivity, GDP per capita, and the share of large enterprises. The model demonstrates relatively strong explanatory power, with the multiple correlation coefficient (R) reaching 0.846 and the coefficient of determination (R^2) equal to 0.715 (Table 1). This indicates that approximately 71.5% of the variability in cloud computing adoption is explained by the included variables. The adjusted R^2 value (0.661) confirms the satisfactory quality of the model after accounting for the number of explanatory variables. The analysis is based on 26 observations, with a standard error of estimate of 8.80. The regression equation for 2018 takes the following form:

$$y = -47.95 + 10.96 x_1 + 0.4 x_2 - 0.03 x_3 - 19.29 x_4$$

(5)

Table 1: Regression analysis of factors influencing the adoption of cloud technologies, 2018 (source: own processing)

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0,846							
R Square	0,715							
Adjusted R Square	0,661							
Standard Error	8,804							
Observations	26							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	4	4086,401065	1021,60	13,180	1,5974E-05			
Residual	21	1627,682	77,509					
Total	25	5714,083						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	-47,95	87,64	-0,55	0,59	-230,22	134,31	-230,22	134,31
ICT Spec.	10,96	1,76	6,22	0,00	7,30	14,62	7,30	14,62
Broadband	0,40	0,90	0,45	0,66	-1,47	2,27	-1,47	2,27
GDPpc	-0,03	0,06	-0,56	0,58	-0,16	0,09	-0,16	0,09
LargeFirm share	-19,29	21,19	-0,91	0,37	-63,36	24,77	-63,36	24,77

Among the explanatory variables, ICT specialists emerge as the only statistically significant determinant. The coefficient of this variable is positive and highly statistically significant ($\beta = 10.96$), indicating that an increase in the share of ICT specialists is strongly associated with a higher level of cloud computing adoption. This result suggests that the availability of digital skills is a key factor enabling the implementation of new technologies. The remaining variables do not exhibit statistically significant effects. Broadband connectivity shows only a weak positive relationship, suggesting that digital infrastructure alone may not be a sufficient driver for the expansion of cloud computing at this stage of digital transformation. Similarly, GDP per capita and the share of large enterprises do not display statistically significant coefficients, indicating that macroeconomic prosperity and firm structure may play a less important role compared to human capital. Overall, the model for 2018 highlights the importance of ICT human capital as the primary determinant of cloud computing diffusion, while structural and infrastructural factors appear to have a more secondary role.

Regression results for the year 2020

The second model represents the situation in 2020, reflecting ongoing digital transformation and the increasing importance of data-driven technologies. In addition to the variables used in the previous model, it also includes big data utilization as an additional explanatory factor. The model shows slightly higher explanatory power, with $R = 0.856$ and $R^2 = 0.733$, indicating that approximately 73.3% of the variability in cloud computing adoption is explained by the included variables. The adjusted coefficient of determination reaches 0.654, suggesting the robustness of the model even after the inclusion of an additional explanatory variable (Table 2). The model is estimated based on 23 observations, with a standard error of regression of 10.52. The regression equation for 2020 takes the following form:

$$y = 219.22 + 1.24 x_1 + 8.58 x_2 - 2.21 x_3 - 0.09 x_4 - 20.51 x_5$$

(6)

Table 2: Regression analysis of factors influencing the adoption of cloud technologies, 2020 (source: own processing)

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0,856							
R Square	0,733							
Adjusted R Square	0,654							
Standard Error	10,520							
Observations	23							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5	5159,788	1031,958	9,324	0,0002042			
Residual	17	1881,519	110,678					
Total	22	7041,307						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	219,22	205,23	1,07	0,30	-213,77	652,21	-213,77	652,21
Big data	1,24	0,45	2,73	0,01	0,28	2,20	0,28	2,20
ICT special	8,58	2,28	3,77	0,00	3,78	13,38	3,78	13,38
Broadband	-2,21	2,07	-1,07	0,30	-6,56	2,15	-6,56	2,15
GDPpc	-0,09	0,08	-1,09	0,29	-0,26	0,08	-0,26	0,08
Large firm share	-20,51	29,18	-0,70	0,49	-82,08	41,05	-82,08	41,05

Two variables emerge as statistically significant. The first is big data utilization, which has a positive and statistically significant coefficient ($\beta = 1.24$). This result suggests that organizations using advanced analytics based on large datasets are more likely to implement cloud computing solutions. The second significant variable remains ICT specialization, which again exhibits a strong positive effect ($\beta = 8.58$). This finding confirms the persistent importance of digital skills in the adoption of advanced digital technologies. The remaining variables—broadband connectivity, GDP per capita, and the share of large enterprises—once again do not show statistically significant effects. This suggests that although infrastructure and economic development create a favorable environment, they may not, on their own, lead to cloud computing adoption without sufficient digital competencies and data-driven capabilities.

Regression results for the year 2023

The empirical analysis of the determinants of cloud computing adoption at the firm level for 2023 was conducted using a multiple linear regression model that includes technological, economic, and organizational factors. The dependent variable is the rate of cloud computing adoption, while the explanatory variables include the share of ICT specialists (ICT Spec.), GDP per capita, the level of data analytics utilization, and the share of large firms (Large firm). The model was estimated on a sample of 25 observations.

In terms of model quality, the coefficient of determination reaches $R^2 = 0.471$, indicating that the model explains approximately 47.1% of the variability in cloud computing adoption. The adjusted coefficient of determination (Adjusted $R^2 = 0.365$)

suggests that after accounting for the number of variables, the explanatory power remains at 36.5%, which can be considered a relatively good result in the context of cross-sectional data. The value of the multiple correlation coefficient (Multiple R = 0.686) indicates a moderate to relatively strong relationship between the observed and predicted values of the dependent variable.

The results of the analysis of variance (ANOVA) confirm that the model as a whole is statistically significant. The F-statistic reaches a value of 4.445, and the corresponding p-value (Significance F = 0.010) is below 0.05, indicating that the model is statistically significant at the 5% significance level. This result suggests that at least one of the explanatory variables has a significant effect on cloud computing adoption. The regression equation for 2023 takes the following form:

$$y = 13.45 + 8.04 x_1 - 0.03 x_2 + 0.03 x_3 - 27.02 x_4 \quad (7)$$

Table 3: Regression analysis of factors influencing the adoption of cloud technologies, 2023 (source: own processing)

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0,686							
R Square	0,471							
Adjusted R Square	0,365							
Standard Error	12,695							
Observations	25							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	4	2865,584	716,396	4,445	0,010			
Residual	20	3223,316	161,166					
Total	24	6088,900						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	13,45	11,48	1,17	0,26	-10,50	37,40	-10,50	37,40
ICT Spec.	8,04	2,14	3,76	0,00	3,59	12,50	3,59	12,50
GDPpc	-0,03	0,10	-0,28	0,78	-0,23	0,18	-0,23	0,18
Data anal.	0,03	0,28	0,10	0,92	-0,55	0,61	-0,55	0,61
Large firm	-27,02	34,67	-0,78	0,44	-99,33	45,30	-99,33	45,30

A more detailed analysis of the individual regression coefficients shows that the key determinant of cloud computing adoption in 2023 is the ICT specialists variable. This variable reaches a coefficient of $\beta = 8.04$, with a p-value that is practically zero ($p = 0.00$), indicating that its effect is statistically significant at a high level of confidence. The interpretation of the coefficient suggests that an increase in the share of ICT specialists by one unit leads, on average, to an increase in cloud computing adoption by 8.04 points, while the confidence interval (3.59 to 12.50) confirms the stability of this estimate. This result is fully consistent with theoretical assumptions, according to which the availability of qualified human capital represents a key prerequisite for the implementation of digital technologies (Table 3). In contrast, the other variables included in the model do not exhibit statistically significant effects. The GDP per capita

variable has a negative coefficient ($\beta = -0.03$), but its p-value ($p = 0.78$) indicates that this relationship is not statistically significant. This result may suggest that the economic level of a country was not a decisive factor in cloud computing adoption in 2023, or that its effect is mediated by other variables. The data analytics variable shows a very low positive coefficient ($\beta = 0.03$) and a very high p-value ($p = 0.92$), indicating that its impact on cloud computing adoption is not statistically significant. This finding is somewhat surprising from a theoretical perspective, as the use of data analytics is often associated with higher levels of digitalization; however, it may be influenced by the limited sample size or multicollinearity with other variables.

The share of large firms (Large firm) variable has a negative coefficient ($\beta = -27.02$), but with a high p-value ($p = 0.44$), meaning that this effect is not statistically significant. Although a positive relationship would be expected theoretically, the result suggests that firm size may not have been a decisive factor in cloud computing adoption during the analyzed period, or that its effect is heterogeneous across different economies. Overall, the econometric analysis for 2023 identifies human capital, represented by the share of ICT specialists, as the key determinant of cloud computing adoption. Other factors, including economic level, the use of data analytics, and firm structure, do not appear to be statistically significant within this model. The results therefore suggest that in 2023, cloud computing adoption was primarily driven by the availability of qualified IT professionals, while the role of other factors was secondary or indirectly mediated.

Regression results for the year 2025

The empirical analysis of the determinants of cloud computing adoption at the firm level in 2025 was conducted using a multiple linear regression model that includes variables representing technological factors, human capital, and economic development. The dependent variable is the rate of cloud computing adoption, while the explanatory variables include the share of ICT specialists (ICT Spec.), GDP per capita, and the level of data analytics utilization. The model was estimated on a sample of 26 observations. The overall quality of the model indicates moderate explanatory power. The coefficient of determination ($R^2 = 0.369$) suggests that approximately 36.9% of the variability in cloud computing adoption is explained by the included variables. After accounting for the number of explanatory variables, the adjusted coefficient of determination (Adjusted $R^2 = 0.283$) points to a slightly lower, yet still acceptable level of explained variability. The value of the multiple correlation coefficient (Multiple $R = 0.607$) indicates a moderately strong relationship between the observed and predicted values of the dependent variable. Regarding the overall statistical significance of the model, the results of the analysis of variance (ANOVA) show that the model is statistically significant at the 5% significance level. The F-statistic reaches 4.2847, and the corresponding p-value (Significance $F = 0.0159$) is below 0.05. This result indicates that the model as a whole is capable of explaining variability in cloud computing adoption and that at least one of the explanatory variables has a non-zero effect. The regression equation for 2025 takes the following form:

$$y = 16.19 + 2.23 x_1 + 0.0002 x_2 + 0.48 x_3$$

(8)

Table 4: Regression analysis of factors influencing the adoption of cloud technologies, 2025 (source: own processing)

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0,607							
R Square	0,369							
Adjusted R Square	0,283							
Standard Error	13,310							
Observations	26							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	3	2277,0655	759,0218	4,2847	0,0159			
Residual	22	3897,2331	177,1470					
Total	25	6174,2986						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	16,19	12,28	1,32	0,20	-9,27	41,65	-9,27	41,65
ICT Spec.	2,23	2,50	0,89	0,38	-2,96	7,42	-2,96	7,42
GDPpc	0,0002	0,00	1,11	0,28	0,00	0,00	0,00	0,00
Data anal.	0,48	0,30	1,62	0,12	-0,13	1,09	-0,13	1,09

However, the interpretation of the individual regression coefficients shows that none of the included variables reaches statistical significance at the conventional 5% level. The ICT specialists variable exhibits a positive coefficient ($\beta = 2.23$), indicating that a higher share of ICT specialists is associated with a higher rate of cloud computing adoption. This relationship is consistent with theoretical expectations, as qualified human capital enhances firms' ability to implement digital technologies. However, the high p-value ($p = 0.38$) indicates that this effect is not statistically significant and therefore cannot be generalized with sufficient confidence. Detailed results are presented in Table 4.

Similarly, the GDP per capita variable exhibits a positive but very small coefficient ($\beta = 0.0002$), reflecting a slight increase in cloud computing adoption with rising economic development. This result suggests that more economically advanced countries tend to use cloud technologies more extensively; however, the p-value ($p = 0.28$) again indicates that this relationship is not statistically significant. In the context of 2025, this finding may indicate that cloud computing is becoming a widely accessible technology, and its adoption is no longer strictly tied to the level of economic development. The most influential factor in the model appears to be the variable representing data analytics utilization, which achieves the highest t-statistic ($t = 1.62$) and the lowest p-value ($p = 0.12$) among all explanatory variables. The coefficient of this variable ($\beta = 0.48$) suggests that a higher level of analytics usage is associated with increased cloud computing adoption. Although this relationship is not statistically significant at the 5% level, its proximity to the threshold of significance indicates the potential importance of this factor, particularly when considering a more

relaxed 10% significance level. This result supports the hypothesis that the adoption of cloud solutions is currently strongly linked to the need to process and analyze large volumes of data. Overall, the results of the econometric analysis for 2025 suggest that cloud computing adoption is determined by a combination of multiple factors, with digital maturity—represented by the use of data analytics—playing a dominant role. Despite the fact that individual variables do not reach statistical significance, the model as a whole is significant, indicating the presence of complex relationships among the examined variables. The findings also suggest that the importance of traditional determinants, such as economic development or the availability of ICT specialists, may be declining in 2025 in favor of factors related to digital transformation and data-driven processes within firms.

4.2 Comparative Analysis of Four Models

The comparison of regression model results for the years 2018, 2020, 2023, and 2025 allows for the identification of the evolution of the determinants of cloud computing adoption over time, as well as the changing importance of individual factors in the context of firms' digital transformation. In terms of overall model quality, a gradual decline in explanatory power can be observed. The model for 2018 achieves the highest coefficient of determination ($R^2 = 0.715$), indicating that the included variables explained the variability in cloud computing adoption very well in the early stage of its diffusion. In 2020, the explanatory power slightly increases ($R^2 = 0.733$), which can be attributed to the inclusion of the big data variable, capturing the growing importance of data-driven technologies. In contrast, a significant decline in explanatory power occurs in 2023 ($R^2 = 0.471$), and this trend continues in 2025 ($R^2 = 0.369$). This development suggests that cloud computing adoption is becoming an increasingly complex phenomenon influenced by a broader range of factors than those captured in the models.

From the perspective of overall statistical significance, all four models are statistically significant at the 5% level, confirming that the selected variables, as a group, are capable of explaining cloud computing adoption. However, the importance of individual determinants changes over time. The most stable and significant determinant across all analyzed periods is the variable representing human capital, specifically the share of ICT specialists. In 2018, it is the only statistically significant variable with a strong positive coefficient, highlighting the crucial role of digital skills in the early stage of cloud computing adoption. In 2020, this variable retains its statistical significance and strong positive effect, confirming the continued importance of qualified human capital. In 2023, its importance becomes even more pronounced, as it remains the only statistically significant factor with a high coefficient ($\beta = 8.04$). In 2025, although its effect remains positive, it no longer reaches statistical significance, which may indicate that as cloud solutions become more widely available and easier to implement, the importance of internal ICT capabilities gradually decreases.

Technological factors exhibit a different dynamic. In 2018, broadband connectivity does not have a statistically significant effect, suggesting that infrastructure alone was not a decisive constraint on adoption. In 2020, big data utilization emerges as a significant factor with a positive and statistically significant impact on cloud computing adoption, reflecting the growing importance of data-driven processes and the need for computational capacity provided by the cloud. In 2023, however, the data analytics variable loses its statistical significance, which may be due to its broader diffusion among firms, reducing its discriminatory power. In 2025, its importance slightly increases again, although it does not reach statistical significance at the 5% level, indicating that it may represent a potentially important factor in the digital economy.

Economic and organizational factors, represented by GDP per capita and the share of large firms, do not show statistically significant effects in any of the analyzed periods. This consistent result suggests that cloud computing adoption is not primarily determined by the macroeconomic level or the size structure of firms. In the case of GDP per capita, fluctuations in the sign of the coefficient can even be observed, indicating instability in its effect. Similarly, the share of large firms does not exhibit a systematic impact, suggesting that cloud solutions are accessible to firms of different sizes and do not require extensive organizational capacity.

From a temporal perspective, a shift in the determinants of cloud computing adoption can be identified. In the initial phase (2018), adoption was strongly dependent on the availability of qualified human capital. In the subsequent period (2020), the importance of big data utilization emerges, reflecting the growing role of the data economy. In later years (2023 and 2025), ICT specialists remain an important factor; however, the overall explanatory power of the models declines, and individual variables lose statistical significance. This trend may indicate that cloud computing is becoming a standard technology, whose adoption is less dependent on individual identifiable factors and more on complex, less measurable aspects of digital transformation. Overall, the results suggest a gradual transition from a phase in which cloud computing adoption was primarily driven by the availability of ICT specialists to a phase in which its adoption is more diffuse and influenced by a broader set of factors. This development reflects the process of technological diffusion, through which cloud computing is increasingly becoming a standard component of business operations.

4.3 Comparative Assessment of Regional Disparities within the European Union

For the purposes of this study, the EU-27 member states were divided into four analytical clusters based on their level of digital development, economic structure, and geographical proximity. The aim of this classification is to capture structural differences in the adoption of artificial intelligence (AI) technologies across regions while maintaining sufficient aggregation for meaningful comparison. The grouping was constructed as follows:

- **Leaders:** Nordic countries (Sweden, Denmark, Finland), Benelux countries (Belgium, the Netherlands, Luxembourg), Ireland, and Estonia
- **Core EU:** Germany, Austria, and France
- **South:** Mediterranean countries (Spain, Italy, Greece, Portugal, Cyprus, Malta)
- **CEE (Central and Eastern Europe):** Visegrád countries (Slovakia, Czechia, Poland, Hungary), EU members from Southeastern Europe (Romania, Bulgaria, Slovenia, Croatia), and Baltic states not classified as leaders (Latvia, Lithuania)

This typology reflects differences in historical development, institutional quality, and technological infrastructure, which significantly influence firms' ability to implement AI solutions. It also corresponds to commonly observed patterns in European digital performance, as reported by the European Commission and Eurostat. In particular, Northern and Western European countries tend to exhibit higher levels of digitalization, stronger innovation ecosystems, and more advanced adoption of new technologies, including AI. In contrast, Southern, Central, and Eastern European countries generally display lower levels of digital maturity and slower diffusion of advanced technologies. The main objective of this grouping is to examine whether regional differences in digital development are reflected in the adoption of AI technologies among firms. By clustering countries into broader regional groups, the analysis reduces noise associated with country-level variability and allows for clearer identification of structural trends. At the same time, the classification preserves key economic and institutional differences across groups, such as levels of technological readiness, industrial structure, and policy support for digital transformation. Furthermore, the distinction between "leaders," the "core EU," and less developed regions (South and Central and Eastern Europe) enables the identification of potential convergence or divergence patterns in AI adoption over time. In particular, the analysis seeks to determine whether lagging regions are catching up with more advanced economies or whether the digital divide within the European Union is widening. This classification thus facilitates the identification of regional differences in AI adoption and the analysis of countries' positions within the broader European context.

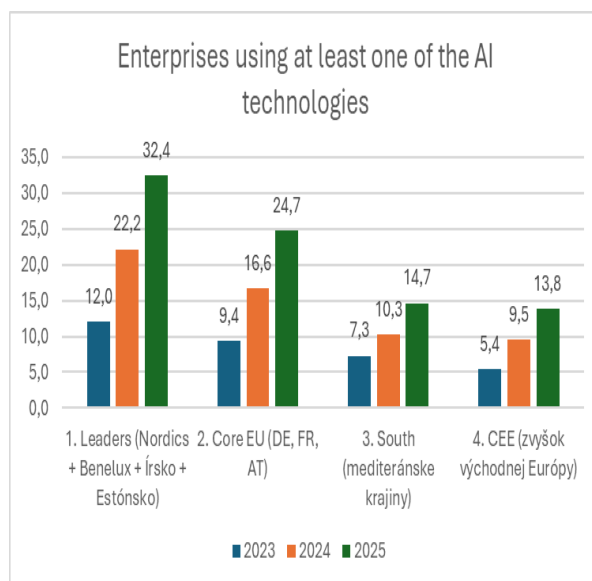


Figure 1: Enterprises using at least one of the AI technologies

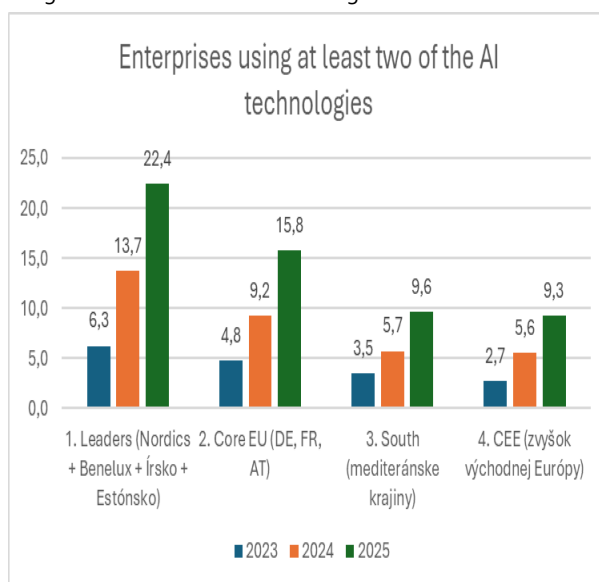


Figure 2: Enterprises using at least two of the AI technologies (source: Eurostat, 2026)

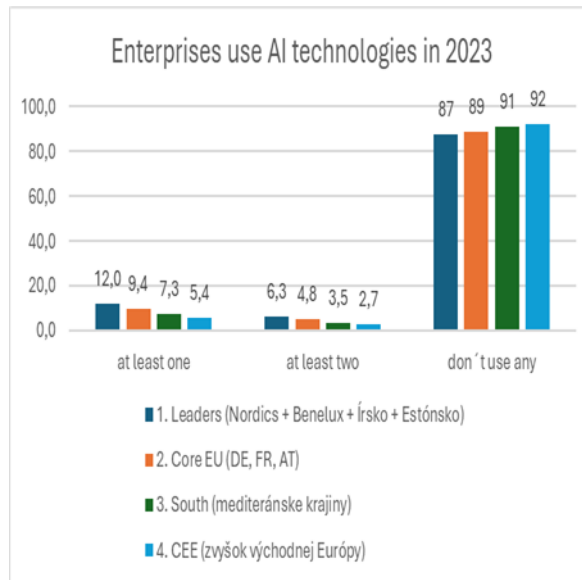


Figure 3: Enterprises use AI technologies in 2023

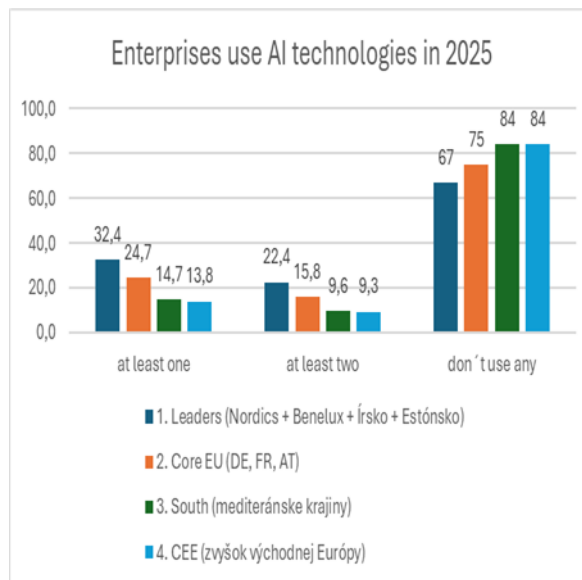


Figure 4: Enterprises use AI technologies in 2025 (source: Eurostat, 2026)

Based on data from the Eurostat database for the period 2023–2025, significant differences in the level of artificial intelligence (AI) adoption can be identified across groups of European Union countries. The analysis is based on the share of enterprises using at least one AI technology, at least two AI technologies, as well as those not

using AI technologies at all. A comparison across country groups—leaders, the EU core, southern countries, and the Central and Eastern Europe (CEE) region—reveals persistent heterogeneity in the process of digital transformation. Detailed results are presented in Figures 1–4. From a temporal perspective (2023–2025), a moderate positive trend can be observed across all groups, particularly in the increasing share of enterprises using at least one AI technology. However, the differences between regions remain largely unchanged, suggesting that the convergence process is relatively slow. The adoption of AI technologies among enterprises in the European Union reveals substantial regional disparities that reflect broader patterns of digital development across member states. Based on aggregated Eurostat data for 2023–2025, a clear differentiation emerges between leading regions, core economies, and less digitally advanced areas.

The results indicate a strong upward trend in AI adoption across all regions. The share of enterprises using at least one AI technology increased significantly between 2023 and 2025. In the group of digital leaders—comprising Nordic countries, Benelux states, Ireland, and Estonia—the adoption rate rose from 12.03% to 32.41%, representing an increase of more than 20 percentage points. Similarly, the core EU economies (Germany, France, and Austria) recorded a substantial increase from 9.41% to 24.69%. The leader group consistently maintains a dominant position across all observed indicators. Enterprises in these countries show the highest shares of both single and multiple AI technology usage, reflecting a high level of technological readiness, availability of skilled human capital, and a well-developed innovation ecosystem. At the same time, this group has the lowest share of enterprises not using AI at all, indicating a more advanced stage of digital diffusion. In contrast, southern European countries and the CEE region exhibit more moderate growth, reaching 14.65% and 13.84% respectively in 2025. These regions show lower levels of AI adoption, with a slower pace of growth in the share of enterprises using AI technologies. They also display a higher proportion of firms not using AI, pointing to persistent structural barriers such as lower levels of digitalization, weaker innovation capacity, or limited access to financial resources.

The EU core countries achieve consistently high values but remain slightly behind the leaders. Their results indicate a relatively high level of AI adoption, particularly in the use of at least one technology; however, a lower share of enterprises implementing multiple AI solutions suggests room for deeper technological integration. This trend may be associated with differences in R&D investment intensity and the level of digitalization among small and medium-sized enterprises. Despite the overall positive trend, the findings point to a persistent and widening digital divide within the EU. The gap between leading and lagging regions not only remains significant but appears to be increasing over time. This divergence is even more pronounced when examining the use of multiple AI technologies, which serves as an indicator of more advanced and sophisticated digital capabilities. In 2025, 22.44% of enterprises in leading regions reported using at least two AI technologies, compared to only 9.59% in southern Europe and 9.26% in CEE countries. This suggests that while basic AI adoption is expanding, advanced usage remains concentrated in digitally advanced economies.

Particularly notable are differences in the use of multiple AI technologies, which can be interpreted as an indicator of a more advanced stage of digital transformation. While the leader group shows substantial growth in this area, southern and CEE regions continue to lag significantly.

The weakest performance is observed in the CEE region, which remains in a stage of gradual convergence. The share of enterprises using AI technologies is lowest in this group, and a substantial proportion of firms do not implement AI at all. Although a modest increase in adoption can be observed over the analyzed period, the gap compared to leaders and the EU core remains significant. This development suggests that CEE countries continue to face structural challenges related to digital infrastructure, the availability of ICT specialists, and the effective implementation of innovation policies. Additional insights can be drawn from the share of enterprises not using any AI technologies. Although this share has declined across all regions, it remains relatively high. In 2025, approximately 66.85% of enterprises in leading regions reported not using AI, compared to more than 84% in both southern and CEE regions. This indicates that AI adoption in the EU is still at an early stage of diffusion, with the majority of firms yet to integrate these technologies into their operations.

The comparative analysis also highlights the role of core EU economies as a transitional group. These countries consistently perform below the leading regions but significantly above southern and CEE countries, indicating an intermediate position in the process of digital transformation. Meanwhile, southern and CEE regions display very similar levels of AI adoption, forming a distinct cluster of economies with lower adoption rates but considerable potential for future growth. Overall, the results confirm the existence of a structural digital divide within the European Union. Northern and Western European countries maintain a clear advantage in both the scale and sophistication of AI adoption, while southern and eastern regions lag behind. Moreover, the faster growth observed in leading regions points more toward a process of divergence rather than convergence. This has important implications for EU digital policy, highlighting the need for targeted support measures aimed at accelerating AI adoption in less developed regions and reducing technological disparities across the Union.

4.4 Comparative Study of Neighboring Regions

The comparative analysis in the context of neighboring Central European countries was conducted based on selected macroeconomic indicators, with the aim of capturing the broader context of artificial intelligence (AI) adoption. The analytical framework includes three composite indices reflecting different dimensions of countries' readiness to implement AI. Specifically, these are the Global Index Score, which measures the level of implementation of responsible AI principles and the quality of regulatory frameworks; the Government AI Readiness Index, which evaluates the preparedness and capacity of the public sector to support and implement AI policies; and the Network Readiness Index (NRI), which captures overall digital readiness through dimensions such as technology, human capital, governance, and

the impacts of digitalization. The integration of these indices enables a more comprehensive analysis of the influence of institutional and systemic factors on AI adoption and provides a holistic view of differences across countries and regions.

A comparative analysis of Slovakia's position in the context of neighboring Central European countries—namely Austria, the Czech Republic, Poland, and Hungary—reveals a consistent pattern of an intermediate to relatively weaker position across multiple dimensions of digital and technological readiness, including the implementation of responsible AI principles, government readiness for AI, and overall network (digital) readiness.

In terms of the implementation of responsible AI principles (Global Index Score 2024), Slovakia occupies a mid-level position, achieving a score of 33.17 points (see Figure 5). Compared to Austria (35.76 points), Slovakia slightly lags behind, reflecting differences in the quality of regulatory frameworks, institutional capacity, and the level of stakeholder engagement in AI governance. Austria, as a more advanced economy, benefits from a more stable legislative environment and a more developed innovation ecosystem. On the other hand, Slovakia slightly outperforms Hungary (32.00 points), indicating a comparable level of development with minor differences in implementation mechanisms or the activity of non-state actors. A more pronounced gap, however, is evident in comparison with Poland (42.73 points), which emerges as a regional leader in this area. This difference signals a more advanced stage of responsible AI policy implementation, likely supported by more systematic strategies and a stronger research and innovation base.

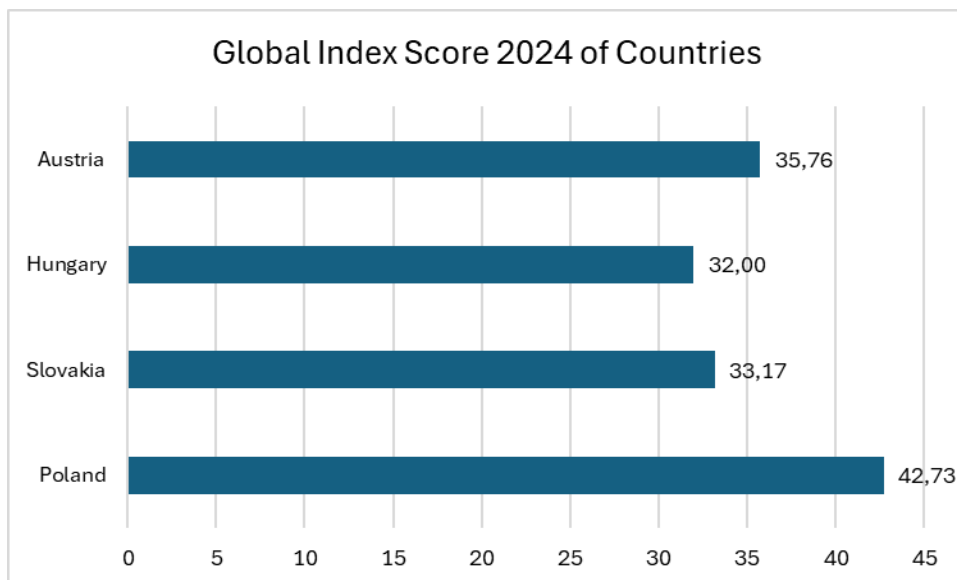


Figure 5: Global Index Score 2024 of regions average score by Countries (source: own spracovanie based on Adams et al., 2024)

Even more pronounced differences are observed in the Government AI Readiness Index 2025. Slovakia, with a score of approximately 48.55 points, lags behind all analyzed countries and ranks last within this group (see Figure 6). Austria achieves approximately 69.7 points, while the Czech Republic and Poland display similar levels (around 69 points), and Hungary records a slightly lower, yet still significantly higher score (approximately 63 points).

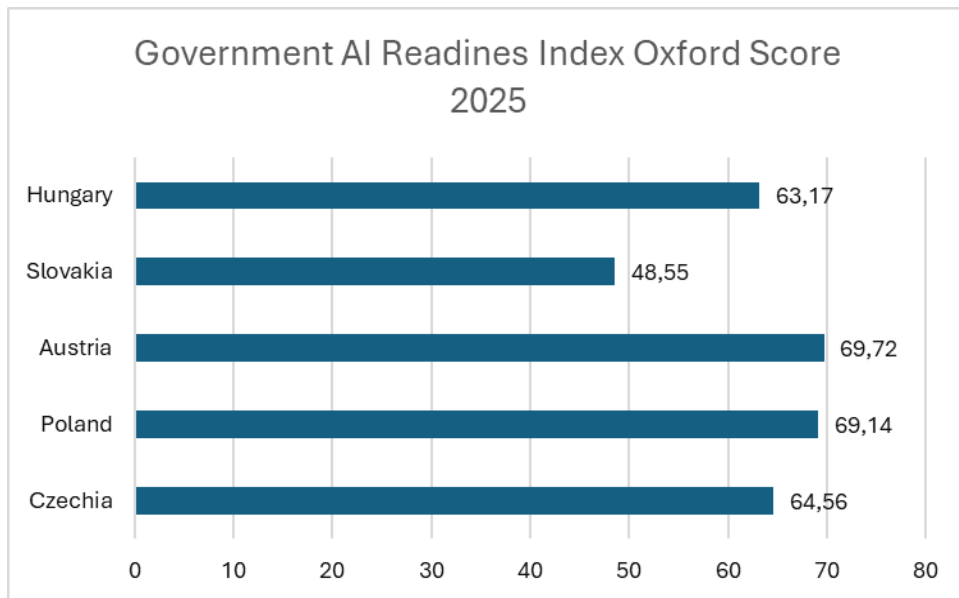


Figure 6: Government AI Readiness Average Index score 2025 (source: Oxford Insights, 2026)

This gap, exceeding 20 points compared to the regional leaders, highlights significant shortcomings in Slovakia in terms of AI strategic governance, the quality of public policies, digital infrastructure, and the ability to implement technological innovations in practice. Slovakia can therefore be characterized as a catching-up country, while other states—particularly Austria and the Czech Republic—emerge as regional leaders. A more comprehensive perspective is provided by the Network Readiness Index 2025, which evaluates digital readiness across four pillars: technology, people, governance, and impact. In this case as well, Slovakia records the lowest overall score (54.67 points; 43rd place) among the compared countries. Austria (67.13 points; 21st place) achieves the best results, followed by the Czech Republic (62.32), Poland (59.40), and Hungary (55.26). This outcome confirms that Slovakia systematically lags behind in overall digital readiness (see Figure 7).

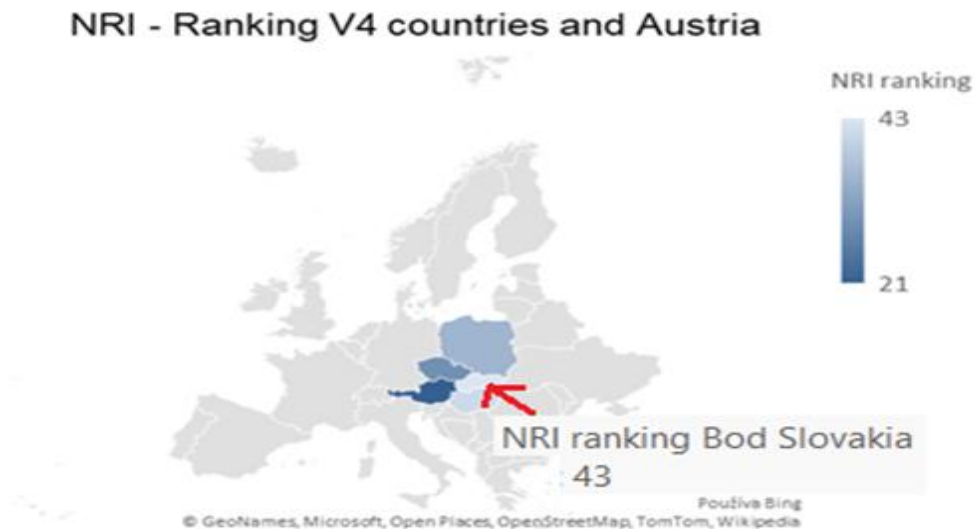


Figure 7 NRI – Ranking by pillars in V4 Countries and Austria (source: Network Readiness Index Database, Portulans Institute, 2025)

A more detailed analysis of the individual pillars reveals structural weaknesses in Slovakia. In the area of technology (46.98 points), the country lags particularly in the availability of advanced technologies and digital content. An even more pronounced deficit is observed in the people pillar (39.98 points), where Slovakia records the lowest values, indicating an insufficient level of digital skills among the population and a low rate of digital service usage. This factor represents a major barrier to effective digital transformation. In contrast, Slovakia achieves relatively better results in the governance pillar (76.12 points), where it approaches Poland and outperforms Hungary, suggesting the presence of a relatively stable regulatory and institutional framework. However, in the impact pillar (55.62 points), Slovakia again falls behind, particularly in terms of the economic benefits of digitalization, indicating a weaker link between technological progress and actual economic performance.

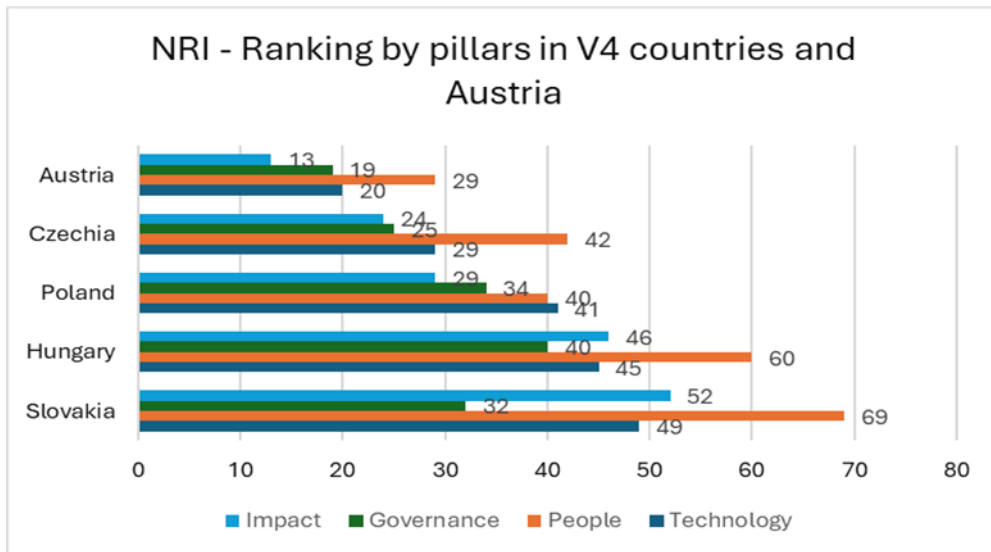


Figure 8 Ranking by pillars in V4 countries and Austria (source: Network Readiness Index Database, Portulans Institute, 2025)

In summary, Slovakia's position within the Central European region can be characterized by a combination of a relatively functional institutional framework and weaker implementation capacity figure 8. The country does not rank among the most lagging in terms of responsible AI, but in the broader context of digital and AI readiness, it systematically falls behind its neighbors. Regional leaders, particularly Austria and the Czech Republic, benefit from a balanced development across all key pillars, whereas Slovakia faces an imbalance between the quality of governance and the level of technological adoption and human capital. This mismatch suggests that future improvements in Slovakia's position will largely depend on strengthening digital skills, technological infrastructure, and the effective implementation of existing policies.

5. Discussion

Based on the presented empirical results, it is possible to evaluate the formulated research hypotheses and subsequently discuss them in the context of existing literature and theoretical foundations. Hypothesis H1, which assumed a positive effect of digital human capital on the adoption of cloud computing and artificial intelligence, is empirically supported. The ICT specialists variable proved to be the strongest and most consistent determinant across the analyzed periods. In the models for 2018, 2020, and 2023, its statistical significance was clearly confirmed, while in 2025 its effect remained positive but without conventional statistical significance. This result suggests that the importance of human capital remains fundamental, although its direct impact may weaken in later stages of cloud technology diffusion. Hypothesis H2, which assumed a positive effect of economic development (GDP per capita) on AI

adoption, was not empirically confirmed. In the regression models, GDP per capita did not appear as a statistically significant factor. This finding suggests that the economic level of a country alone is not a sufficient condition for the adoption of cloud computing and AI. Instead, more important roles are played by specific digital capabilities, the ability to effectively implement technologies at the firm level, and the quality of the institutional environment. Similarly, Hypothesis H3, which assumed a positive effect of the share of large firms, was not supported. The variable representing the structure of the business population did not show a statistically significant effect. This result may indicate that cloud computing, as a technological solution, lowers entry barriers for small and medium-sized enterprises, thereby reducing the traditional advantage of large firms in implementing IT infrastructure. Hypothesis H4, which assumed a positive relationship between the level of composite indices (Global Index Score, Government AI Readiness, and Network Readiness Index) and the level of AI adoption, was supported based on the comparative analysis. Countries with higher values of these indices—particularly leaders and core EU countries—achieve significantly higher levels of AI adoption. In contrast, countries with lower levels of digital readiness, such as those in Southern and Central and Eastern Europe, lag behind. This result highlights the importance of institutional and systemic factors in the diffusion of technological innovations. Hypothesis H5, which assumed the existence of significant regional differences between groups of countries, was clearly confirmed. The analysis of Eurostat data revealed substantial differentiation between leaders, the EU core, and less developed regions. While Northern and Western European countries exhibit high levels of AI adoption, Southern and Central and Eastern European countries lag behind, with these differences persisting over time. Moreover, the growth dynamics suggest a process of divergence rather than convergence, as the most advanced regions are growing at a faster pace.

The discussion of the results highlights several key implications. First, the findings emphasize the dominant role of ICT human capital as the main enabler of artificial intelligence adoption. This factor appears to be more important than traditional macroeconomic indicators such as GDP. Second, the importance of big data technologies, which is consistent with recent findings on the role of analytics capabilities in enhancing firm performance and innovation (Wamba et al., 2020; Mikalef et al., 2021), observed in the later model, suggests that AI adoption is closely linked to the development of data-driven capabilities and digital ecosystems. Third, the regional analysis confirms the existence of a structural digital divide within the European Union. This divide is not only the result of differences in economic development but also reflects disparities in institutional quality, regulatory frameworks, and digital infrastructure. Countries such as Slovakia occupy an intermediate position, lagging particularly in implementation capacity, digital skills, and technological adoption. Finally, the results suggest that the mere availability of technologies or infrastructure is not sufficient for their effective utilization, which aligns with recent research emphasizing the importance of organizational capabilities and digital strategy (Bharadwaj et al., 2020; Verhoef et al., 2021). The key factor remains the ability of organizations and economies to absorb and integrate these technologies into their processes. From a policy perspective, this implies the need for

a comprehensive approach that combines support for education, the development of digital skills, investment in infrastructure, and the strengthening of the institutional framework for digital transformation. Overall, it can be concluded that the adoption of artificial intelligence in European enterprises is determined by a combination of microeconomic and macroeconomic factors, with human capital and the level of digital readiness of countries playing the most significant roles.

6. Research limitations

Despite its contributions, the study has several limitations that should be considered when interpreting the results. First, AI adoption is approximated in the analysis by the rate of cloud computing usage, which represents a simplification of a complex phenomenon. Although cloud computing provides the foundational infrastructure for AI, it does not fully capture all aspects of its implementation, particularly more advanced forms of AI usage. Second, the analysis is based on aggregated country-level data, which may lead to a loss of detailed information regarding firm behavior and sector-specific characteristics. As a result, micro-level differences between firms may not be fully captured. Third, the regression models include a limited number of explanatory variables, and some potentially relevant factors—such as regulatory barriers, the level of competition, or cultural aspects—were not included due to data limitations. Fourth, the composite indices used in the comparative analysis are based on different methodologies and weighting schemes, which may affect the comparability of results across countries. Finally, the time period covered by the analysis is relatively short, limiting the ability to capture long-term trends in AI adoption and the process of regional convergence. Future research should focus on the use of more detailed micro-level data, the inclusion of additional variables in the models, and the analysis of longer time series in order to better understand the dynamics of AI adoption and its determinants within the European context.

7. Conclusion

The aim of this study was to analyze the determinants of artificial intelligence adoption in European enterprises by integrating a microeconomic approach based on cloud computing adoption with a macroeconomic perspective focused on regional disparities and composite indices of digital readiness. The results of the empirical analysis confirm that AI adoption is a complex process determined by a combination of technological, organizational, and institutional factors. The econometric analysis highlighted the dominant role of digital human capital, with the share of ICT specialists emerging as the only consistently statistically significant determinant of cloud computing adoption across the analyzed periods. This finding underscores the crucial importance of digital skills and the ability of organizations to effectively implement technological innovations. In contrast, traditional macroeconomic factors, such as GDP per capita and the share of large enterprises, did not show statistically significant effects, suggesting that economic development alone is not a sufficient condition for

AI adoption. The comparative analysis at the European Union level confirmed the existence of significant regional disparities. Northern and Western European countries maintain a leading position in AI adoption, while Southern and Central and Eastern European countries lag behind. Moreover, the development dynamics suggest a widening of differences rather than their reduction, indicating a persistent digital divide within the EU. The analysis of composite indices further confirmed the importance of the institutional environment, the quality of public policies, and overall digital readiness for the successful implementation of AI. Particular attention to Slovakia shows that the country occupies an intermediate position, with a relatively stable regulatory framework but significant shortcomings in technological adoption and human capital. This implies the need for systematic strengthening of digital competencies, support for innovation, and the effective implementation of existing policies. Overall, the study contributes to the literature by linking the micro-level of firm behavior with the macro-level of institutional and regional environments. From a policy perspective, the results suggest that successful and inclusive AI adoption requires not only investments in technology but, above all, systematic support for digital skills, data capabilities, and the implementation capacity of both public and private actors. Without targeted policies in these areas, the digital divide between regions of the European Union is likely to persist or even deepen further.

Acknowledgement

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Determinants of user satisfaction in mandatory vs voluntary IT systems: A Systematic Review focusing on mandatory electronic invoicing systems for SMEs

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Abstract

Governments have imposed their own digital systems on citizens and taxpayers, and this has led to substantial changes, especially for small and medium-sized businesses that can no longer choose to use a certain platform. E-invoicing systems, for example, are used for legal compliance, not by taxpayer choice. The questions that naturally arise: Are taxpayers satisfied with what they are forced to use? And do these mandatory systems really work? This paper presents a systematic review examining user satisfaction in mandatory and voluntary adoption of IT systems, focusing on mandatory e-invoicing systems for SMEs. Following PRISMA guidelines, this review synthesizes empirical studies published 2015 - 2026 in European Union and in international contexts, and it is structured around the following research questions: (1) how does user satisfaction differ between voluntary and mandatory adoption of IT systems; (2) to what extent do system and service quality determine user satisfaction in mandatory e-government systems; and (3) what influences user satisfaction in mandatory e-invoicing systems for SMEs. Our findings show that in mandatory systems, satisfaction is more heterogeneous than in voluntary ones, and the reasons leading to satisfaction are completely different between the two situations. In mandatory systems, satisfaction comes from the benefits perceived, while in voluntary adoption contexts, user satisfaction is related to ease of use, enjoyment, and emotional or attitudinal commitment. In both mandatory and non-mandatory e-government systems, the quality of the system and service affects user satisfaction. It also matters how good the received information is, what concrete benefits are in using the system, and how much the user trusts the system. When focusing on SMEs operating under mandatory e-invoicing regimes, the literature shows that user satisfaction depends primarily on how efficient the system is and its integration with existing accounting workflows. It also matters how accurate and easy to use the information in the system is.

Keywords: Mandatory IS adoption, E-invoicing, DeLone & McLean Success Model

1. Introduction

Digital transformation has brought about significant changes in the use of IT systems. What was an innovation two years ago may now be mandatory by law. Relationships between companies have changed, and also between companies and the state. Taking electronic invoicing, for example, it started as a voluntary process by companies that wanted to be more efficient implemented it. Now, governments all over the world have turned it into a legal obligation to combat evasion and ensure full transparency of transactions (relevant examples include the RO electronic invoicing systems in Romania or SDI in Italy). From a simple management software, it has become the mandatory interface between taxpayers and the state.

The fundamental problem with mandatory systems is that they eliminate users' freedom of choice. In the classic Information Systems (IS) literature, success is largely associated with voluntary use; however, under government regulations, users are legally obligated to adopt the technology regardless of its quality. This can lead to "false adoption," characterized by resistance and errors. As a result, a tension arises between legal compliance and user satisfaction. In these contexts, since use is 100% legal, the only way to measure success is to see how satisfied users are. Without real satisfaction, administrative costs for companies increase, and the quality of data collected by the government may decrease, making the digital financial reforms a failure.

Despite the large-scale implementation of mandatory systems, there are several theoretical gaps in the literature. First, the paradox of obligation, traditional models of system success, such as the DeLone & McLean (D&M) model, were developed primarily for contexts where "usage" is the key indicator of success. There is a gap in adapting these models to regulatory environments where use is mandatory. The second gap refers to the inconsistency of factors affecting success. Previous empirical evidence from the Romanian context (RO e-Invoice) suggests that system and service quality are not significant determinants of satisfaction (Lupu & Severin, 2025), which contradicts established information systems theories. And last, there is an underrepresentation of SMEs, which are often overlooked in digital regulatory literature, which typically focuses on large companies or on macro-level financial performance; this literature does not focus on the specific user experience of smaller enterprises.

The present study uses a systematic review to examine the dynamics of satisfaction in restrictive technological environments. The goal is to gather all the evidence on how the quality of the system and services affects users (especially SMEs) who are required

to use e-government platforms. To guide this synthesis, the following research questions are addressed:

Q1: How does user satisfaction differ between voluntary and mandatory adoption of information systems?

Q2: To what extent do system and service quality affect user satisfaction in mandatory e-government systems?

Q3: What influences SMEs' satisfaction with mandatory e-invoicing systems?

By answering these questions, we try to better understand how mandatory systems, especially e-invoicing, really impact small businesses, if they help them to comply with the law, and also to bring benefits.

2. Theoretical Framework

Mentioned in numerous specialized studies, the DeLone & McLean (D&M) Model remains, to this day, most widely used when you want to analyze how well an IT system is performing. In the architecture of this model, we identify three quality dimensions as direct predictors of user satisfaction (DeLone & McLean, 2003). The first dimension, System Quality (SYQ), refers to technical performance — from server stability and processing speed to data security and interface ergonomics. Second, Information Quality (IQ) evaluates the outputs' accuracy and clarity; in the specific context of SMEs, this translates into the financial precision of transmitted data and the intelligibility of error messages in the compliance process. Finally, Service Quality (SEQ) includes the support offered by the developer or state institutions, covering the accessibility of technical assistance (help desk), the quality of training sessions, and the promptness in fixing errors.

While the D&M model isolates the elements that determine technical success, Expectation Confirmation Theory (ECT) explains the psychology behind satisfaction. According to ECT, satisfaction is not a fixed value. It is the result of the subjective comparison between what we initially expected and what we got. Before adopting a system, we anticipate a certain level of effort or benefits. When reality exceeds expectations, we have positive confirmation. In mandatory government applications, which are usually harder to implement, negative confirmation seems to be the main source of dissatisfaction. That is why ECT becomes essential to understand why users remain reluctant or dissatisfied, even when the system works perfectly from a technical point of view.

3. Methodology

We followed the PRISMA 2020 guidelines (J. McKenzie et al., 2017), and to capture the global adoption of the mandatory fiscal digitalization, we looked at the period 2015-2026. We searched Scopus, IEEE Xplore, ScienceDirect, and AIS eLibrary to find as much relevant literature as possible. For each research question, we used a logical search string:

Q1: ("information system adoption" OR "technology adoption") AND ("mandatory" OR "voluntary" OR "mandatory use") AND ("user satisfaction" OR "user acceptance") AND ("e-government" OR "public sector information systems")

Q2: ("system quality" OR "service quality" OR "information quality") AND ("user satisfaction" OR "information system success") AND ("mandatory system" OR "e-government system")

Q3: ("e-invoice" OR "e-invoice") AND ("mandatory" OR "continuous transaction control") AND ("user satisfaction" OR "perceived benefit" OR "ease of use") AND (SME OR "small enterprise")

Studies were selected according to the following criteria: articles written in English, that analyze e-government systems or mandated e-invoicing systems (G2B/B2G/B2B reporting), or that examine SMEs and businesses operating under digital fiscal compliance, published in peer-reviewed journals. Editorial works, books, or informational papers; studies focused on voluntary B2C systems; and research focused exclusively on technical implementation or on the VAT/taxation gap without a user-centered perspective were excluded.

The selection process was multi-stage. We started with 758 records. We removed 248 duplicates with Mendeley Reference Manager, leaving 510 unique studies. To reduce human bias and be precise, we checked the titles and abstracts with the Consensus platform (based on Semantic Scholar) (Faix, 2025). We kept all borderline articles for full screening. And we manually checked 10% of the 375 articles removed by the AI. The remaining 135 full-text articles were evaluated for their inclusion of theoretical models and SME-specific data. Finally, we selected 62 studies for qualitative synthesis. Each study underwent a methodological quality assessment based on four critical questions (Kitchenham, 2007), scored 0, 0.5, or 1: (Q1) Are the research objectives clearly defined? (Q2) Is the data collection methodology transparent and adequate? (Q3) Is the theoretical model (e.g., D&M) applied correctly? (Q4) Are the results supported by clear statistical or empirical evidence? We only retained studies with a score above 2.5. Furthermore, we checked the prestige of the journals with Scimago Journal Rank (SJR). We mainly chose sources from Q1 and Q2 to ensure the review is based on top academic contributions. For the final selection, we used thematic synthesis. We organized all the conclusions in three directions: the

quality dimensions, the differences between mandatory and voluntary regimes, and the constraints specific to SMEs.

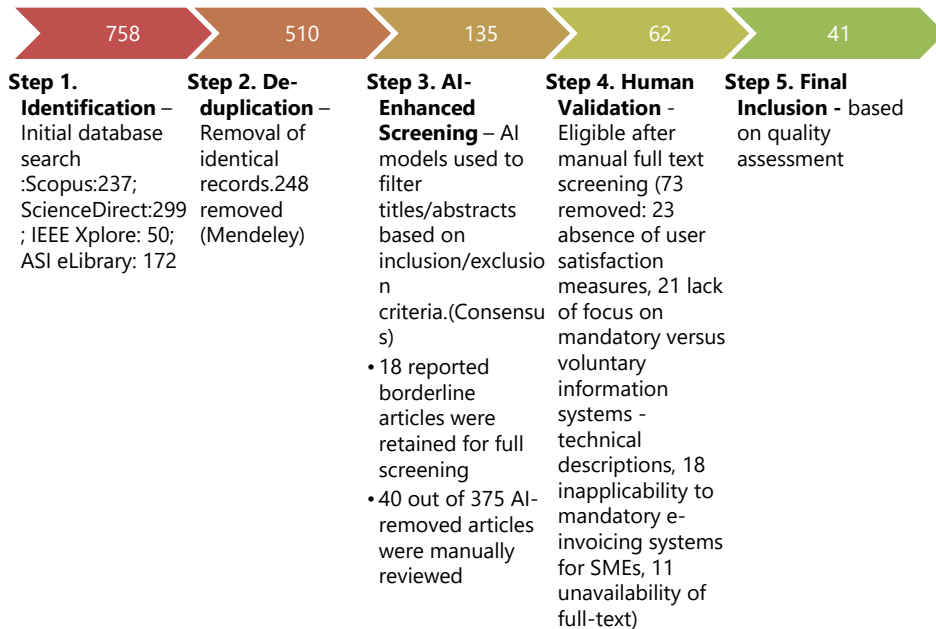


Figure 1. PRISMA Flow

4. Results

The final selection for this analysis includes 41 high-quality studies, most of them published between 2020 and 2025, reflecting the recent global trend towards mandatory fiscal digitalization. The geographical distribution reveals a high level of research interest in emerging markets (e.g., Indonesia, Jordan, Malaysia, Vietnam, and Kenya) and in European countries undergoing administrative reforms (e.g., Romania, Slovenia, Greece, Bulgaria, and Sweden). Methodologically, most of the selected studies use quantitative approaches, in particular Structural Equation Modeling (SEM), providing a robust empirical basis for analyzing the links between quality indicators and user satisfaction.

The synthesis shows that satisfaction levels do not consistently differ between voluntary and mandatory regimes, but the hierarchy of determinants changes radically. When adoption is voluntary, satisfaction comes from intrinsic and emotional factors, such as preference, perceived enjoyment, and ease of use. In this context, users act as “customers” with the power to abandon a platform they find unpleasant to use. In the case of mandatory adoption, satisfaction is based on perceived benefit and compliance with favorable conditions (Alkrajji, 2020; Fridkin et al., 2024; Nguyen et al.,

2020). Users are in a “captive” state, and their main goals are financial compliance and risk avoidance. What matters more is trust in institutions and the system’s ability to provide legal certainty (Information Quality), rather than aesthetics or user experience. In both e-government contexts, System Quality (SYQ) and Service Quality (SEQ) often appear as dominant factors of satisfaction, acting together with Information Quality and Trust (Al-Okaily et al., 2025; Amalina & Suryani, 2022). System Quality is defined as necessary for technical stability and correct processing of financial data (e.g., XML files and API stability). Service Quality acts as a mediator for technological stress in mandatory environments. While service quality is essential for general services to citizens, the synthesis also reveals that its impact is more nuanced in the business-to-government (B2G) sector. For SMEs operating under mandatory e-invoicing regimes, satisfaction is determined by a certain type of “Pragmatic Benefit.” Satisfaction depends on how well the mandatory system is integrated into existing accounting workflows. A key finding is that while service quality is important, it is a weaker or less significant indicator of satisfaction compared to system and information quality (Al-Hattami & Almaqtari, 2023; Bii et al., 2025). SMEs prioritize a robust system that “just works” (Zero Contact), rather than reactive support.

5. Discussion

One of the key contributions of this review is the identification of a significant discrepancy between universal models of Information Systems (IS) success and the operational reality of SMEs in mandatory electronic invoicing environments. While the broader e-government literature frequently defines Service Quality (SEQ) as an indispensable element for user satisfaction, this synthesis reveals that, for SMEs, SEQ is often less prominent or statistically insignificant when compared to System and Information Quality. This apparent contradiction can be interpreted through what we refer to as a “support paradox”. For many small business owners, who often operate under time and resource constraints, the need for technical support is perceived not as an advantage but as an indication that the system itself is not functioning optimally. In this sense, effective support services do not completely compensate for deficiencies in system design. On the contrary, a functional system is usually one that minimizes the need for external support.

These findings also suggest that the applicability of the DeLone & McLean Information Systems Success Model may need to be re-evaluated in the context of legally mandated digital infrastructures. In voluntary contexts, system usage is often considered a significant indicator of success. However, in mandatory contexts, where usage is effectively enforced, this dimension loses much of its explanatory power. Under these circumstances, user satisfaction becomes a more significant indicator, reflecting both the perceptions of system quality and the administrative and economic burden felt by users. In this context, Information Quality becomes a critical factor,

especially in aspects related to legal clarity and financial accuracy. For SMEs, these elements are directly linked to compliance risks, which are more important than how easy the system is to use. At the same time, System Quality and Service Quality can function more as fundamental requirements. Their absence can create frustration and resistance, while their presence does not imply high levels of satisfaction, but rather indicates that things are working normally.

From a practical point of view, these observations have various implications.

For those who make public policies, it may be better to focus on improving system reliability, API stability, and overall platform robustness, rather than on reactive support mechanisms such as call centers. But if the legal framework remains complex or ambiguous, even well-designed systems may not bring added value; therefore, simplifying regulatory requirements first can play the most important role.

For technology providers, the findings highlight the necessity of designing solutions that naturally integrate into existing business processes. Concepts such as “zero-touch compliance”, like total automation for checks and reporting, can help reduce the operational burden on SMEs. In parallel, business owners can also benefit from investing in internal digital capabilities, which can increase autonomy and reduce reliance on external platforms that are not always stable or easy to use.

These issues are particularly important in emerging markets, where SMEs often face a combination of limited resources and reliance on still-developing digital infrastructures. In such contexts, system robustness can be the main guarantee of compliance in a constantly changing environment. Compared to more mature economies, where digital systems tend to be more stable, user satisfaction in these environments seems to depend more on how reliably the systems operate in the background, rather than on the quality of the interaction, the interface, or the pleasant experience.

6. Conclusion

This systematic review shows a new perspective on how we assess the success of Information Systems (IS), especially for SMEs operating under mandatory e-government mandates. By examining how these systems are adopted when use is not a choice, we find a complete change in user behavior and priorities.

The conclusions corresponding to the research questions are as follows:

From Choice to Mandate (RQ1): The transition from voluntary to mandatory adoption fundamentally changes what drives user satisfaction. When use is mandatory, aspects such as aesthetics or a pleasant interface do not have a significant role. Instead, satisfaction comes from pragmatic needs: legal compliance, institutional trust, and fiscal security.

The Changing Hierarchy of Quality (RQ2): While the classic DeLone & McLean model remains a solid foundation, its components operate differently here. The quality of information (in particular, the accuracy of tax data) is now the most important determinant of satisfaction, as it has a direct impact on the survival of the business. Meanwhile, the quality of systems and services has become “hygiene factors”: their absence causes frustration, but their presence is simply expected as a reference point, rather than being a determinant of a positive feeling.

The “support paradox” in SMEs (RQ3): We have identified a unique trend among small businesses. Satisfaction is determined by how well the system integrates with existing workflows. SMEs prefer a technically robust, autonomous system over one that offers reactive and frequent human support. Once the system provides the necessary technical stability and legal certainty, traditional “service quality” often becomes a statistically irrelevant factor in overall user satisfaction.

Our paper introduces a framework for the “Captive User”, a concept for understanding environments where usage is legally fixed at 100%. In such cases, “frequency of use” is no longer a valid metric for success. Instead, we propose that User Satisfaction should become the main tool to measure the level of economic friction and administrative burden that a government imposes on its businesses. We define this behavior as “SME Pragmatism”, where functionality and legal certainty effectively replace the need for traditional service-oriented support.

As with any systematic review, our conclusions are inherently limited by the scope and quality of the existing literature. Furthermore, while this study is based on global data, it is important to note that the digital maturity of a country – whether it is an emerging or developed market – significantly influences how companies respond to government mandates.

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Customer Experience Management in Hungarian SMEs

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Abstract

In increasingly globalized markets, competition is no longer driven solely by the core attributes of products and services; it has become essential for companies to consciously design, manage, and continuously improve their interactions with customers throughout the sales process. As a result, Customer Experience Management (CXM) has emerged as a critical driver of competitiveness. This mixed-method, nationally representative study conducted in Hungary explores the extent to which small and medium-sized enterprises (SMEs) understand the concept of Customer Experience Management and how they conceptualize its key dimensions. It examines the degree to which CXM practices are embedded in their operations and the extent to which external consultants are engaged in this area, employing advanced statistical modelling to ensure rigorous analysis. The findings show that a substantial proportion of SMEs lack a formalized customer experience strategy, although many still apply a range of tools and practices to enhance it. Nearly all companies operate dedicated channels for complaint handling and problem resolution, while personalized service delivery and the development of communication channels are also identified as key priorities. The study further investigates potential approaches and tools through which customer experience quality could be enhanced, thereby strengthening the overall competitiveness of SMEs.

Keywords: Customer Experience Management (CXM), Small and Medium-Sized Enterprises (SMEs), Customer Experience Strategy, Service Personalization, Competitiveness

JEL Classification: L25, L26, D12

1. Introduction

In increasingly globalized and digitally connected markets, competition is no longer determined solely by product quality, price, or technological superiority. Companies are increasingly expected to deliver memorable and meaningful experiences throughout the entire customer journey. The emergence of customer experience as a

strategic differentiator has contributed to a transition from product-centered marketing toward experience-centered approaches, where customer value is increasingly created through interactions, emotions, and engagement rather than through product attributes alone (Schmitt, 1999; Verhoef et al., 2009; Lemon & Verhoef, 2016). As markets become more saturated and customer expectations continue to evolve, organizations are challenged to differentiate themselves through superior customer experiences rather than through products alone. Consequently, Customer Experience Management (CXM) has emerged as a strategic approach that enables organizations to design, manage, and continuously improve interactions with customers across all touchpoints (Verhoef et al., 2009).

The growing importance of customer experience has attracted considerable attention from both academics and practitioners. Contemporary marketing literature emphasizes that customer experience encompasses customers' cognitive, emotional, social, and sensory responses to interactions with a company throughout the purchasing process and beyond (Verhoef et al., 2009). Unlike traditional approaches focusing primarily on customer satisfaction or service quality, CXM adopts a holistic perspective by considering the entire customer journey and the cumulative impact of all customer-company interactions (Lemon & Verhoef, 2016).

Organizations increasingly recognize customer experience as a critical source of competitive advantage. Previous studies suggest that positive customer experiences contribute to higher customer satisfaction, stronger loyalty, increased customer retention, and improved financial performance (Fatma, 2014; Becker & Jaakkola, 2020). Consequently, firms across various industries have invested substantial resources in developing customer-centric strategies and implementing customer experience management practices. While large multinational corporations have extensively adopted CXM frameworks, the implementation of customer experience management among small and medium-sized enterprises (SMEs) remains less understood. SMEs operate under significantly different conditions than large organizations. Their limited financial and human resources often restrict the implementation of sophisticated customer experience systems. At the same time, SMEs frequently benefit from closer customer relationships, greater flexibility, and more direct communication channels, potentially enabling effective customer experience management despite the absence of formalized strategies.

2. Literature review

2.1. The Evolution of Customer Experience

The concept of customer experience emerged from the broader development of experiential marketing and relationship marketing. During the last two decades,

customer experience has become one of the most influential concepts within contemporary marketing research. Verhoef et al. (2009) define customer experience as a multidimensional construct encompassing cognitive, affective, emotional, social, and physical responses to a firm's offerings and interactions. Importantly, customer experience extends beyond direct service encounters and includes all customer interactions with a firm, whether they occur through physical, digital, or social channels (Verhoef et al., 2009). This broader perspective distinguishes customer experience from traditional service quality concepts, which often focus on specific service encounters.

The growing relevance of customer experience can largely be attributed to changing consumer expectations. Advances in technology have increased transparency and provided customers with unprecedented access to information and alternatives. Consequently, customer decisions are increasingly influenced by the quality of experiences rather than solely by product attributes (Lemon & Verhoef, 2016).

According to Becker and Jaakkola (2020), customer experience should be understood as a phenomenon that is co-created through interactions between customers and organizations. Their framework emphasizes that customer experiences are subjective, context-dependent, and influenced by both firm-controlled and customer-controlled factors. This conceptualization highlights the complexity of customer experience management and underscores the need for organizations to understand customer journeys comprehensively.

2.2. Customer Experience Management

Customer Experience Management refers to the systematic process through which organizations design, monitor, and improve customer interactions across all touchpoints. The primary objective of CXM is to create consistent and positive experiences that strengthen customer relationships and generate long-term value (Verhoef et al., 2009).

According to Verhoef et al. (2009), effective customer experience management requires organizations to coordinate multiple organizational functions, including marketing, sales, customer service, operations, and information technology. This cross-functional nature distinguishes CXM from traditional marketing activities and positions it as a strategic management approach. The strategic importance of CXM has been widely recognized in recent years. Hwang and Seo (2016) argue that customer experience management has evolved from a service management tool into a strategic organizational capability. Their review indicates that organizations increasingly regard customer experience as a key determinant of customer loyalty, customer retention, and competitive differentiation.

Similarly, Fatma (2014) identifies several antecedents of successful CXM implementation, including organizational culture, customer-centric leadership, employee engagement, technological infrastructure, and service quality. The study further demonstrates that effective customer experience management positively influences customer satisfaction, trust, commitment, and loyalty, ultimately contributing to organizational performance (Fatma, 2014).

2.3. Customer Journey Perspective

One of the most influential developments in customer experience research has been the adoption of the customer journey perspective. Lemon and Verhoef (2016) conceptualize customer experience as a dynamic process that develops across multiple stages of customer-company interaction.

The customer journey typically consists of three major phases:

- Pre-purchase
- Purchase
- Post-purchase

Each phase includes numerous touchpoints that influence customers' perceptions and evaluations of the organization (Lemon & Verhoef, 2016). These touchpoints may include advertising, websites, social media interactions, sales encounters, customer service contacts, delivery experiences, and complaint resolution processes. Importantly, customer experiences are not formed through isolated interactions but rather through the cumulative effect of multiple touchpoints throughout the customer journey (Lemon & Verhoef, 2016). Therefore, organizations must adopt a holistic approach when managing customer experiences.

This perspective is particularly relevant for SMEs, which often rely on personalized interactions and direct communication channels to establish long-term customer relationships.

2.4. Customer Experience and Competitiveness

The relationship between customer experience and organizational performance has become a central topic within CXM research. A growing body of evidence suggests that customer experience functions as a significant driver of competitiveness (Fatma, 2014; Becker & Jaakkola, 2020). Positive customer experiences contribute to customer satisfaction, which subsequently increases customer loyalty and repurchase intentions (Fatma, 2014). Loyal customers generate recurring revenue streams and frequently act as advocates through positive word-of-mouth communication.

According to Becker and Jaakkola (2020), customer experience serves as a mechanism through which organizations create value beyond the functional characteristics of products and services. Experiences become strategic resources that competitors may find difficult to imitate, thereby contributing to sustainable competitive advantage. Research further indicates that organizations that successfully manage customer experiences tend to achieve superior business performance, stronger customer retention rates, and greater customer lifetime value (Fatma, 2014; Verhoef et al., 2009). Consequently, CXM is increasingly regarded as an important strategic capability rather than merely a marketing function.

2.5. Research Gap

Although customer experience management has become a mature research field, existing literature predominantly focuses on large corporations, multinational enterprises, and service-intensive industries (Hwang & Seo, 2016). Comparatively limited attention has been devoted to SMEs despite their substantial contribution to economic activity and employment. Furthermore, previous studies have primarily investigated organizations that have already implemented formal customer experience strategies (Verhoef et al., 2009; Lemon & Verhoef, 2016). Less attention has been paid to situations in which firms apply customer-oriented practices without explicitly identifying them as customer experience management activities.

This limitation is particularly relevant in the SME context, where resource constraints often prevent the formalization of strategic management systems. Nevertheless, SMEs may still engage in customer experience-enhancing activities such as personalized service delivery, complaint handling, customer communication management, and relationship building.

Therefore, further empirical research is needed to understand how SMEs perceive customer experience management, which CXM practices they employ, and how these practices contribute to organizational competitiveness. The present study seeks to address this gap by examining the awareness, implementation, and strategic role of Customer Experience Management among Hungarian SMEs.

2.6. Customer Experience Management in the Era of Digital Transformation and Artificial Intelligence

The growing importance of Customer Experience Management cannot be separated from the broader process of digital transformation that has fundamentally reshaped contemporary business environments. Modern management faces unprecedented challenges arising from rapidly changing market conditions, increasing volumes of available data, and continuously rising customer expectations. Organizations are expected not only to provide high-quality products and services but

also to respond quickly to customer needs while delivering personalized and seamless experiences across multiple channels.

In this context, artificial intelligence (AI) has emerged as a key enabler of organizational effectiveness and customer-centric management. AI technologies allow organizations to process and analyze large volumes of data in real time, identify hidden patterns, and support evidence-based managerial decision-making. As a result, managers can rely less on intuition and more on data-driven insights when designing customer experience strategies and responding to market changes. The application of AI contributes to improved forecasting accuracy, reduced operational risks, and faster organizational responses to environmental changes (Perkov, 2019). Similarly, Vasilj and Torbica (2025) emphasize that AI enables organizations to transform large datasets into actionable knowledge, thereby enhancing managerial decision-making quality, operational efficiency, and strategic responsiveness. The increasing availability of customer data has further strengthened the importance of analytics within Customer Experience Management. Organizations can now collect information from multiple touchpoints, including websites, social media platforms, mobile applications, customer service interactions, and purchasing transactions. Artificial intelligence enables firms to transform these large datasets into actionable insights that support customer segmentation, personalization, predictive analytics, and proactive service delivery (Vasilj & Torbica, 2025).

Digital transformation has also altered the broader context within which customer experiences are created and managed. According to Perkov (2019), digital transformation affects five key dimensions of organizational life: distance, communication, environment, work, and mobility. These dimensions directly influence how organizations interact with customers and how customer experiences are designed and delivered. The increasing importance of remote communication, digital channels, and mobile technologies has created new opportunities for firms to engage customers throughout the customer journey. Similarly, Ezell (2018) argues that contemporary digitalization extends beyond the simple adoption of information technologies and increasingly involves the integration of artificial intelligence, interconnected communication systems, robotics, and the automation of business processes. Such technologies contribute to the development of more efficient and responsive organizations capable of delivering enhanced customer experiences while simultaneously improving operational performance.

Recent research further suggests that AI is not intended to replace managerial decision-makers but rather to augment their capabilities by providing more accurate information and supporting complex decision-making processes. Organizations that successfully combine human expertise with AI-driven insights may achieve superior outcomes in customer relationship management, service delivery, and strategic planning (Vasilj & Torbica, 2025). Within the context of SMEs, digital transformation

presents both opportunities and challenges. While smaller firms often face resource constraints that limit investments in advanced technologies, digital tools and AI-based solutions are becoming increasingly accessible. Consequently, SMEs are progressively able to implement customer experience-enhancing practices such as personalized communication, automated customer support, digital feedback systems, and data-driven decision-making. These developments suggest that digitalization and artificial intelligence may play a growing role in strengthening SME competitiveness through improved customer experience management.

The integration of digital technologies into CXM practices is therefore becoming an increasingly important area of research, particularly among SMEs where the level of formalization and technological adoption may differ significantly from that observed in larger organizations.

3. Methods

The primary research was conducted on a representative sample of 300 Hungarian small and medium-sized enterprises (SMEs) operating in the service sector. Data collection was carried out in December 2025 through telephone interviews. In all cases, respondents were employees holding managerial or decision-making positions within their respective organizations. The objective of the research was to explore the current position and maturity of Hungarian SMEs in the field of Customer Experience Management (CXM). To achieve this, both closed-ended and open-ended questions were included in the survey instrument. Given the nature of the topic, Customer Experience Management practices and perceptions were assessed using a few variables measured on seven-point Likert scales, particularly in cases where respondents could not reasonably be expected to provide precise quantitative data.

Beyond descriptive statistical analyses, the representative nature of the sample supports the validity of the results and allows for the application of inferential statistical methods. Consequently, the findings can be generalized to the broader population of Hungarian SMEs with a high level of statistical confidence.

4. Results

The first issue examined was whether participating organizations had a clearly defined and formally articulated Customer Experience (CX) strategy. As illustrated in Figure 1, 79% of the surveyed SMEs reported having no explicit Customer Experience strategy, while only 21% indicated that their organization considers the formal development and articulation of such a strategy to be important. This finding suggests that Customer Experience Management remains underformalized within the majority of Hungarian SMEs.

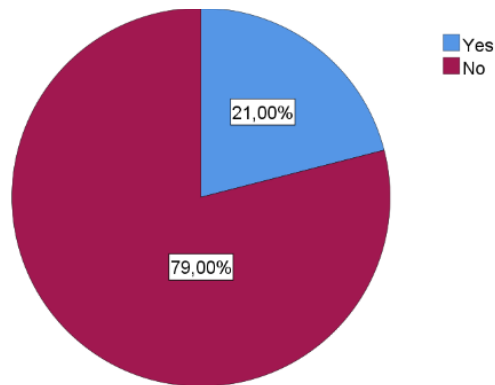


Figure 1. The existence of customer experience strategy (source: created by the authors)

Subsequently, respondents were asked to evaluate, using a seven-point Likert scale, the extent to which their organizations monitor and adopt emerging trends in Customer Experience Management (CXM)

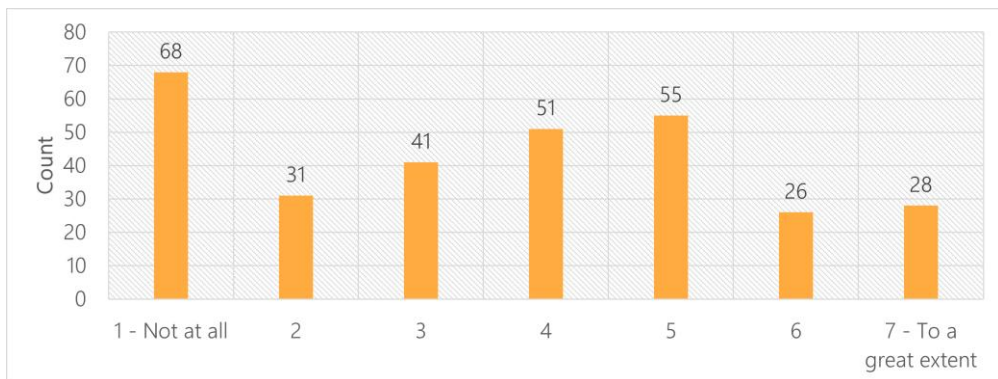


Figure 2. Extent of following new customer experience trends (source: created by the authors)

The figure indicates (Figure 2) that only 68 firms in the sample, accounting for 23% of the surveyed organizations, exhibited a clearly negative attitude toward Customer Experience Management (following the trends). This prompted a further investigation into whether such attitudes varied according to the presence or absence of a formally articulated Customer Experience strategy within the organization. (Figure 3)

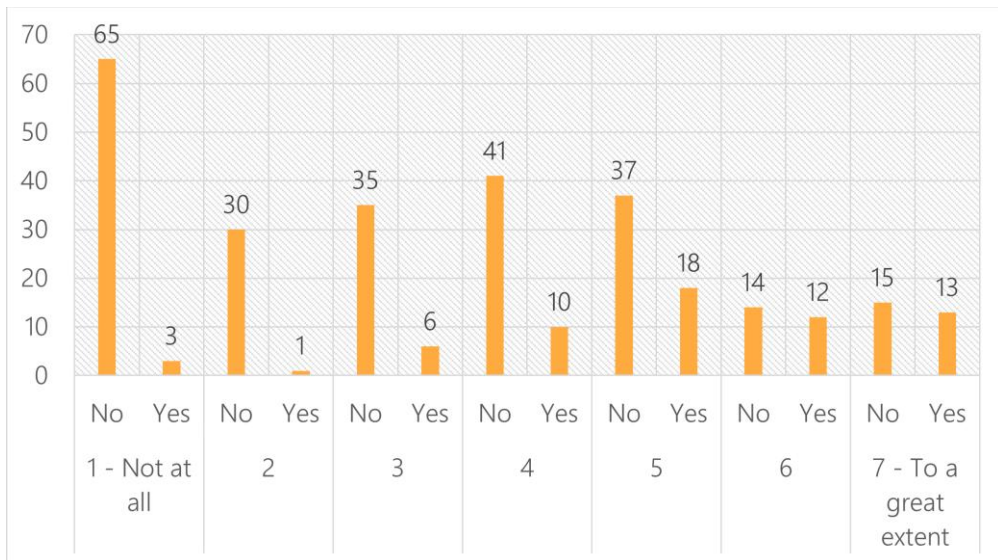


Figure 3. How closely companies follow CX trends, comparing those with and without a CX strategy (source: created by the authors)

The research further explored the specific tools and practices employed by companies to enhance customer experience. These findings are especially relevant when analyzed from the perspective of organizational CX maturity and the degree of strategic awareness demonstrated by the firms.

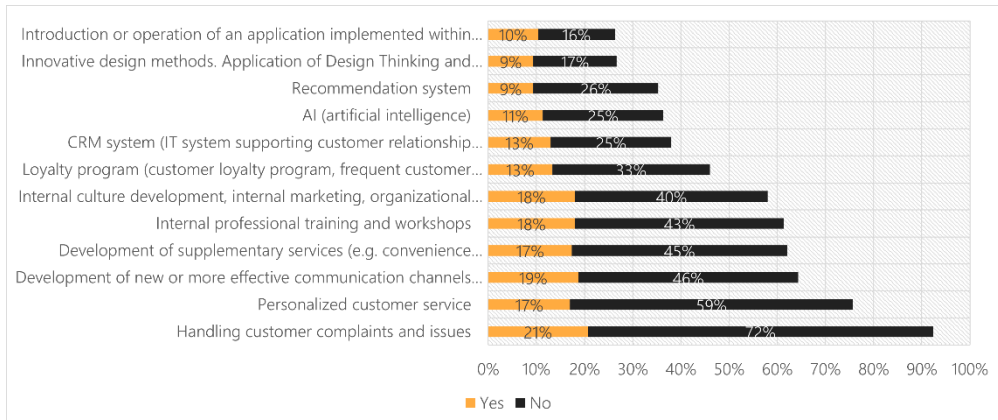


Figure 4. CX improvement tools by CX strategy status (source: created by the authors)

The findings reveal that organizations place the strongest emphasis on handling customer complaints and issues and on delivering personalized customer service. Conversely, the development of customer-facing applications appears to be the least

prioritized area, indicating a relatively low level of openness toward digital innovations in Customer Experience Management. (Figure 4)

5. Discussion

The research shows that only 21% of Hungarian SMEs have a clearly articulated Customer Experience (CX) strategy. This implies that, in terms of consciousness and structured engagement with the field, only about one in five companies can be considered actively strategic. In this study, this indicator is interpreted as a proxy for CX awareness. However, awareness does not necessarily imply that organizations without a formal strategy consider Customer Experience unimportant.

Only 23% of respondents indicated on a seven-point Likert scale that following Customer Experience trends is not important at all. While this result may be partly explained by sector-specific characteristics, even in such cases a low level of importance would typically be expected. Operating in a narrow market niche may, to some extent, lead to organizational complacency in this regard.

Responses ranging from 2 to 7 on the scale broadly resemble a distribution close to normality, which aligns with the initial expectations of the study.

In order to better understand the left-skewed distribution of following CX trends, the results were further analyzed based on whether firms had a consciously defined Customer Experience strategy. Nearly all 68 companies reporting “the lowest” importance of it belong to the group without a formal strategy. Among higher-rated responses, a substantial proportion is also found among firms without a defined CX strategy.

Notably, 15 companies – representing approximately 5% of the Hungarian SME sector – rated following the Customer Experience trends as extremely important despite not having a formal strategy in place. Among firms without a CX strategy, 107 companies (36% of the total sample) assigned a score of 4 or higher on the Likert scale, indicating at least a moderate level of importance. When including firms that do have a formal CX strategy, an additional 53 companies also rated following the trends of CX at 4 or above. Altogether, this accounts for 160 companies, or 53% of Hungarian SMEs.

This 53% share can be interpreted as relatively low, implying that for 47% of SMEs, following the new trends of Customer Experience is not considered particularly important.

The findings also show that 93% of companies in the sample pay some form of attention to handling customer complaints and issues. This is partly driven by the 72% of firms that do not have a formal Customer Experience (CX) strategy. Given that 79%

of the total sample falls into this category, it follows that approximately 7% of companies do not engage in complaint handling at all.

On the other hand, the remaining 21% of firms that do have a defined CX strategy are fully represented within this 93%, indicating that complaint handling is universally present among strategically oriented organizations.

Overall, personalized customer service is also considered important by a large share of firms (76%). Approximately two-thirds of respondents (65%) consider the development of new or more effective communication channels and platforms important.

By contrast, the least important areas of development are the introduction or operation of customer-facing applications within a multichannel system, as well as the use of innovative design methodologies such as Design Thinking and Service Design techniques (e.g., personas and customer profiling).

Among the 21% of companies with a formally defined Customer Experience (CX) strategy, the most important areas include, in addition to handling customer complaints and issues, the development of new or more effective communication channels and platforms, internal professional training and workshops, as well as internal culture development, including internal marketing, organizational culture, and mindset shaping.

Slightly less than half of these strategically oriented firms also consider innovative design methods – such as the application of Design Thinking and Service Design techniques (e.g., personas and customer profiling) – and recommendation systems to be important. This corresponds to a value of approximately 9% of the total sample, which, when recalculated within the subgroup of CX-strategy holders (21% of the sample), represents about 43%. In terms of improving customer experience through communication channels, this reflects a relatively strong level of strategic alignment within this group.

By contrast, the situation is markedly different among companies without a formal CX strategy. In this segment, only 17% consider innovative design methods important, which corresponds to approximately 22% within the non-strategic subgroup. This indicates a significantly lower level of engagement with more advanced CX development approaches among firms lacking a formalized strategy.

6. Conclusions

The findings suggest that, although the vast majority of Hungarian SMEs do not have a formally defined Customer Experience (CX) strategy, many of them still place considerable emphasis on continuously improving customer experience. Even those

companies without an explicit CX strategy maintain dedicated processes and channels for handling customer complaints and providing personalized services. This indicates that, even if not in a structured or conscious manner, the importance of Customer Experience is still present within organizational practices.

From a channel development perspective, greater emphasis could be placed on the development of mobile applications. Similarly, relatively low importance is attributed to customer profiling and recommendation systems. In order to maintain their current position and ensure long-term competitiveness, these areas represent the most significant opportunities for further development and progress.

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Digital transformation and relationship quality in automotive retail: Testing commitment-trust theory in hybrid service environments

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Abstract

Digital transformation has significantly reshaped customer–firm interactions in the automotive retail sector, shifting traditional service encounters towards hybrid digital–physical customer journeys. Customers increasingly engage with dealerships through online platforms, digital communication tools, and technology-enabled services before and after in-person interactions. Despite these developments, much of the existing relationship quality literature continues to reflect pre-digital, high-contact service environments, leaving uncertainty about whether established relational mechanisms remain applicable in digitally enabled contexts. This study investigates whether the satisfaction–trust–commitment mechanism proposed by commitment–trust theory remains valid within digitally enabled automotive dealership environments and examines whether perceived service innovation influences these relational pathways.

A cross-sectional survey design was adopted, collecting data from 463 South African automotive customers between November 2024 and April 2025. Established multi-item scales were used to measure customer satisfaction, trust, commitment, and perceived service innovation. Data was analysed using covariance-based structural equation modelling (CB-SEM) in AMOS to test the hypothesised relationships, while moderation effects were examined through a latent interaction modelling approach.

The results confirm that satisfaction significantly strengthens trust, with both constructs positively influencing customer commitment. These findings support the robustness of commitment–trust theory within hybrid service environments. Trust partially mediates the relationship between satisfaction and commitment, highlighting its role as a key relational mechanism. However, perceived service innovation does not moderate the relational pathways, suggesting that customers evaluate technological improvements and relational experiences through distinct cognitive processes.

The findings indicate that technological advancements alone cannot substitute for strong relational foundations in automotive retail. Dealerships must complement digital service

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innovations with transparent communication, reliable service delivery, and consistent interpersonal engagement to strengthen trust and sustain long-term customer commitment. Overall, the study demonstrates that digital transformation does not weaken the relational processes underpinning commitment; rather, digital and interpersonal cues jointly shape satisfaction and trust within hybrid service ecosystems.

Keywords: automotive retail; digital service innovation; relationship marketing; service-dominant logic; customer satisfaction; customer trust; customer commitment.

JEL Classification: M31; D91; L81; O33; M15

1. Introduction

The automotive retail sector today plays a critical role in South Africa's economy, contributing approximately 5.2% to the gross domestic product, 22.6% of national manufacturing output, and supporting nearly 498,000 jobs across the formal economy (National Association of Automobile Manufacturers of South Africa [NAAMSA] 2025; NAAMSA 2026). Dealerships remain the primary channel for new vehicle sales, accounting for nearly 80% of all transactions, with domestic sales increasing by 12.5% year-on-year to 54 896 units in November 2025. At the same time, vehicle buyers are increasingly initiating their purchase journeys online, using digital platforms to research models, compare prices, request quotations, and evaluate dealership offerings (Walker & Proff 2024; Terason, Pattanayanon & Phawitpiriyakliti 2025; McKinsey & Company 2025). These developments have reconfigured customer expectations, with digital transparency, interface usability, and seamless channel integration now shaping dealership evaluations, even before a physical visit occurs.

This growing dependence on digital touchpoints is not simply a behavioural shift but reflects broader structural changes in the automotive sector. Digitalisation is reshaping business models, enabling data-driven customer management, customer relationship management (CRM) integration, and innovation in value delivery (Acciarini et al. 2022; Hu & Basiglio 2023; Verhoef et al. 2024). The rise of artificial intelligence (AI), digital configurators, automated communications, and Service 4.0 ecosystems has accelerated the transition towards hybrid service journeys in which customers fluidly move between online and physical dealership interactions (Dalili, Heidari & Ghasemi 2024; Jankovic-Zugic et al. 2023; Huang & Rust 2024). Therefore, understanding how customers evaluate satisfaction, trust, and relational continuity in this environment carries substantial social and industry significance. Long-term dealership relationships remain central to customer safety, post-purchase servicing, maintenance quality, and vehicle ownership experience. Consequently, identifying the relational drivers that sustain customer-dealership commitment within digitally

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enabled environments is vital for organisational performance and consumer well-being.

Although digital transformation has been widely examined in marketing research, the relational consequences of hybrid digital-physical journeys remain underexplored, particularly in high-involvement sectors such as automotive retail. Prior research provides strong evidence that satisfaction, trust, and commitment jointly underpin relationship quality and loyalty in traditional, high-contact dealership settings (Van Tonder, Petzer & Van Zyl 2017; Van Vuuren, Roberts-Lombard & Van Tonder 2012). However, these mechanisms were conceptualised in an era when interpersonal salesperson interactions dominated customer evaluations. The growing prevalence of system-generated cues, such as interface reliability, automated communication accuracy, and data transparency, raises important questions about whether these relational pathways operate unchanged in digitally mediated settings. Recent research on digital customer journeys and service ecosystems similarly highlights the need to reassess traditional relationship constructs in technology-enabled environments where customers evaluate firms across multiple integrated touchpoints (Becker & Jaakkola 2023; De Keyser et al. 2023; Verhoef et al. 2024).

Scholars recently revisited commitment–trust theory, reaffirming the enduring explanatory power of trust and commitment in relational exchange while calling for renewed empirical testing within digitally transformed service environments (Palmatier, Dant & Grewal, 2007; Steinhoff, Arli, Weaven & Kozlenkova, 2019; Keiningham, Aksoy, Bruce, Cadet, Clennell, Hodgkinson & Kearney, 2017). Brown, Crosno and Tong (2019) questioned whether trust and commitment operate unchanged in digitally mediated exchanges, Morgan and Feng (2024) reaffirmed CTT’s foundational role within marketing capability research, and Badrinarayanan and Ramachandran (2024) called for renewed empirical testing of the theory across modern sales and service environments. However, despite this renewed conceptual attention and calls for updated empirical scrutiny, systematic testing of CTT within digitally enabled automotive retail contexts, particularly in emerging market settings, remains notably scarce.

Although recent scholarship has reaffirmed the relevance of commitment–trust theory and called for renewed empirical testing in digitally transformed service environments, empirical applications within hybrid automotive retail contexts, particularly in emerging markets, remain limited. In addition to this contextual gap, uncertainty persists regarding the role of perceived service innovation within relational frameworks. Some studies suggest innovation enhances relational outcomes by signalling competence and customer centricity (Mahmoud, Hinson & Anim 2018; Tai, Wang & Luo 2021), whereas others argue it primarily enhances functional value without altering deeper relational mechanisms (Pansari & Kumar 2017; Steinhoff et al. 2019). There is limited empirical clarity on whether innovation modifies the trust-

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commitment pathway in hybrid dealership ecosystems. Addressing this gap is essential to advance theory on customer–firm relationships in digital service environments.

1.1. Problem statement and conceptual framework

This study is grounded in CTT, the central framework within relationship marketing that conceptualises trust and commitment as the key mediators through which relationship-building efforts influence relational continuity (Morgan & Hunt 1994). Recent analyses reaffirm its relevance across contemporary service environments and call for renewed testing in digitally transformed contexts (Badrinarayanan & Ramachandran 2024; Morgan & Feng 2024). The theory suggests that satisfaction strengthens trust, which fosters commitment-relationships consistently validated in traditional service settings.

Digital transformation introduces system-based trust cues, such as interface reliability, data security, and process transparency, that may complement or partially substitute interpersonal cues (Belanche, Casaló & Flavián 2021; Kim, Connerton & Park 2022). This raises theoretical uncertainty about whether digitalised service encounters weaken, strengthen or leave unchanged the classical satisfaction-trust-commitment mechanism. The role of perceived service innovation further complicates this relational structure. Innovation may enhance functional and experiential evaluations, yet its ability to condition relational pathways remains unclear. Consequently, the conceptual framework integrates satisfaction, trust, and commitment within a CTT lens, while examining perceived service innovation as a potential moderating variable.

1.2. Research objectives

This study aimed to examine whether the satisfaction-trust-commitment mechanism remains robust in digitally enabled automotive dealership environments and to assess whether perceived service innovation moderates the trust-commitment relationship. The research objectives included:

- To test the direct effect of satisfaction on trust;
- To test the direct effects of satisfaction and trust on commitment;
- To examine the mediating role of trust in the satisfaction-commitment relationship; and
- To assess whether perceived service innovation moderates the trust-commitment relationship.

The literature review and hypotheses are discussed next, followed by research design and methods. Thereafter, the measurement and structural model results are reported, with the findings, theoretical contributions, managerial implications, and

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future research directions then being outlined. Finally, the study's conclusion and limitations are acknowledged.

2. Literature review and hypothesis development

In digitally enabled automotive dealership environments, customers increasingly rely on psychological assessments of their service experiences to guide long-term relational decisions. Therefore, customer satisfaction, trust, and commitment remain core relational constructs for understanding how relationships are formed within hybrid human-digital service encounters. This section reviews the theoretical and empirical foundations of these constructs, emphasising the mediating role of customer trust in linking satisfaction to stronger relational commitment. It further examines perceived service innovation as a contextual moderator that may amplify or weaken trust's influence on commitment, particularly as dealerships adopt more technology-driven service practices. By synthesising this body of work, this section provides the conceptual grounding for the study's hypotheses and the development of the proposed model.

2.1. Commitment-trust theory, digital transformation, and relationship quality

CTT remains one of the most influential frameworks for explaining why customers maintain long-term relationships with firms (Brown et al. 2019; Morgan & Hunt 1994). CTT proposes that satisfaction strengthens trust, which strengthens commitment, forming a sequential mechanism that underpins relationship quality and relational continuity. Recent scholarship confirms the enduring relevance of this framework in contemporary sales and service environments (Badrinarayanan & Ramachandran 2024; Morgan & Feng 2024), while also calling for renewed scrutiny of its assumptions as digital transformation reshapes customer-firm interaction patterns (Brown et al. 2019).

Digital transformation fundamentally reconfigures the informational, transactional, and relational architecture of service encounters (Verhoef et al. 2021). In automotive retail specifically, industry reports indicate that customers now complete a substantial portion of their decision journey online before visiting a dealership, using digital channels to research models, compare prices, configure vehicles, and obtain quotations (Walker & Proff 2024; Terason et al. 2025). This shifts the locus of satisfaction formation from purely interpersonal encounters to hybrid journeys in which system-based cues, such as website functionality, information accuracy, and booking reliability, play a central role. Empirical work across banking, retail, and hospitality similarly shows that digital interfaces shape satisfaction and relational outcomes via perceived transparency, convenience, and control (Belanche, Casaló & Flavián 2019; Belanche et al. 2021; Steinhoff et al. 2019).

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These developments suggest that classical relationship quality constructs, such as satisfaction, trust, and commitment, originally conceptualised in high-contact, salesperson-dominated settings (Brown et al. 2019; Mpinganjira, Roberts-Lombard & Svensson 2017) must be re-examined in technologically mediated contexts. Recent research on digital customer journeys and omnichannel service environments similarly emphasises that relational constructs developed in traditional service settings require re-evaluation as customers increasingly interact with firms through hybrid digital–physical touchpoints (Becker & Jaakkola 2023; De Keyser et al. 2023; Verhoef et al. 2024). In digitally enabled dealerships, customers integrate interpersonal and system-based cues when forming trust judgements (Chauhan, Akhtar & Gupta 2022; Verhoef et al. 2024). The system-based trust theory proposes that when customers cannot directly observe a firm’s motives or internal processes, they rely on structural assurances, including secure systems, reliable procedures, and situational normality such as professional interfaces and standardised processes, to infer trustworthiness (McKnight, Choudhury & Kacmar 2002). Contemporary studies on digital trust similarly show that customers rely on technological infrastructure, platform transparency, and system reliability as signals of institutional trustworthiness in technology-enabled service environments (Becker & Jaakkola 2023; Huang & Rust 2023). Digital platforms provide structural assurances through secure payment gateways, traceable communications, and transparent information displays, suggesting that CTT’s mechanisms might operate through a broader set of cues in hybrid journeys than originally envisaged. Against this backdrop, this study applied CTT as the primary theoretical lens to examine how satisfaction and trust shape commitment in digitally enabled automotive dealership environments and to test whether these mechanisms remain robust under conditions of technological mediation.

2.2. Service innovation, ecosystems, and digitalised service experiences

Service innovation has become central to the digital transformation efforts of firms, particularly in environments where customers interact across multiple technology-enabled touchpoints. It refers to new or enhanced service processes, interfaces, and offerings that improve the service experience, often within broader digitally connected ecosystems (Lusch & Nambisan 2015; Wagner, Schramm-Klein & Steinmann 2020; Witell et al. 2016). In automotive retail, such innovations include online configurators, virtual showrooms, integrated booking platforms, automated service reminders, and AI-based communication tools (Miguel et al. 2022; Wan et al. 2023).

However, empirical findings about the relational implications of service innovation remain fragmented. Some studies indicate that innovation can signal competence, responsiveness, and modernity, thereby enhancing customer satisfaction and loyalty intentions (Mahmoud et al. 2018; Tai et al. 2021). Others suggest that innovation

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primarily improves functional outcomes, such as convenience and process efficiency, without fundamentally altering deeper relational constructs such as trust and commitment (Pansari & Kumar 2017; Steinhoff et al. 2019). Very few studies explicitly examine whether service innovation interacts with established relationship quality mechanisms or influences the satisfaction-trust-commitment pathway central to CTT.

To clarify these theoretical ambiguities and locate this study within broader service innovation literature, a structured synthesis of key contributions across A- and strong B-rated journals was undertaken. Table 1 summarises leading conceptual and empirical work on service innovation, service ecosystems, and relationship quality.

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Table 1. Summary of conceptual contributions on service innovation, **service** ecosystems and relationship quality (Source: Author)

Study (year, journal)	Context and service setting	Conceptualisation of service innovation, ecosystems, and touchpoints	Relational constructs	Methodological approach	Main findings	Gaps and implications for the current study
Boxer and Rekettye (2011); <i>International Journal of Services and Operations Management</i>	Business-to-business (B2B) service relationships in Israel and Hungary	Service innovation is defined as improvements in service offerings that enhance perceived service value in ongoing B2B exchanges.	Service value, affective commitment, loyalty	Quantitative survey; structural equation modelling (SEM)	Service innovation and emotional intelligence improve perceived value, strengthening commitment and loyalty.	Focuses on B2B, rather than consumer contexts; trust and satisfaction are not modelled. Does not address digital or omnichannel ecosystems relevant to modern automotive retail.
Ganesan and Sridhar (2016); <i>Corporate Reputation Review</i>	Multi-sector service firms	Service innovation viewed through process/organisational enablers and barriers; limited ecosystem framing.	Customer satisfaction, relationship improvement	Mixed methods	Barriers and facilitators of innovation indirectly influence satisfaction and relational enhancement.	Does not measure trust or commitment; no digital touchpoint analysis. Limited ecosystem perspective.

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Study (year, journal)	Context and service setting	Conceptualisation of service innovation, ecosystems, and touchpoints	Relational constructs	Methodological approach	Main findings	Gaps and implications for the current study
Witell et al. (2016); <i>Journal of Business Research</i>	Conceptual, cross-industry service settings	Positions service innovation within service-dominant logic; emphasises resource integration and service ecosystems.	Relational constructs implicit (value, co-creation)	Conceptual review	Synthesises innovation types, mechanisms, and value creation pathways.	No empirical testing; it does not examine satisfaction, trust, or commitment chains. Calls for empirical work in specific service ecosystems – precisely what this study addresses.
Sukwadi (2017); <i>International Journal of Services, Economics and Management</i>	Three-star hotels in Jakarta	Service innovation as enhancements to hotel services, used as a moderator.	Satisfaction, value, loyalty	Quantitative survey; SEM	Service innovation moderates satisfaction-value; value increases loyalty	Relational variables are limited (no trust, commitment). Hospitality is low involvement compared to automotive.
Mahmoud et al. (2018); <i>European Journal of Innovation Management</i>	Telecommunication services in Ghana	Innovation is conceptualised as improved offerings and processes that enhance	Satisfaction, loyalty intentions	Quantitative survey	The innovation → value → satisfaction → loyalty pathway is supported.	No trust or commitment. Limited digital-physical ecosystem integration;

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Study (year, journal)	Context and service setting	Conceptualisation of service innovation, ecosystems, and touchpoints	Relational constructs	Methodological approach	Main findings	Gaps and implications for the current study
		value across multiple touchpoints.				telecommunication differs from high-involvement durable goods.
Ta and Yang (2018); <i>International Journal of Innovation Management</i>	Telecommunications in Vietnam	Differentiates between interactive versus support service innovation across multi-touchpoint service encounters.	Satisfaction, retention	Quantitative modelling	Both innovation types raise satisfaction and retention.	Trust and commitment are not included. Does not embed innovation in a relationship-quality chain.
Kanwal and Yousaf (2019); <i>Emerging Economy Studies</i>	Retail banking in Pakistan	Innovation involves new service features and process enhancements within bank service systems.	Satisfaction (indirect link to loyalty)	Quantitative survey	Innovation significantly improves satisfaction, which influences behavioural outcomes.	Only satisfaction measured; no trust or commitment. Does not adopt an ecosystem or touchpoint perspective.
Tai et al. (2021); <i>Service Business</i>	Hospitality sector	Compares technology-driven versus human-driven service innovation	Satisfaction, delight, loyalty	Survey; SEM	Both innovation types improve satisfaction and loyalty; human-	Trust and commitment are absent; hospitality differs from that in high-involvement

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Study (year, journal)	Context and service setting	Conceptualisation of service innovation, ecosystems, and touchpoints	Relational constructs	Methodological approach	Main findings	Gaps and implications for the current study
		across experience touchpoints.			related innovation has stronger effects.	digital-physical hybrid retail, such as dealerships.
Woo, Kim and Wang (2021); <i>Industrial Marketing Management</i>	B2B service relationships	Examines provider innovation behaviour within long-term B2B exchanges.	Relationship performance, loyalty	Quantitative	Innovation behaviour increases relationship performance and loyalty.	No satisfaction, trust or commitment. B2B focus limits applicability to consumer retail ecosystems.
Awuku, Agyei and Gonu (2023); <i>PLoS One</i>	Mobile telecommunications in Ghana	Innovation practices as bundles of new/improved services within a broader telecommunication system.	Satisfaction (partial), loyalty, perceived value	Survey; SEM	Innovation boosts loyalty through satisfaction and value creation.	Trust and commitment remain implicit; the quality chain of ecosystem relationships is not formalised.
Wu, Xu and Wu (2024); <i>Journal of Marketing Communications</i>	Smart unmanned retail stores	Service innovation operationalised as product, process, and interface innovation in tech-intensive ecosystems.	Experiential relationship quality	Survey; SEM	Innovation enhances experiential relationship quality, resulting in stronger shopping outcomes.	Does not decompose relationship quality into satisfaction, trust, and commitment. Context is fully

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Study (year, journal)	Context and service setting	Conceptualisation of service innovation, ecosystems, and touchpoints	Relational constructs	Methodological approach	Main findings	Gaps and implications for the current study
Biswas, Kant and Jaiswal (2025); <i>Benchmarking: An International Journal</i>	Retail banking in India	Innovation examined alongside fairness and reputation in post-COVID-19 banking ecosystems.	Satisfaction, relationship commitment, value, image	Survey-based SEM	Together, service innovation, commitment, and fairness drive satisfaction and cross-buying.	automated; it lacks hybrid human-digital relevance for dealerships. Includes commitment, but trust is proxied, rather than explicitly modelled. Banking differs from high-involvement automotive purchases and digital dealership ecosystems.

2.3. *Synthesis and conceptual gap*

Collectively, the studies summarised in Table 1 reveal that service innovation research, even within reputable A- and strong B-rated outlets, remains theoretically fragmented and insufficiently linked to the relational quality mechanisms that underpin long-term customer-firm relationships. Many studies demonstrate that service innovation enhances satisfaction, value or loyalty within various industries, such as banking, hospitality, telecommunications, and automated retail. However, few incorporate trust or commitment as distinct constructs, and even fewer examine how innovation interacts with the satisfaction-trust-commitment sequence foundational to relationship marketing and CTT.

Moreover, the reviewed work rarely examines high-involvement hybrid digital-physical contexts. Automotive dealerships represent such environments, where customers face substantial financial, performance, and safety risks and where relationships typically extend beyond the initial transaction to include ongoing maintenance and after-sales service. None of the studies specifically investigates service innovation within digitally enabled automotive dealerships, nor assess whether innovation conditions the trust-commitment pathway predicted by CTT. This omission highlights a clear conceptual and empirical gap. This study addressed this gap by re-examining the satisfaction-trust-commitment mechanism in digitally transformed dealership ecosystems and evaluated perceived service innovation as a potential moderator of the trust-commitment relationship. Building on this foundation, the following subsections develop hypotheses for the tested model.

2.4. *Digitalisation and the transformation of relational value*

Digitalisation has blurred the boundary between transactional efficiency and relational quality in service settings (Kamalaldin et al. 2020; Becker & Jaakkola 2023). Historically, automotive dealership relationships were shaped primarily by salesperson expertise, interpersonal warmth, and the quality of after-sales engagement (Balinado et al. 2021; Van Tonder et al. 2017). These interpersonal drivers remain important, yet digital touchpoints now play an equally critical role by providing rapid access to information, self-service convenience, and greater transparency around pricing and availability (Grewal, Roggeveen & Nordfält 2017; Verhoef et al. 2021; De Keyser et al. 2023). Recent research on digitally integrated service ecosystems further suggests that technology-enabled interfaces increasingly complement interpersonal interactions by enhancing accessibility, information transparency, and service responsiveness (Hollebeek, Sprott & Andreassen 2022; Becker & Jaakkola 2023).

Therefore, in digitally enabled dealerships, customer satisfaction and trust emerge from evaluations of an integrated journey rather than a single encounter. Website performance, information accuracy, online booking reliability, real-time communication, showroom experience, and service quality all contribute to relational judgements. Contemporary customer journey research similarly emphasises that value creation occurs across interconnected digital and physical touchpoints that collectively shape customer perceptions of reliability, convenience, and relational quality (De Keyser et al. 2023; Becker & Jaakkola 2023). This hybrid reality suggests that CTT's relational constructs are not replaced by digitalisation but are recontextualised within multichannel service ecosystems. Whether the psychological linkages identified by CTT function in the same way within these digital-physical journeys remain an open empirical question.

2.5. *Customer satisfaction and trust in hybrid service environments*

Customer satisfaction reflects a cumulative evaluation of a dealership's performance relative to expectations across multiple touchpoints, including perceptions of process quality, information quality, and interpersonal interactions (Oliver 1980). In hybrid digital-physical contexts, satisfaction is influenced not only by face-to-face encounters, but also by the ease of navigating online interfaces, the coherence

of cross-channel experiences, and the reliability of digital tools (Pansari & Kumar 2017; Van Phuong et al. 2024).

Consequently, in digitally enabled dealerships, satisfaction emerges from evaluations that span website functionality, information completeness, quotation processes, booking systems, in-dealership treatment, and after-sales service. Each touchpoint generates cues about organisational competence and customer centricity. The system-based trust theory posits that when customers cannot directly observe the intentions of a firm, they rely on structural assurances, for example, secure systems, professional interfaces, and standardised procedures and situational normality to infer trustworthiness (McKnight, Choudhury & Kacmar 2002; Al-Kfairy et al. 2023; Geebren 2025). Digital channels provide such structural assurances through secure communication, traceable interactions, and transparent information displays. Accordingly, high satisfaction with hybrid service journeys should strengthen perceptions of reliability and integrity, thereby fostering trust. Empirical work on digital banking, hospitality, and retail supports this satisfaction-trust link in technology-mediated environments (Belanche et al. 2019, 2021; Steinhoff et al. 2019). Based on this reasoning, the following hypothesis is proposed:

H1: Customer satisfaction positively affects customer trust in digitally enabled automotive dealerships.

2.7. Customer trust and commitment in digitally enabled dealerships

Trust is the willingness to rely on a partner based on perceptions of reliability, integrity, and dependability (Badrinarayanan & Ramachandran 2024; Morgan & Hunt 1994). In automotive retail, trust is particularly salient due to the high financial outlay, performance uncertainty, and safety implications associated with vehicle purchase and maintenance (Brown et al. 2019; Van Tonder et al. 2020). For example, South African consumers face substantial financial exposure, as vehicle purchases often involve high capital outlays, long-term financing arrangements, and ongoing servicing commitments, reflecting the scale of the domestic automotive market which recorded nearly 600 000 new vehicle sales in 2025 (NAAMSA 2026). Trust helps customers manage perceived risk in this setting by providing confidence that a dealership will act in their best interest, deliver promised quality, and provide reliable after-sales support over time.

CTT posits that trust is a central determinant of relational continuity, as customers are more likely to commit to relationships where they believe the partner is reliable and benevolent (Morgan & Hunt 1994). In digitally transforming dealership contexts, digital tools do not eliminate risk. Still, customers may reduce information asymmetry through transparent pricing, online reviews, and comparison tools, potentially strengthening the role of trust in commitment formation. Empirical studies across digital banking, social commerce, and omnichannel environments show that trust remains a strong predictor of commitment and relational intention, even when interactions are partially mediated by technology (Alzaidi & Agag 2022; Ozuem et al. 2024; Reydet & Carsana 2017). This suggests that system-based trust and interpersonal trust can coexist to support long-term relational commitment in hybrid journeys. Accordingly, the following hypothesis is proposed:

H2: Customer trust positively affects customer commitment in digitally enabled automotive dealerships.

2.7. Customer satisfaction and commitment in digital service contexts

Satisfaction is frequently positioned as a primary determinant of behavioural intentions, including repurchase, recommendation, and long-term commitment, because it signals that the relationship has generated value and is likely to do so in the future (Oliver 1980; Otto, Szymanski & Varadarajan 2020). Meta-analytic evidence indicates that satisfaction exerts a positive, though variably strong, effect on loyalty-related outcomes across industries (Otto et al. 2020). In hybrid service contexts, favourable

evaluations of digital and physical touchpoints can enhance customers' willingness to maintain relationships, as consistent satisfaction indicates reliable value delivery and reduces the perceived risk of future interactions (Pansari & Kumar 2017).

At the same time, digitalisation introduces conditions that may both weaken and strengthen the satisfaction-commitment link. On one hand, reduced switching costs and the availability of competing platforms may make customers less dependent on any single provider, potentially weakening the impact of satisfaction on commitment (Jacob, Thomas & Joseph 2024). On the other hand, when digital tools deliver high convenience, integrated experiences, and time savings, customers may become more inclined to commit to providers that consistently meet their expectations, particularly in high-involvement purchases where learning and adaptation costs are non-trivial (Sumiyana, & Komariyah 2024). Hence, in automotive retail, satisfaction with the integrated sales and service experience may contribute directly to customers' willingness to maintain long-term relationships with specific dealerships. Thus, the following hypothesis is advanced:

H3: Customer satisfaction positively affects customer commitment in digitally enabled automotive dealerships.

2.8. The mediating role of trust

CTT proposes that trust functions as a key mediating mechanism through which satisfaction influences long-term relational intention (Jacob et al. 2023; Morgan & Hunt 1994). Satisfied customers are more likely to perceive a firm as reliable and benevolent, which increases their willingness to commit to the relationship. In traditional dealership contexts, satisfaction has consistently been shown to increase trust, thus strengthening commitment (Mpinganjira et al. 2017; Van Vuuren et al. 2012).

Digitalisation may complicate this pathway by introducing alternative evaluative structures and potentially reducing interpersonal engagement. Nonetheless, system-based trust research indicates that digital performance cues, such as platform reliability, information accuracy, and data security, can reinforce perceptions of confidence and credibility, allowing trust to operate as a mediator even when interactions are technology-reliant (Belanche et al. 2021; Dai & Liu 2024). In hybrid digital-physical dealership ecosystems, satisfaction with both digital and interpersonal aspects of the journey is expected to shape commitment partly by strengthening trust.

Partial rather than full mediation is anticipated. While trust is expected to translate satisfaction into deeper relational intention, satisfaction may also exert a direct effect on commitment through habitual inertia, perceived switching costs, and the convenience benefits of remaining with a familiar dealership (Otto et al. 2020). Hence, satisfaction may influence commitment directly and indirectly via trust. Hence, the following hypothesis is proposed:

H4: Customer trust mediates the relationship between customer satisfaction and customer commitment in digitally enabled automotive dealerships.

2.9. Perceived service innovation as a moderator

Perceived service innovation reflects customers' perceptions of the extent to which a dealership employs novel and technologically advanced processes and tools, such as digital configurators, online booking systems, automated service communication, and virtual information resources, to enhance the service experience (Wan et al. 2023; Wu et al. 2024).

Service innovation may interact with the trust-commitment relationship through two competing mechanisms. First, innovation may amplify the positive effect of trust on commitment (Wu et al. 2024). When customers perceive a dealership as both trustworthy and technologically progressive, innovation can serve as a signal of organisational competence, future orientation, and customer centricity. These signals may strengthen customers' confidence in the dealership's long-term reliability and adaptive capability, thereby increasing their intention to maintain the relationship. Under this complementary mechanism, trust provides relational assurance, while perceived innovation reinforces expectations of sustained value creation, jointly strengthening commitment.

Second, innovation could dampen the effect of trust on commitment by providing functional assurance independent of relational confidence (Wu et al. 2024). For instance, if customers perceive those digital systems 'just work', booking processes are reliable, information is transparent, and service reminders are seamless, they may then feel comfortable committing based on functional performance alone, even if relational trust is weaker. In this scenario, perceived service innovation partially substitutes trust as a basis for commitment, thus weakening the reliance on relational mechanisms. Given these competing possibilities, the direction of moderation is treated as an empirical question. To capture both potential patterns, the following alternative hypotheses are specified:

H5a: Perceived service innovation positively moderates the relationship between customer trust and customer commitment, such that the effect of trust on commitment is stronger when perceived service innovation is high.

H5b: Perceived service innovation negatively moderates the relationship between customer trust and customer commitment, such that the effect of trust on commitment is weaker when perceived service innovation is high, indicating functional substitution.

Perceived service innovation is conceptualised solely as a moderator, rather than as a direct antecedent, for three reasons. Firstly, innovation in automotive retail primarily concerns process enhancements (e.g., booking systems and configurators), rather than changes to the core service outcome, suggesting that its primary role is contextual instead of relational. Secondly, prior literature and preliminary empirical evidence indicate that perceived innovation correlates with relational constructs, but does not exhibit clear theoretical priority as an antecedent of commitment relative to satisfaction and trust. Thirdly, modelling innovation as a moderator allowed this study to address a theoretically distinct question: whether technological perceptions reshape relational processes, rather than whether innovation independently builds commitment. Figure 1 depicts the proposed research model.

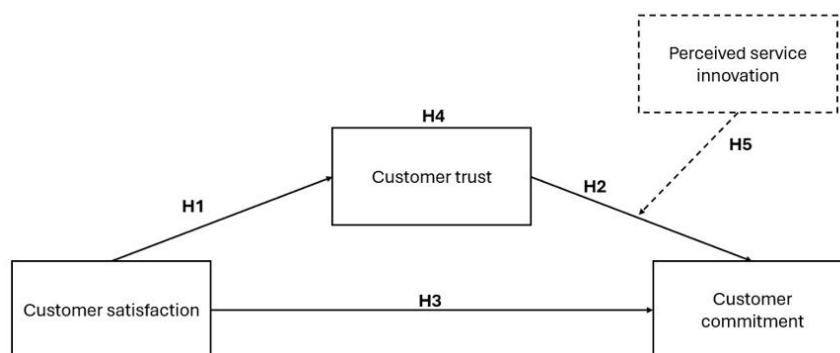


Figure 1. Proposed research model (source: author)

3. Research methods and design

To empirically test the proposed hypotheses and conceptual model, a structured quantitative research design was employed.

3.1. Research design and data collection

This study adopted a quantitative, cross-sectional survey design to examine the relationships among customer satisfaction, trust, and commitment within digitally enabled automotive dealership environments. A structured online questionnaire was used to capture standardised responses from South African automotive customers.

Data were collected via a professional research agency that distributed the survey link to members of a verified national consumer panel. Before responding to the questionnaire, respondents were screened to ensure they had engaged with an automotive dealership (online or in person) within the previous 12

months. The questionnaire comprised four sections: (1) screening and consent, (2) dealership interaction behaviour, (3) demographic profile, and (4) psychometric scales measuring customer satisfaction, trust, commitment, and perceived service innovation (see Table 2).

A pilot test with 30 respondents was conducted to assess the clarity, sequencing, and relevance of the items. Feedback from the pilot informed minor wording refinements, ensuring a clear and user-friendly instrument for the main data collection.

Table 2. Construct descriptions, sample items, sources, and scale anchors (source: author)

Construct	Item code	Item wording	Scale	Source
Customer satisfaction	CS1	I am satisfied with the level of information provided by the car dealership.	1–7	Fornell et al. (1996); Oliver (1980)
	CS4*	I am dissatisfied with the choice I made regarding my interaction with this dealership. (reverse-scored)	1–7	Oliver (1980)
	CS5	My choice to use a car dealership was a wise one.	1–7	Oliver (1980)
Customer trust	CT2	I trust my chosen car dealership completely.	1–7	McKnight et al. (2002); Morgan and Hunt (1994)
	CT3	I believe my chosen car dealership can be counted on to do what is right consistently.	1–7	Morgan and Hunt (1994)
	CT4	I rely on my chosen car dealership.	1–7	McKnight et al. (2002)
Customer commitment	CC4	I feel a connection with the car dealership I choose to transact with.	1–7	Morgan and Hunt (1994)
	CC5	I feel a sense of belonging to the car dealership I choose to transact with.	1–7	Morgan and Hunt (1994)
	CC6	For my chosen car dealership, maintaining a relationship with me means a lot.	1–7	Morgan and Hunt (1994)
Service innovation	SI5	This car dealership frequently updates and improves its automotive services.	1–7	den Hertog (2000); Witell et al. (2016)
	SI6	The technology-driven self-service options provided by my selected dealership enhance my experience.	1–7	den Hertog (2000)
	SI7	I appreciate the convenience of being able to access dealership services online through a user-friendly interface.	1–7	Witell et al. (2016)
	SI8	My selected car dealership shares service-related information using new approaches.	1–7	den Hertog (2000)
	SI9	My selected car dealership provides new experiences by improving its service demonstration facilities.	1–7	Witell et al. (2016)
	SI11	This dealership improves the procedure for service delivery.	1–7	den Hertog (2000)

3.2. Sample and procedure

A total of 500 responses were initially obtained. After removing incomplete questionnaires and multivariate outliers identified using Mahalanobis distance ($p < 0.001$), 463 valid responses were retained for analysis. Respondents were South African customers aged 16 years and older who had interacted with a franchised new-vehicle dealership in Gauteng, Western Cape, and KwaZulu-Natal (see Table 3).

A non-probability quota sampling strategy was employed to ensure representation across three generational groups relevant to automotive segmentation: changers (< 30 years), boomers (30 – 49 years), and traditionalists ($\geq$ 50 years). Quotas were also applied across the three provinces. Participation was voluntary and respondents completed the online questionnaire at their own convenience. The survey took approximately 10 minutes to complete.

Table 3. Socio-demographic profile of respondents (n = 463) (source: author)

Variable	Category	n	%
Age group	18–29 (changers)	140	30.2%
	30–49 (boomers)	232	50.1%
	50+ (traditionalists)	91	19.7%
Gender	Male	248	53.6%
	Female	202	43.6%
	Nonbinary	3	0.6%
	Prefer not to say	10	2.2%
Education	Grade 12	18	3.9%
	Higher certificate	30	6.5%
	Diploma	59	12.7%
	Degree	127	27.4%
	Postgraduate	86	18.6%
	Prefer not to say	143	30.9%
Income	R0–R20 000	72	15.6%
	R20 001–R40 000	45	9.7%
	R40 001–R60 000	31	6.7%
	R60 001–R80 000	25	5.4%
	R80 001–R100 000	20	4.3%
	> R100 000	10	2.2%
	Prefer not to say	260	56.2%
Province	Gauteng	230	49.7%
	KwaZulu-Natal	88	19%
	Western Cape	145	31.3%

3.3. Construct measurement

All constructs were measured using multi-item Likert scales adapted from established relationship marketing and service innovation literature. Customer satisfaction, trust, and commitment were measured on seven-point scales (1 = strongly disagree; 7 = strongly agree). Perceived service innovation – conceptualised as customers' perception of a dealership's technology-enabled service practices was also measured using seven-point Likert-type items.

Content validity was ensured through expert review by academics familiar with automotive services and by the pilot test. As covariance-based SEM (CB-SEM) requires unidimensional and psychometrically sound indicators, scale purification was undertaken during confirmatory factor analysis (CFA). Only items

with satisfactory factor loadings, conceptual coherence, and reliability were retained in the final measurement model. These retained items and their properties are summarised in Table 4.

Table 4. Measurement model results (source: author)

Construct	Item	Loading	α	CR	AVE	p-value
Customer commitment	CC4	0.786	0.857	0.864	0.679	< 0.001
	CC5	0.836				< 0.001
	CC6	0.849				< 0.001
Customer satisfaction	CS1	0.571	0.766	0.804	0.585	< 0.001
	CS4	0.891				< 0.001
	CS5	0.797				< 0.001
Customer trust	CT2	0.851	0.855	0.859	0.670	< 0.001
	CT3	0.778				< 0.001
	CT4	0.825				< 0.001
Service innovation	SI5	0.547	0.855	0.866	0.522	< 0.001
	SI6	0.693				< 0.001
	SI7	0.705				< 0.001
	SI8	0.800				< 0.001
	SI9	0.816				< 0.001
	SI11	0.743				< 0.001

Notes: α , Cronbach's alpha; CR, composite reliability; AVE, average variance extracted.

3.4. Data analysis and validity checks

Data analysis was conducted using AMOS 28 and SPSS. The two-step CB-SEM procedure was followed:

Measurement model – CFA was used to assess indicator reliability, internal consistency, convergent validity, and discriminant validity (see Table 5).

Structural model – the hypothesised relationships among satisfaction, trust, and commitment were estimated using maximum likelihood.

Table 5. Discriminant validity (Fornell-Larcker criterion) (source: author)

Criterion/Constructs	Customer satisfaction	Perceived service innovation	Customer commitment	Customer trust
Customer satisfaction	0.765			
Service innovation	0.481	0.723		
Customer commitment	0.412	0.482	0.824	
Customer trust	0.711	0.530	0.407	0.819

Note: Diagonal figures are the square root of AVE

Normality was evaluated using skewness and kurtosis. To assess potential common method bias, Harman's single-factor test was performed, and a one-factor CFA model was compared to the full measurement model. The largest single factor accounted for less than 50% of the variance, and the one-factor model showed substantially poorer fit, indicating that common method bias was unlikely to be a serious concern.

Global model fit was evaluated using χ^2/df , goodness-of-fit index (GFI), adjusted GFI (AGFI), comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardised root mean square residual (SRMR). Recommended thresholds were used as benchmarks for adequate fit. The indices for the measurement and structural models are reported in Table 6.

Table 6. Measurement and structural model fit indices (source: author)

Fit index	Recommended threshold	Measurement model	Structural model
χ^2/df	< 3.00	2.998	2.775
GFI	> 0.90	0.914	0.921
AGFI	> 0.85	0.886	0.887
CFI	> 0.90	0.981	0.944
TLI	> 0.90	0.977	0.930
RMSEA	< 0.08	0.066	0.072
SRMR	< 0.08	0.028	0.044

Note: All indices meet or exceed widely accepted thresholds for good model fit.

3.5. Moderation analysis

Perceived service innovation was modelled as a moderator of the relationship between trust and commitment. A latent interaction term (trust $\times$ innovation) was specified in AMOS using product indicators. The significance of the interaction term was assessed using bias-corrected bootstrapping with 5 000 resamples. Simple slopes were examined at ± 1 standard deviation of perceived service innovation to aid the interpretation of any significant moderation effects.

3.6. Ethical considerations

Ethical clearance for the study was obtained from the University of Johannesburg's School of Consumer Intelligence and Information Systems Research Ethics Committee (Ethics Reference Number: 2024SCiS023). Participation was voluntary and informed digital consent was obtained from all respondents. No identifying information was collected, and all data were handled in accordance with the Protection of Personal Information Act.

4. Results

This section presents the empirical findings of the study, beginning with descriptive statistics and correlation analysis, followed by hypothesis testing to evaluate the proposed relationships among the constructs.

4.1. Descriptive statistics

Descriptive statistics and inter-construct correlations are presented in Table 7. Mean scores for satisfaction, trust, and commitment were all high, indicating generally favourable evaluations of dealership relationships. Correlations between the constructs are positive and significant, thus consistent with the theorised relational mechanisms.

Table 7: Descriptive statistics and inter-construct correlations (source: author)

FIELD, J., STRUWEG, I. & WARD, I. / *Digital Transformation and Relationship Quality in Automotive Retail: Testing commitment-trust theory in hybrid service environments*

Constructs	Mean	Std. deviation
Customer commitment	6.7099	0.60906
Customer satisfaction	6.8098	0.46627
Customer trust	6.8540	0.35814
Perceived service innovation	6.7747	0.38841
Customer trust	0.0000	0.35814
Perceived Service innovation	0.0000	0.38841
Valid N (listwise)		

4.2. Measurement model evaluation

CFA was used to evaluate the measurement properties of the latent constructs. All standardised factor loadings were statistically significant at $p < 0.001$ and exceeded 0.57, with most above 0.70, indicating satisfactory indicator reliability. Cronbach's alpha and CR values for all constructs were greater than 0.70, demonstrating internal consistency. AVE exceeded 0.50 for each construct, supporting convergent validity. These results were reported in Table 4.

Discriminant validity was assessed using the Fornell-Larcker criterion. For each construct, the square root of its AVE exceeded its correlations with other constructs, confirming discriminant validity (Table 5). Together, these findings indicate that the measurement model demonstrates sound psychometric properties. The measurement model exhibited good fit: $\chi^2 = 431.664$, $df = 144$, $\chi^2/df = 2.998$, GFI = 0.914, AGFI = 0.886, CFI = 0.981, TLI = 0.977, RMSEA = 0.066, and SRMR = 0.028. All indices met recommended thresholds, providing a robust foundation for structural model testing.

4.3. Structural model assessment

Following validation of the measurement model, the structural model was estimated to test the hypothesised relationships among satisfaction, trust, and commitment, and to incorporate the interaction term for perceived service innovation. The structural model demonstrated acceptable fit ($\chi^2 = 233.088$, $df = 84$, $\chi^2/df = 2.775$, GFI = 0.921, AGFI = 0.887, CFI = 0.944, TLI = 0.930, RMSEA = 0.072, SRMR = 0.044). Figure 2 presents the structural model with standardised path coefficients, and Table 8 summarises the direct path estimates.

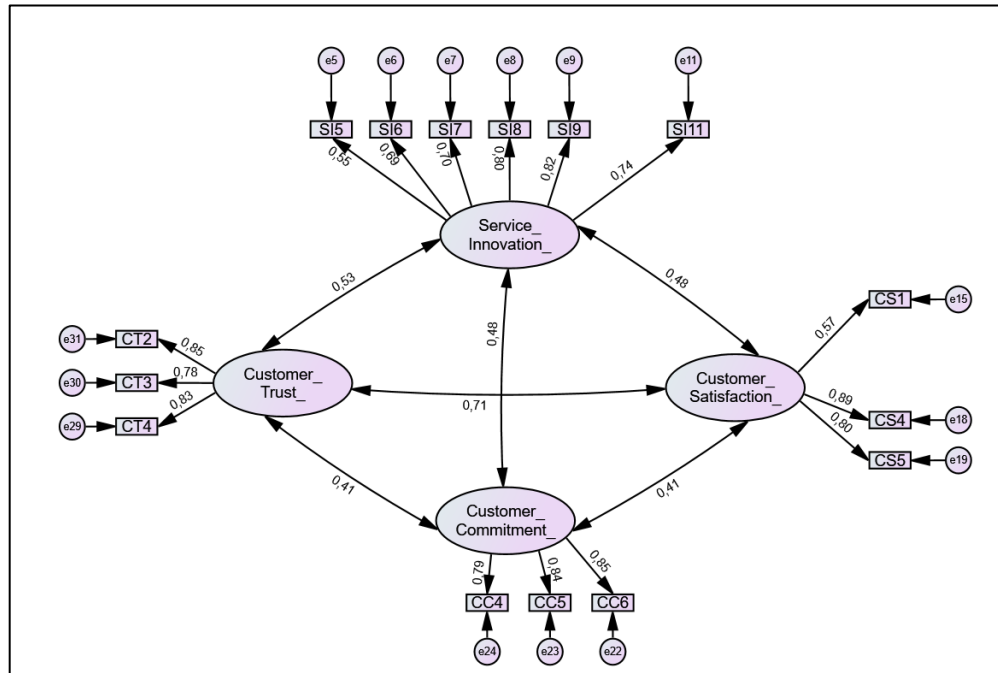


Figure 2: Structural equation model results (customer satisfaction, trust, and commitment) (source: author)

Table 8: Structural path estimates and hypothesis testing results (source: author)

Hypothesis	Path	β	p -value	Result
H1	Satisfaction $\rightarrow$ trust	0.655	< 0.001	Supported
H2	Trust $\rightarrow$ commitment	0.356	0.004	Supported
H3	Satisfaction $\rightarrow$ commitment	0.415	< 0.001	Supported
H5	Trust $\times$ service innovation $\rightarrow$ commitment	-0.009	0.962	Not supported

Table 9: Structural model estimates with R^2 , f^2 , and Q^2

Hypotheses	Direct path estimates (β)	Probability value (p)	Hypothesis result ($p < 0.05$)	Variance explained (R^2)
H1: Customer satisfaction $\rightarrow$ customer trust	0.655	0.000		0.521
H2: Customer commitment $\rightarrow$ customer trust	0.135	0.015		0.172
H3: Customer satisfaction $\rightarrow$ customer commitment	0.415	0.000		

All direct hypothesised relationships were significant and positive. Satisfaction had a strong effect on trust ($\beta = 0.655$, $p < 0.001$) and a significant direct effect on commitment ($\beta = 0.415$, $p < 0.001$), while trust also significantly influenced commitment ($\beta = 0.356$, $p = 0.004$).

4.4. Mediation analysis

To examine the mediating role of trust in the relationship between satisfaction and commitment, a bias-corrected bootstrapping procedure with 5 000 resamples was conducted. The results are illustrated in Figure 3.

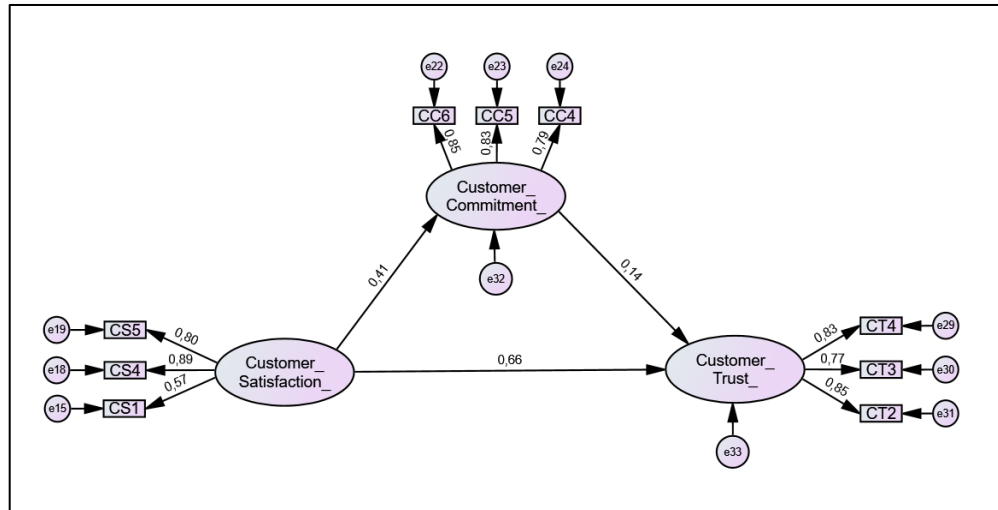


Figure 3: Mediation analysis (source: author)

As shown in Figure 3, satisfaction has a significant positive direct effect on commitment. In addition, satisfaction exerts a significant indirect effect on commitment through trust ($\beta = 0.050$, $p = 0.047$). Because both the direct and indirect effects remain significant, the results indicate partial mediation.

This finding suggests that customer satisfaction enhances commitment in two ways: directly, and indirectly by increasing trust, which in turn strengthens commitment. Trust therefore, operates as a relational mechanism that partially translates evaluative satisfaction into deeper dealership commitment within digitally enabled dealership relationships.

The indirect effect is statistically significant but smaller in magnitude than the direct effect, indicating that while trust plays an important explanatory role, satisfaction remains the primary driver of commitment. This supports H4.

4.5. Moderation analysis

Perceived service innovation was specified as a moderator of the trust-commitment relationship. The latent interaction term (trust $\times$ innovation) was non-significant ($\beta = -0.009$, $p = 0.962$), indicating that perceived innovation did not significantly strengthen or weaken the effect of trust on commitment within the tested model.

Although perceived service innovation correlated positively with satisfaction, trust, and commitment at the bivariate level, its role was not conditional in the structural model. The relational pathway from satisfaction to trust and from trust to commitment appears to operate largely independently of customers' perception of service innovation in this context.

4.6. Diagnostic checks

Additional diagnostic checks confirmed the robustness of the proposed model. Variance inflation factor values for all indicators and predictors are below 2.0, indicating no multicollinearity concerns. The common method bias tests (Harman's single-factor test and comparison of a one-factor CFA model with

the full model) suggest that a single latent factor does not dominate the data and that common method variance is unlikely to bias the results substantively.

5. Discussion, implications, and recommendations

This study examined how satisfaction, trust, and commitment interact within digitally enabled automotive dealership environments and whether perceived service innovation conditions these relationships. The findings indicate that although digitalisation changes how customers evaluate their service journeys, it does not alter the relational logic underpinning commitment. Satisfaction and trust remain central drivers of relationship quality, whereas perceived innovation enhances functional value but does not modify relational mechanisms. Recent research on digital customer journeys similarly suggests that technological integration reshapes service delivery processes without fundamentally replacing the psychological foundations of customer–firm relationships (Verhoef et al., 2021; Becker & Jaakkola, 2023; De Keyser et al., 2023). In high-involvement service environments such as automotive retail, customers continue to rely on satisfaction and trust as key signals of reliability, risk reduction, and relational security when interacting with firms across digital and physical touchpoints (Hollebeek, Sprott & Andreassen, 2022; Becker & Jaakkola, 2023).

5.1. Direct effects and comparison to prior South African research

The strong satisfaction–trust effect aligns with earlier South African research, notably Van Tonder et al. (2017), who reported similar relationships in an offline luxury dealership context. Despite significant contextual differences, including the integration of digital touchpoints, broader brand portfolios, and more diverse customer demographics, the relational pattern remains consistent. This suggests that satisfaction serves as a robust anchor of relational confidence across both traditional and hybrid automotive environments. Recent empirical studies across digitally mediated service industries similarly confirm that satisfaction continues to function as a primary antecedent of trust and long-term relational outcomes even as service encounters become increasingly technology enabled (Hollebeek et al., 2022; Rather, Hollebeek & Rasoolimanesh, 2023).

The findings of this study extend prior work by conceptualising trust as a mediator rather than a parallel antecedent. While Van Tonder et al. (2017) found that satisfaction directly influenced trust and behavioural intention, the current results revealed a dual-path mechanism: satisfaction affects commitment both indirectly through trust (relational pathway) and directly through the perceived coherence of hybrid digital-physical interactions (experiential pathway). This refinement aligns with recent omnichannel research indicating that customers increasingly evaluate service encounters holistically across integrated physical and digital channels, where seamless experiences reinforce relational engagement and commitment (Becker & Jaakkola, 2023; De Keyser et al., 2023).

A further distinction concerns the trust–outcome pathway. Van Tonder et al. (2017) reported no direct effect of trust on behavioural intention in a luxury setting, whereas this study found that trust significantly predicts commitment in mainstream and digitally mediated dealerships. This divergence suggests that when customers rely more heavily on digital tools and experience greater transparency across multiple touchpoints, trust may play an even stronger role in shaping relational intention. Recent relationship marketing research similarly demonstrates that trust remains a critical mechanism through which customers develop loyalty, relational commitment, and long-term engagement with firms operating in digitally integrated service ecosystems (Hollebeek et al., 2022; Rather et al., 2023).

5.2. Mediation: Trust as a dual-pathway mechanism

Trust partially mediates the satisfaction–commitment relationship, indicating that customers rely on both relational reassurance and holistic journey coherence when forming long-term relational intentions. The relatively stronger direct effect of satisfaction implies that hybrid experiences characterised by

transparency, reliability, and reduced friction can foster commitment independently of trust. This finding extends Commitment–Trust Theory by demonstrating that in technology-rich environments, experiential ease complements relational confidence rather than being subordinate to it. Recent research on customer engagement and digitally enabled service ecosystems similarly highlights how satisfaction, trust, and engagement mechanisms interact to drive sustained customer relationships in omnichannel environments (Hollebeek et al., 2022; Rather et al., 2023).

5.3. Moderation: Innovation as a contextual rather than relational mechanism

Perceived service innovation does not moderate the trust–commitment pathway. This null effect contrasts with the literature suggesting that innovation enhances relational outcomes and therefore highlights a meaningful boundary condition. Three explanations are plausible. First, customers may process functional (innovation) and relational (trust) cues through distinct cognitive systems, resulting in parallel rather than interactive effects. Second, trust may already operate near ceiling levels in the high-risk automotive context, leaving limited variance for innovation to amplify relational outcomes. Third, innovation may function as a hygiene factor – expected by customers and appreciated when present, but insufficient to alter deeper relational mechanisms. Recent service innovation research similarly suggests that technological advancements primarily enhance service efficiency, personalisation, and convenience, while relational outcomes such as commitment continue to depend on trust and consistent service quality (Ostrom et al., 2021; De Keyser et al., 2023; Becker & Jaakkola, 2023).

6. Theoretical implications

This study contributes to relationship marketing theory in four key ways. First, the results confirm the durability of CTT within hybrid digital-physical environments. Satisfaction and trust remain strong predictors of commitment, demonstrating that digitalisation complements, rather than replaces, relational mechanisms. Second, the identification of dual satisfaction–commitment pathways refines existing theory by showing that experiential coherence functions as an additional mechanism influencing commitment. This provides conceptual nuance to models that traditionally emphasise interpersonal interaction as the locus of relational development.

Third, the non-significant moderating effect of perceived service innovation establishes an empirical boundary condition for digital transformation research. Innovation enhances functional performance but does not reshape relational dynamics in high-involvement settings. This distinction clarifies theoretical ambiguities by differentiating functional value from relational value, thereby highlighting the need for models that account for the independent – and sometimes non-overlapping – roles of technological and relational evaluations.

Fourth, the findings contribute to emerging work on digital trust by demonstrating that customers incorporate interpersonal and system-based cues when forming trust. However, system trust does not interact with relational trust to strengthen commitment, suggesting a layered but non-interactive trust architecture. This insight emphasises the need for relationship quality models to integrate digital trust without overstating its relational influence. By contrasting the present findings with Van Tonder et al. (2017), this study expanded the applicability of relationship-quality theory in South Africa, demonstrating that relational processes in mainstream and digitally enabled dealerships are structured differently from those in offline luxury environments.

7. Managerial implications

Dealership managers ought to recognise that relationship quality emerges from relational competence and the integrated performance of digital and physical touchpoints. Satisfaction influences commitment through relational and experiential pathways, requiring cross-channel quality assurance systems that ensure accurate information, pricing consistency, and friction-free navigation across

platforms. Trust remains central, despite digitalisation. Thus, dealerships should institutionalise organisation-wide trust-building mechanisms, transparent pricing, predictable processes, effective complaint management, and consistent follow-through. Trust should be understood as a strategic organisational capability, rather than a frontline behaviour. The relational neutrality of innovation indicates that digital investments should be framed as enablers, not substitutes, for relational quality. Advanced tools cannot compensate for inconsistent service or operational unreliability. Therefore, employee training should focus on hybrid journey competence, including the ability to interpret digital traces, personalise interactions, and ensure channel continuity.

Three pitfalls are particularly likely to undermine relationship quality:

- Over-investing in digital features while neglecting relational fundamentals – innovation improves convenience, but cannot substitute reliability, fairness or integrity.
- Assuming digitally fluent customers require less trust building – despite the extensive use of technology, customers across age groups rely heavily on trust when forming commitment.
- Treating digital and physical operations as separate spheres – siloed processes create inconsistencies that erode satisfaction. Hybrid journeys require cross-functional integration.

By addressing these pitfalls proactively, dealerships can translate technological upgrades into sustained relational value.

8. Limitations and future research

Several limitations provide avenues for further research. The cross-sectional design restricts causal inference, thus longitudinal or experimental studies could clarify how satisfaction, trust, and innovation perceptions evolve across repeated encounters. The reliance on self-reported measures introduces potential method bias. Hence, future studies could link perceptual data to behavioural indicators, such as service retention or CRM records.

Perceived innovation was conceptualised as a unidimensional construct, which may mask the differential impact of informational, transactional, communicative, and experiential innovations. Disaggregated measures could yield more nuanced insights. Furthermore, while trust's mediating role was confirmed, the specific psychological mechanisms through which satisfaction generates trust in digital contexts remain unexplored. Qualitative methods may illuminate these micro-level processes. Finally, future models should integrate value-based or identity-based constructs, such as perceived value or brand attachment, to assess whether relational pathways differ across mainstream and luxury segments or across generational cohorts.

9. Conclusion

This study demonstrated that while digitalisation reshapes the nature of customer–dealership interactions, the core relational mechanisms underpinning commitment remain grounded in satisfaction and trust. Satisfaction influences commitment through both relational and experiential pathways, whereas perceived innovation enhances functional value without altering the underlying relational processes. These findings contribute to the literature by showing that the relational mechanisms proposed by Commitment–Trust Theory remain robust even within digitally enabled automotive service environments. Rather than replacing interpersonal relationship drivers, digital technologies appear to extend the range of cues through which customers evaluate reliability, transparency, and service competence.

From a managerial perspective, the results suggest that dealerships should prioritise the seamless integration of digital and interpersonal touchpoints to strengthen relationship quality. Investments in digital platforms and service innovation should therefore be complemented by consistent service delivery, trustworthy practices, and transparent communication across the entire customer journey.

Technological novelty alone is unlikely to generate sustained commitment unless it is embedded within coherent hybrid experiences that reinforce customer confidence and reduce perceived risk.

Future research should expand on these insights through longitudinal research designs that capture evolving customer relationships over time. The integration of behavioural data, such as actual service usage and repurchase patterns, may further enhance understanding of commitment formation in digitally mediated dealership environments. In addition, future studies could examine differentiated forms of service innovation, including AI-enabled interactions, digital advisory tools, and predictive service technologies, to better understand how emerging technologies shape relationship quality in evolving automotive ecosystems.

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Appendix A. Cover letter and questionnaire

Invitation to participate in a PhD study on customer engagement at Automotive dealerships in South Africa

Dear participant

Thank you for taking the time to participate in this study. The study aims to investigate the impact of technology-based service innovation on customer engagement (CE) and purchase intentions among different customer groups seeking to purchase a new vehicle. To this end, the researcher, Mrs Jade Turner, from the Department of Marketing Management of the University of Johannesburg, in the Department of Marketing Management, wishes to collect data regarding your expectations of customer engagement and technology-based service innovation and how these factors affect your decision-making process when purchasing a new vehicle from a dealership. This study extends a warm invitation to individuals in three age groups: those under 30 years, those between 30 and 50 years, and those above 50 years who are considering the purchase of a new vehicle. Your participation is highly valued. Please note the following:

1. Your participation in this study is entirely voluntary. You have the right to privacy, confidentiality, anonymity, equality, justice, human dignity, freedom of choice, and freedom of expression, and you have the right to withdraw from this research study at any time without any punishment or penalty. You will only be included in the study if you have written consent.
2. You can discontinue the questionnaire at any point without adverse consequences.
3. No personal questions or identifying particulars will be asked. Please note that the data collected in this questionnaire is for research purposes only, and no personal identifiers are used in this study (i.e., your name).
4. The questionnaire will be handled confidentially and anonymously and will not be associated with identifiable information. The collected data will be aggregated and not shared with any third parties.
5. The original questionnaires will be stored in a secure location (a password-protected device) for five years, after which the questionnaires will be destroyed.
6. Electronic datasets will be anonymised entirely and stored indefinitely on a password-protected computer.
7. Only the researchers involved in the project will have access to the raw data.
8. The dataset may be utilised in future research, and the same confidentiality will be applied.
9. You must participate in a survey by completing an email-administered questionnaire consisting of seven sections, which will take about 20 minutes to complete.
10. Your responses will be recorded on the questionnaire, and NO personally identifiable information will be recorded (refer to Point 5).
11. No significant risks are linked with this research project.
12. There are no direct benefits to you as the respondent, but your participation will contribute to findings that will add to the academic body of knowledge surrounding relationship marketing (including internal marketing, employee satisfaction and turnover intention). This knowledge may

be disseminated to the academic community by compiling them for journal articles and conference papers published in conference proceedings.

13. If you have any concerns or questions related to the study in general or the items in the questionnaire, please contact the project leader, Jade Turner, at jturner@uj.ac.za or Prof. I. Struweg at istruweg@uj.ac.za or Dr I. Lubbe (Ward) at IsoldeL@uj.ac.za.

Kind regards,

Mrs B. Jade Field
(Project leader)
jturner@uj.ac.za

Prof. I. Struweg
(Supervisor)
istruweg@uj.ac.za

Prof I. Ward (Nee Lubbe)
(Co-supervisor)
IsoldeL@uj.ac.za @uj.ac.za

INFORMED CONSENT

I have been asked to participate in the above study. I have been informed about my involvement in the research, and what is required of me. I understand that:

- **My participation in the research study is voluntary;**
- **My answers will not be used if I do not provide written, informed consent;**
- **I may withdraw from the research at any time with no negative consequences for myself;**
- **My responses will be recorded in the form of a completed questionnaire, which will be confidential. The questionnaire will contain no personal identifying information. The original questionnaire will be securely stored for five years, after which it will be destroyed;**
- **My answers will be kept confidential, and the anonymised data will be safely stored on a password protected computer;**
- **The data and results may be used for journal publications and/or conference presentations;**
- **The raw data (the questionnaires) will be stored in a secure location on the University of Johannesburg campus for a period of five years after which it will be destroyed;**
- **The data may also be used in related studies in future;**
- **Other researchers may have access to the data but my name will not appear on any of the data that is sent to other researchers;**
- **I will not receive any reports on individual results, but I can request feedback on the overall findings of the study;**
- **I can contact the researchers, whose details have been provided above, if I have any uncertainties or concerns that relate to the study and/or the items in the questionnaire;**
- **I have received the contact details of the researchers on the participant information sheet;**
- **All my questions about the research have been answered and I agree that my responses from the questionnaires can be used for the research;**
- **I have read the abovementioned information and agree to participate as per the above conditions. I understand the information provided and consent voluntarily to participate in this study. I hereby, agree to participate in the research as set out above and provide consent to complete this questionnaire.**

I hereby agree to participate in the research as set out above and provide consent to complete this questionnaire:

SECTION A: SCREENING QUESTIONS

Please place an 'X' in the box with the most appropriate answer.

Do you plan to purchase a new vehicle in the next 12 to 18 months from a car dealer?

Yes	
No	

Over the past 12 months, have you been actively looking for a new vehicle? This might include browsing websites or social media, or visiting car dealerships.

Yes	
No	

Have you test-driven any vehicles in the last 12 to 24 months, intending to purchase soon?

Yes	
No	

Are you between the ages of 18 and 65?

Yes	
No	

Please complete the questionnaire if your answer is 'Yes' to both these questions.

If your answer is 'No' to any of the two questions, you do not have to complete the questionnaire.

SECTION B: DEMOGRAPHIC PROFILE

Please answer the following questions by recording your response in the appropriate block.

B1. Please select your age category.	
18 years – 29 years	1
30 years – 49 years	2
50+ years	3

B2. What is your gender?	
Male	1
Female	2
Nonbinary	3
Prefer not to state	4

B3. What is your highest level of education?

Grade 12	1
Higher certificate	2
Diploma	3
Degree	4
Post-graduate qualification	5
Prefer not to state	6

B4. Please indicate your average monthly gross income (before deductions)	
R 0 – R 20 000 per month	1
R 20 001 – R 40 000 per month	2
R 40 001 – R 60 000 per month	3
R 60 001 – R80 000 per month	4
R80 001 – R100 000 per month	5
More than R100 000 per month	6
Prefer not to state	7

SECTION C: CUSTOMER INVOLVEMENT

Please place an 'X' in the box, answering the following statements regarding how much you agree with the statement.

('1' being you 'strongly disagree' and '7' being you 'strongly agree')

When answering the statements below, think of your vehicle purchasing journey.

CUSTOMER INVOLVEMENT		Strongly disagree				Strongly agree		
CI1	Searching for information about the car dealership would interest me.	1	2	3	4	5	6	7
CI2	I tend to review the car dealerships' options for their vehicles.	1	2	3	4	5	6	7
CI3	I notice differences between car dealerships.	1	2	3	4	5	6	7
CI4	Considering a new vehicle is important to me.	1	2	3	4	5	6	7
CI5	Considering a new vehicle is irrelevant to me (reverse score).	1	2	3	4	5	6	7
CI6	Considering a new vehicle is valuable to me.	1	2	3	4	5	6	7
CI7	A new vehicle needs to reflect my personality for me even to consider it	1	2	3	4	5	6	7

SECTION D: PERCEIVED VALUE

Please place an 'X' in the box, answering the following statements regarding how much you agree with the statement.

('1' being you 'strongly disagree' and 7 being you 'strongly agree')

When answering the statements below, think of your vehicle purchasing journey.

PERCEIVED VALUE		Strongly disagree				Strongly agree		
PV1	I would be willing to purchase a vehicle from this car dealership.	1	2	3	4	5	6	7
PV2	I would recommend purchasing a vehicle from this car dealership to friends or relatives.	1	2	3	4	5	6	7
PV3	I would not expect any problems with a vehicle purchased from this car dealership.	1	2	3	4	5	6	7
PV4	Car dealerships have up-to-date technology to provide services for me.	1	2	3	4	5	6	7
PV5	Automotive dealerships provide innovative services during a vehicle purchase journey.	1	2	3	4	5	6	7
PV6	I receive innovative services from car dealerships during a vehicle purchase journey.	1	2	3	4	5	6	7
PV7	The service I get from the car dealership is excellent.	1	2	3	4	5	6	7
PV8	This car dealership gives me a feeling of being in control.	1	2	3	4	5	6	7
PV9	The overall value I get from this car dealership is worth the money and effort.	1	2	3	4	5	6	7

SECTION E: CUSTOMER SATISFACTION

Please place an 'X' in the box, answering the following statements regarding how much you agree with the statement.

('1' being you 'strongly disagree' and '7' being you 'strongly agree')

When answering the statements below, think of your vehicle purchasing journey.

CUSTOMER SATISFACTION		Strongly disagree				Strongly agree		
CS1	I am satisfied with the level of information provided by the car dealership.	1	2	3	4	5	6	7
CS2	I am satisfied with the quality of information the car dealership provides regarding new vehicles.	1	2	3	4	5	6	7
CS3	I feel confident in my decision to engage with this dealership for my automotive needs.	1	2	3	4	5	6	7
CS4	I am dissatisfied with the choice I made regarding my interaction with this dealership (reverse score).	1	2	3	4	5	6	7

CS5	My choice to use a car dealership was a wise one.	1	2	3	4	5	6	7
CS6	I am always happy with the automotive dealership's services.	1	2	3	4	5	6	7
CS7	Overall, I am satisfied with the services provided by car dealerships.	1	2	3	4	5	6	7
CS8	I did the right thing when I decided to use a car dealership.	1	2	3	4	5	6	7
CS9	I feel good about using a car dealership.	1	2	3	4	5	6	7
CS10	I feel that my experience with the dealership has been enjoyable.	1	2	3	4	5	6	7

SECTION F: CUSTOMER TRUST, PERCEIVED RISK

Please place an 'X' in the box, answering the following statements regarding how much you agree with the statement.

('1' being you 'strongly disagree' and '7' being you 'strongly agree')

When answering the statements below, think of your vehicle purchasing journey.

CUSTOMER TRUST		Strongly disagree				Strongly agree		
CT1	I believe my chosen car dealership has high integrity	1	2	3	4	5	6	7
CT2	I trust my chosen car dealership completely.	1	2	3	4	5	6	7
CT3	I believe my chosen car dealership can be counted on to do what is right consistently	1	2	3	4	5	6	7
CT4	I rely on my chosen car dealership.	1	2	3	4	5	6	7
CT5	I trust this car dealership will run its business reliably.	1	2	3	4	5	6	7
CT6	I believe this car dealership will be responsible and reliable in conducting its business with me.	1	2	3	4	5	6	7
CT7	I trust that this car dealership will prioritise customers' benefits as well as its own.	1	2	3	4	5	6	7
CT8	I find the services provided by the car dealership to be trustworthy.	1	2	3	4	5	6	7
CT9	The car dealership consistently keeps its promises and commitments	1	2	3	4	5	6	7
CT10	I trust the car dealership because they prioritise my best interests.	1	2	3	4	5	6	7
PERCEIVED VALUE		Strongly disagree agree				Strongly agree		
PR1	Avoiding monetary losses is important to me when considering purchasing a vehicle.	1	2	3	4	5	6	7

PR2	It is important to me that using a car dealership's service does not inconvenience me.	1	2	3	4	5	6	7
PR3	I am concerned that using a particular car dealership could lead to inconvenience.	1	2	3	4	5	6	7
PR4	Good car dealership service is very important to me.	1	2	3	4	5	6	7
PR5	Using unknown car dealerships may lead to negative outcomes.	1	2	3	4	5	6	7
PR6	I believe that using unknown car dealerships could lead to negative consequences.	1	2	3	4	5	6	7
PR7	I feel that there are uncertainties involved when choosing a car dealership.	1	2	3	4	5	6	7

SECTION G: CUSTOMER COMMITMENT

Please place an X in the box, answering the following statements regarding how much you agree with the statement.

(1 being you strongly disagree and 7 being you strongly agree)

When answering the statements below, think of your vehicle purchasing journey.

CUSTOMER COMMITMENT		Strongly disagree				Strongly agree		
CC1	My commitment to purchasing from this car dealership is strong.	1	2	3	4	5	6	7
CC2	I intend to continue purchasing from this car dealership indefinitely.	1	2	3	4	5	6	7
CC3	Maintaining a relationship with this car dealership deserves my utmost effort.	1	2	3	4	5	6	7
CC4	I feel a connection with the car dealership I choose to transact with.	1	2	3	4	5	6	7
CC5	I feel a sense of belonging to the car dealership I choose to transact with.	1	2	3	4	5	6	7
CC6	For my chosen car dealership, maintaining a relationship with me means a lot.	1	2	3	4	5	6	7
CC7	I trust that my chosen car dealership will never take actions that could harm our relationship.	1	2	3	4	5	6	7
CC8	My chosen car dealership actively works to maintain a long-term relationship with me.	1	2	3	4	5	6	7

SECTION H: CUSTOMER ENGAGEMENT

Please place an 'X' in the box, answering the following statements regarding how much you agree with the statement.

('1' being you 'strongly disagree' and '7' being you 'strongly agree')

When answering the statements below, think of your vehicle purchasing journey.

CUSTOMER ENGAGEMENT		Strongly disagree				Strongly agree		
CE1	I enjoy recommending car dealerships to my friends and family because of the financial referral incentives	1	2	3	4	5	6	7
CE2	I do not actively discuss car dealerships on any social media platforms (reverse score).	1	2	3	4	5	6	7
CE3	I enjoy discussing my experiences with car dealerships	1	2	3	4	5	6	7
CE4	I share the benefits I receive from car dealerships with others.	1	2	3	4	5	6	7
CE5	I provide feedback about my experiences with car dealerships to the dealership	1	2	3	4	5	6	7
CE6	I offer suggestions for enhancing the performance of the car dealership	1	2	3	4	5	6	7
CE7	I provide feedback/suggestions regarding the new vehicles/services the car dealership offers.	1	2	3	4	5	6	7
CE8	I give feedback/suggestions for developing new vehicles/services for car dealerships	1	2	3	4	5	6	7

SECTION I: SERVICE INNOVATION

Please place an 'X' in the box, answering the following statements regarding how much you agree with the statement.

('1' being you 'strongly disagree' and '7' being you 'strongly agree')

When answering the statements below, think of your vehicle purchasing journey.

SERVICE INNOVATION		Strongly disagree				Strongly agree		
SI1	Core Service product innovation	1	2	3	4	5	6	7
	This car dealership frequently introduces innovative services to meet my automotive need							
SI2	I perceive my selected car dealership as being innovative in the services they offer to customers.	1	2	3	4	5	6	7
SI3	Peripheral service product innovation	1	2	3	4	5	6	7
	I perceive my selected car dealership's additional services as enhancing the value of their main automotive offerings.							
SI4	The evolution of my selected car dealership services by adding new features aligns well with my expectations as a customer.	1	2	3	4	5	6	7
SI5	Do you notice that this car dealership frequently updates and improves its automotive services?	1	2	3	4	5	6	7
SI6	Core process innovation	1	2	3	4	5	6	7
	The technology-driven self-service options provided by my selected car dealership enhance my experience with their dealership.							
SI7	I appreciate the convenience of being able to access car dealership services online through their user-friendly interface.	1	2	3	4	5	6	7
SI8	My selected car dealership shares service-related information using new approaches.	1	2	3	4	5	6	7
SI9	Peripheral service-process innovation	1	2	3	4	5	6	7
	My selected car dealership provides new experiences by improving its service demonstration facilities.							
SI10	My selected car dealership continuously brings new features to its self-service technologies.	1	2	3	4	5	6	7
SI11	This selected car dealership improves the procedure for service delivery.	1	2	3	4	5	6	7
SI12	Strategic innovation	1	2	3	4	5	6	7

	This car dealership encourages customer participation in developing its services.							
SI13	This car dealership takes the initiative to provide after-sales services/follow-up services.	1	2	3	4	5	6	7
SI14	Marketing Innovation This car dealership promotes its services differently.	1	2	3	4	5	6	7
SI15	This car dealership reaches me through multiple channels like websites, social media, showroom floors, and mobile apps.	1	2	3	4	5	6	7

SECTION J: PURCHASE INTENTION

Please place an 'X' in the box, answering the following statements regarding how much you agree with the statement.

('1' being you 'strongly disagree' and '7' being you 'strongly agree')

PURCHASE INTENTION		Strongly disagree				Strongly agree		
PI1	I would purchase a new vehicle through my selected car dealership.	1	2	3	4	5	6	7
PI2	My selected car dealership is my first choice for buying a new vehicle.	1	2	3	4	5	6	7
PI3	I would do more business with my selected car dealership in the next few years.	1	2	3	4	5	6	7
PI4	Do you find purchasing a new vehicle from this car dealership difficult because of the high costs? (reverse score).	1	2	3	4	5	6	7
PI5	A new vehicle is expensive for me (reverse score).	1	2	3	4	5	6	7
PI6	I think owning my vehicle is convenient for daily routines.	1	2	3	4	5	6	7

THANK YOU FOR YOUR VALUABLE CONTRIBUTION.

Appendix B: ETHICAL CLEARANCE**CBE RESEARCH ETHICS COMMITTEE**

Dear J Turner

ETHICAL APPROVAL GRANTED FOR RESEARCH PROJECT**Decision: Clearance granted**

This letter serves to confirm that the proposed research project indicated in the table below, has been reviewed by the School of Consumer Intelligence and Information Systems Research Ethics Committee of the University of Johannesburg. Ethical clearance is hereby granted and is valid for three years, from 02 July 2024 until 02 July 2027.

Applicant	TURNER, J
Supervisor/s	Prof I Struwig; Prof I Ward
Student/staff number	200710472
Title	Customer engagement at Automotive dealerships in South Africa
Decision date at meeting	20 June 2024
Reviewers	SCIISREC
Ethical clearance code	2024SCiis023
Rating of application	CODE 02

CODE 01 - Approved
suggestions/

CODE 02 - Approved with

requirements with

no re-submission CODE 03

- Referred back

CODE 04

- Disapproved, cannot re-submit

FIELD, J., STRUWEG, I. & WARD, I. / *Digital Transformation and Relationship Quality in Automotive Retail: Testing commitment-trust theory in hybrid service environments*

The researcher/s may now commence with the study providing that:

1. The researcher/s will ensure that the project adheres to ethical research requirements.
2. The researcher/s will be conducting the study as set out in the approval application,
i.e. Form_7a and Form_7b linked to research proposal and supporting documents, secondary data analysis, and primary data collection.
3. The researcher/s will ensure that the project adheres to all applicable legislation, scopes of practice, professional codes of conduct, and scientific standards as it pertains to the field or study.
4. The researcher/s will bring under the attention of the research ethics committee any proposed changes, concerns that arise, and/or unexpected ethical management issues.
5. Any changes that can affect the study-related risks for participants or researchers must be reported immediately to the committee in writing.
6. No data collection or fieldwork activities may continue after the ethical clearance has expired. A request for an extension of ethical clearance can be made in writing to the committee.
7. All data collection must be done within Government regulations.
8. The researcher/s must be aware that infectious diseases may influence researcher/s, research participants, and responses. Steps must be taken to the best of researcher/s' ability to avoid the spread

FIELD, J., STRUWEG, I. & WARD, I. / *Digital Transformation and Relationship Quality in Automotive Retail: Testing commitment-trust theory in hybrid service environments*

of COVID19.

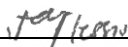
CODE 2 REQUIREMENTS

The researcher/s must address the following comment/s from the committee:

1. Researcher elaborates further on Section 2 (g), concerning the funding of the research by UJ. Send an email to SCiISREC chair with more information regarding UJ funding to be added to the REC database.
2. Remove reverse score annotation in questionnaire. It is not incorrect to use reverse score, but the annotation must be removed prior to data collection to avoid confusing research participants.
3. The ListSA quote, with a list of conditions, is aimed at protecting ListSA. Researcher must send an email to the SCiISREC chair confirming that ListSA has obtained permission from South African citizens to sell their personal information to researchers.
4. Please note CBEREC_Form A, Section 6.15.

The School of Consumer Intelligence and Information Systems Research Ethics Committee wish the researcher/s all the best with this research project.

Regards,



Prof T du Plessis
SCiISREC Chair

tduplessis@uj.ac.za

What High-Performing Hotel Websites Do Differently: A Case Study of Direct Booking Success

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Abstract

The market dominance of Online Travel Agencies (OTAs) in recent years has significantly reduced hotels' share of direct bookings, increasing distribution costs and limiting direct customer relationships. Although prior research has established a link between website quality and booking behavior, existing studies are largely quantitative and offer limited insight into how website characteristics function strategically in supporting direct bookings. This study addresses this gap through a multiple case study of hotels with high shares of direct reservations, selected from a national sample of 201 Croatian hotels. A systematic website content analysis was conducted, examining e-commerce functionality, content structure, and interactivity. The findings demonstrate that content quality outweighs content quantity in fostering direct bookings. High-performing hotel websites rely on narrative-driven, experiential communication, positioning storytelling as a strategic website dimension rather than a promotional feature. Moreover, the study reframes website quality as a strategic capability that integrates digital experience with distribution performance. By linking experiential communication to tangible distribution outcomes, the paper contributes to a more integrated understanding of digital strategy in hospitality management.

Keywords: digital strategy digital storytelling, digitalization in hospitality, hotel booking strategy

JEL Classification: O31, O33

1. Introduction

The hotel industry is widely recognized as one of the most competitive sectors of the global tourism economy (Khan et al., 2020). Over the past two decades, rapid advances in digital technologies and online distribution platforms have fundamentally transformed the way hotels reach and interact with customers. While hotels were once primarily competing with one another for market share, the rise of OTAs has

significantly reshaped competitive dynamics within the sector (Lv et al., 2020). OTAs have emerged as dominant intermediaries in hotel distribution, capturing a substantial share of online bookings and playing a central role in travellers' accommodation search and reservation processes. Industry reports indicate that OTAs account for a significant proportion of online hotel reservations, in some markets exceeding 40–50% of total online bookings, highlighting their growing influence within digital tourism distribution systems (Dadić et al., 2022).

Previous research has shown that OTAs play a critical role in shaping hotel distribution systems by increasing market visibility, facilitating price comparison, and reducing search costs for travellers, which has further strengthened their position within digital tourism markets (Martin-Fuentes et al., 2018; Shah et al., 2025). While OTAs provide visibility and access to global markets, their growing influence has also created several challenges for hotels. High commission fees reduce profit margins, while reliance on intermediaries limits hotels' control over customer relationships, guest loyalty, personalization opportunities, and direct communication with guests (Ćurlin et al., 2022). As a result, many hotels have increasingly focused on strengthening their direct booking channels. Strategies such as loyalty programs, price incentives for direct reservations, and investments in hotel websites and direct distribution technologies have become common approaches to reducing dependence on intermediaries. Previous studies also emphasize that strengthening direct channels enables hotels to retain greater control over pricing strategies, customer data, and brand communication, while simultaneously improving profitability (Ampountolas et al., 2019; Vieira et al., 2023).

In this context, hotel websites play a crucial role as both information platforms and direct sales channels. Previous research has highlighted the importance of website characteristics, functionality, and design in shaping consumer behaviour and online booking intentions. Studies have particularly emphasized the role of information quality, ease of navigation, reservation system functionality, visual design, and interactive features in influencing user satisfaction and purchase intentions (Tomić et al., 2025). In addition, trust, usability, and website aesthetics have been identified as important determinants of online booking decisions in the hospitality sector (Amin et al., 2021). However, relatively little attention has been devoted to identifying specific patterns in website content, aesthetics, and functionalities associated with a higher share of direct bookings. In particular, existing research has rarely examined how organizational factors such as innovation-oriented culture and interfunctional collaboration within hotels may influence the development of website characteristics that support direct booking strategies.

The aim of this study is therefore to identify common patterns in the content, aesthetics, and functionalities of hotel websites associated with a high share of direct reservations, and to examine how these website characteristics relate to organizational

innovation culture. This study employs a multiple best-practice case study design based on a systematic content analysis of hotel websites with exceptionally high shares of direct bookings. A case study approach combined with cross-case analysis was used to achieve the research objectives. The empirical analysis was conducted on a sample of 201 Croatian hotels. Previous research has suggested a potential relationship between organizational culture and hotel website content (Ćurlin, 2022). However, to the best of the author's knowledge, no previous study has specifically identified website content characteristics associated with higher shares of direct bookings.

The paper is organized as follows. Following the introduction, the theoretical background section reviews the relevant literature on hotel distribution channels and hotel website characteristics. The methodology section describes the research design and data collection procedures. The results section presents the findings of the analysis, followed by a discussion of the main implications. Finally, the conclusion summarizes the key contributions of the study, outlines its limitations, and proposes directions for future research.

2. Literature review

2.1. Distribution channels in hotel industry

The rapid development of information and communication technologies has led to significant structural changes in hotel distribution systems, often described in the literature through the concepts of disintermediation and reintermediation (O'Connor, 2023). Disintermediation refers to the process whereby service providers attempt to bypass traditional intermediaries and interact directly with customers through their own digital platforms, such as official hotel websites (O'Connor, 2023). At the same time, the emergence of new online intermediaries, particularly OTAs, has simultaneously resulted in reintermediation, where new digital actors assume an important role in connecting supply and demand in tourism markets (Yadav, 2025). Consequently, electronic OTAs have become key actors in tourism and hotel distribution (Ćurlin, 2022)

Early collaborations between hotels and OTAs were largely driven by the goal of increasing occupancy rates and maximizing revenue (Shah, 2025). As a result, a substantial body of research has examined revenue management and distribution strategies related to OTA partnerships. Earlier studies have explored issues such as room allocation strategies, early booking discounts, cancellation policies, and overbooking practices within OTA-mediated distribution systems (Cetin et al., 2016). Further research has focused on optimizing hotel cooperation with OTAs by managing room availability and pricing strategies as well as examining how a hotel's ranking on OTA search results pages influences booking probabilities (Sumawidari et al., 2025).

As the role of intermediaries has grown, hotels have become increasingly dependent on them for room sales, which can reduce profit margins due to commission fees and may lead to a loss of control over pricing strategies, customer relationships, and brand positioning (Ćurlin et al., 2022). Hotels begin to seek methods to strengthen their direct distribution channels. From an organisational perspective, the successful development of direct booking strategies often depends on internal capabilities such as innovation-oriented culture and strong interfunctional coordination (Singh et al., 2019). These organisational characteristics facilitate collaboration between marketing, IT, and revenue management functions, enabling hotels to develop more effective digital platforms and direct reservation mechanisms.

Major hotel chains such as Hilton, Marriott, and Hyatt began investing heavily in direct booking campaigns and loyalty programs as early as 2016, while other brands, including InterContinental Hotels and Choice Hotels, have introduced similar initiatives to strengthen direct distribution channels.

More recent industry developments have further reinforced the strategic importance of direct distribution. The COVID-19 pandemic accelerated digital transformation in the hospitality sector and highlighted the role of online communication, mobile technologies, and website analytics in hotel marketing and customer engagement (Şanlıöz-Özgen et al., 2024).

Consequently, hotels increasingly started investing in the development of their official websites and digital platforms in order to strengthen direct relationships with guests, improve booking conversion rates, and enhance overall profitability (Bilgihan et al., 2024). Organisational capabilities such as innovation-oriented culture and interfunctional collaboration can play an important role, as they support the development of more advanced digital interfaces, content strategies, and online reservation functionalities. Therefore, hotel websites have become one of the most important strategic tools for managing direct distribution channels, making their design, functionality, and content quality a critical factor in influencing customer booking behaviour.

2.2. Hotel websites

At first, hotel websites primarily functioned as online brochures providing basic information about accommodation services. Over time, they have evolved beyond simple information channels into platforms that enable customer data collection, interaction, and real-time transactions (Srivastava et al., 2025). As a result, the quality of hotel websites has become an important factor influencing consumer behaviour and purchasing decisions. In online environments, purchase intentions are strongly shaped by user satisfaction and trust in websites, making website quality a critical component of online service delivery (Harris et al., 2010).

Tourism and hospitality research has extensively examined the factors used to evaluate hotel website performance. Earlier studies have applied different terms when analyzing hotel website performance. Some authors focused on web effectiveness

(Schmid et al., 2008), while others examined web usability or web performance (Yeung et al., 2004). Similarly, concepts such as website quality and website design have been frequently used to analyze website characteristics (Semerádová et al., 2020).

Several studies have attempted to structure these concepts more precisely. The most important definition when conceptualizing hotel website performance is one developed by Yeung and Law (2004) who defined website quality through two key dimensions: usability, referring to the efficiency of the system in promoting products and services, and functionality, referring to the quality and completeness of information provided to users. Later research further refined these classifications. Law (2019) placed design, user interface, and aesthetics within the broader concept of usability, while Sriphaew et al. (2017) described website usability as a combination of user experience, functionality, and interface design. More recently, Koronios et al. (2021) introduced the concept of website persuasiveness, which includes dimensions such as informativeness, usability, credibility, inspiration, interactivity, and relationship-building elements.

Other authors have proposed broader models of hotel website service quality. For example, Sun et al. (2017) developed a framework that incorporates elements such as interactivity, online reviews, and online payment functionalities. Despite differences in terminology, most studies ultimately distinguish between two main groups of website attributes: technical-functional elements, such as reservation systems and transaction tools, and design-content features related to informational and communicative aspects of websites (Szende, 2020). In addition to technical and design characteristics, some studies have also explored the psychological mechanisms through which website quality influences consumer behaviour (Ongsakul et al., 2021). For instance, Ali et al. (2016) examined the role of perceived flow as a mediator between website quality, customer satisfaction, and purchase intentions. In the context of hotel websites, engaging and immersive digital environments may therefore increase customer satisfaction and encourage repeat visits and bookings (Ongsakul et al., 2021).

In an increasingly competitive digital marketplace, hotels are therefore encouraged to invest in the development and marketing of their direct online channels (Dimitrios et al., 2023). Although Web 2.0 technologies have enabled more active information search behaviors among travellers, users often face information overload and invest significant effort in identifying reliable accommodation information online (Chan et al., 2021). Empirical studies also highlight the growing importance of hotel websites as drivers of direct reservations. For example, Ettis et al. (2024) demonstrated that website functionality significantly influences booking intentions, particularly among users with higher levels of internet experience.

Taken together, previous research suggests that website content, functionality, and design play an important role in shaping consumer perceptions and booking behaviour. However, relatively little attention has been devoted to identifying specific patterns of website characteristics associated with higher shares of direct bookings. Addressing this gap requires a more detailed examination of the content,

functionalities, and interactive features of hotel websites, which forms the focus of the methodological approach presented in the following section.

3. Methodology and Case selection

In order to achieve the objectives of this study, a multiple-case exploratory best-practice research design was employed, based on a systematic content analysis of hotel websites. The selected hotels were identified from a broader sample of 201 Croatian hotels previously analysed as part of a doctoral dissertation. Within this dataset, hotels with a high share of direct bookings through their official websites were identified and used as potential cases for further analysis.

From the analysed sample, three hotels were selected for an in-depth case study in order to explore whether common patterns exist in the website characteristics of hotels that achieve above-average performance in direct bookings. The selected cases differ in terms of hotel category, ownership structure, and location, while all demonstrate strong performance in direct booking share and organizational capabilities.

The website analysis focused on three main dimensions. First, e-commerce functionalities were examined based on the previously applied e-MICA framework. The Extended Model of Internet Commerce Adoption (e-MICA) is a widely used framework for evaluating the level of e-commerce adoption and functionality on websites, typically distinguishing between informational, interactive, and transactional stages of online presence (Nelson, 2000). Second, the content structure and thematic richness of each website were analysed by measuring the number of themes presented and the total number of words contained on the website pages. Finally, the third dimension included interactive features and the presence of social media integration, which were examined as indicators of customer engagement and communication potential.

A cross-case comparison approach was then applied in order to identify recurring patterns and highlight specific functionalities and content characteristics shared by hotel websites with a high proportion of direct bookings. Table 1 presents the key characteristics of the analysed hotels, including their categorization, ownership structure, location, and organisational score.

Table 1. Hotel case selection (source: Author's work)

Hotel	Category	Ownership	Location	Organizational score
Hilton Imperial	5*	Domestic	Seaside	5.0
Lemongarden Sutivan	5*	Foreign	Seaside	4.9
Hotel Osijek	4*	Domestic	Land	4.9

4. Results and Discussion

As previously states, three Croatian hotels cases were selected based on their strong performance across several dimensions, including organizational aspects, website quality characteristics, and a high share of direct bookings.

The selection process was informed by the results of the Structural Equation Modeling (SEM) analysis, as well as by findings obtained from the survey instrument and the multi-method evaluation of hotel website quality described earlier in the study. Based on the overall research results, three hotels demonstrating above-average performance in both organizational and digital dimensions were identified as representative best-practice examples within the Croatian hotel sector.

The selected cases are Hilton Imperial Dubrovnik, Lemongarden Sutivan (island of Brač), and Hotel Osijek. These hotels exhibit a strong innovation-oriented organizational culture, which is reflected in the quality of their websites, particularly in terms of content richness, digital engagement, and social media activity and as well as in their relatively high share of direct bookings.

The following section presents brief descriptions of the selected hotels and provides a case analysis of their organizational characteristics and website features. The aim is to deepen the understanding of factors associated with successful digital distribution strategies in Croatian hotels and to provide benchmarking insights for organizations seeking to increase their share of direct reservations.

4.1. Case descriptions

The present study focuses on hotels that strategically prioritize increasing the share of direct bookings as part of a deliberate distribution management strategy. For these hotels, direct reservations represent an important mechanism for maintaining greater control over booking channels, reducing intermediary commission costs, establishing more direct and personalized relationships with guests, and strengthening brand visibility and market positioning. Best practice cases were identified within the research sample based on a combination of a high share of direct bookings and strong organizational performance indicators.

Three hotels were selected for the case study analysis, each representing a different segment of the Croatian hotel market. Hilton Imperial Dubrovnik represents a high-category international chain hotel located in a coastal destination. Lemongarden in Sutivan on the island of Brač represents a small, foreign-owned boutique hotel operating within a specialized niche market, while Hotel Osijek represents a domestically owned continental hotel.

The selected cases also differ in terms of guest structure and travel motivations. Hilton Imperial Dubrovnik serves both leisure and business travelers, Lemongarden operates as an adults-only leisure hotel, while Hotel Osijek primarily attracts business travelers alongside leisure guests. The hotels vary in size, ownership structure, market positioning, and strategic orientation. However, despite these structural differences,

all three hotels share a strategic emphasis on strengthening direct booking channels as part of their overall distribution strategy.

4.2. Hilton Imperial Dubrovnik

Hilton Imperial Dubrovnik is a five-star hotel and part of an international hotel group, with approximately 150 rooms. According to the research results, the hotel demonstrates highly developed organisational aspects, particularly interfunctional orientation and innovation culture, with strong internal coordination and employee-driven idea generation.

From a website perspective, the hotel does not exhibit a high number of technical features within the e-MICA framework (18 out of 42 elements on the website), nor an above-average number of thematic categories. However, its website contains 5,466 words, significantly above the sample average which is 3,350 words total. The content is structured, detailed, and experience-oriented, with extensive room descriptions and destination recommendations. The booking option is prominently displayed across all pages, reinforcing direct conversion.

The hotel maintains active Facebook and Instagram profiles, with consistent content publication and integration of booking links. Direct bookings account for approximately 60–70% of total reservations, positioning the hotel as a benchmark case. The findings support the argument that content depth and organisational alignment, rather than feature quantity, contribute to higher direct booking shares.

4.3. Lemongarden Sutivan

Lemongarden Sutivan is a small five-star adults-only hotel located on the island of Brač. Despite its size, the hotel demonstrates a highly developed innovation culture and strong market orientation, particularly in strategic planning and competitive positioning.

Its website is characterised by rich, narrative-driven content and aesthetic coherence. Although the site includes a relatively high number of e-MICA features (33 out of 42 elements on the website), the most distinctive element is content richness, with over 12,000 words, placing it among the highest in the sample. Descriptions are experiential, detailed, and strongly aligned with the hotel's brand identity. Direct booking advantages are clearly communicated.

The hotel is highly active on social media, maintaining regular engagement across Facebook and Instagram. Direct bookings represent approximately 45% of total reservations, a strong result for a small independent property. The case illustrates how storytelling and experiential communication reinforce positioning and support direct booking strategies.

4.4 Hotel Osijek

Hotel Osijek is a four-star independent hotel located in continental Croatia. The hotel demonstrates above-average organisational performance across interfunctional coordination, market orientation, and innovation culture.

Its website is simple, clean, and conversion-focused. The number of technical features (21 e-MICA elements) is below the sample average, and thematic diversity is not excessive. However, the website contains 9,750 words—substantially above the sample average—indicating strong content depth. Descriptions of accommodation, gastronomy, and destination attributes are detailed and experience-oriented.

The hotel maintains active Facebook and Instagram profiles, with daily updates and strong emphasis on gastronomic storytelling. Direct bookings exceed 50% of total reservations, despite the hotel's independent ownership and non-coastal location. This case acknowledges that organisational alignment, content richness, and active digital engagement contribute more to direct booking performance than technical complexity or website feature density.

4.5. Cross-case Analysis

Although the cases differ substantially in size, ownership structure, market positioning, and target segments, they share a strategic orientation towards direct reservations. Hilton Imperial represents a high-category international chain property, Lemongarden a small niche luxury hotel, and Hotel Osijek an independent continental hotel. Despite these contextual differences, all three demonstrate highly developed organisational aspects, particularly strong innovation culture and interfunctional coordination.

A cross-case comparison of website characteristics reveals a consistent pattern. None of the hotels rely on excessive thematic diversity or high technical feature density. Instead, all three exhibit above-average content volume, with detailed and experience-oriented descriptions that exceed the sample mean. This supports the empirical finding that content richness, rather than content fragmentation, is positively associated with direct booking share. Furthermore, all cases maintain active social media presence and integrate booking links within their digital ecosystem. These platforms often include direct booking links, which further support the process of direct reservations. Social media activity appears to increase the visibility and reach of hotels among potential guests, regardless of whether the hotel is a globally recognized chain such as Hilton or a locally owned hotel such as Hotel Osijek. However, according to the findings of this study, the number of social media followers itself does not appear to be a decisive factor, as the three analyzed hotels demonstrate significant differences in their follower base. Overall, the results suggest that while hotels may develop different sales strategies depending on their business objectives and contextual circumstances, those with well-developed organizational capabilities, websites characterized by richer descriptive content and fewer excessive features, and

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active social media engagement tend to achieve a higher share of direct bookings, regardless of other hotel-specific factors.

Table 2 presents a results of a cross-case analysis where the e-MICA dimension, number of themes, words and social media activity on the selected were shown. There is no significant deviation from the sample average in number of e-MICA functionalities, and number of themes. In fact, all the selected hotels have either around average or either slightly less topics on their websites. However, all three hotels have significantly higher number of words on their websites, which indicate the significance of good storytelling and descriptions within the website in order to achieve higher number of direct reservations. Lastly, all hotels showed high social media activity, investing in their social channels, even connecting their social media channels with direct booking systems.

Table 2. Case hotel results (source: Author's work)

Variable	Hilton Dubrovnik	Lemongarden Sutivan	Hotel Osijek	Sample Average
E-MICA	18	33	21	25
Themes	19	24	25	21
Words	5.466	12.000+	9.750	3.350
Social Media Activity	High	High	High	-

Analysis of the three selected hotels reveals that all of them demonstrate highly developed internal and external organizational aspects, as well as an established innovation-oriented culture that enables the implementation of innovative strategies and business practices. An examination of their websites further reveals that, although the sites do not include an excessive number of different features or functional elements, they contain substantially more textual content than the average website in the research sample. This finding is consistent with the results of the broader empirical analysis. In particular, detailed and descriptive narratives about the hotel, its characteristics, and its surrounding environment appear to positively influence potential guests. Furthermore, the websites of all three hotels display a strong emphasis on visual aesthetics, including a consistent use of colors, themes, and content structure, as well as carefully selected images and videos. These elements appear to contribute to the overall user experience and may represent important factors to consider in future research on hotel website design. The analyzed websites also attempt to communicate the experience of staying at the hotel while simultaneously presenting the hotel's mission and brand philosophy to potential guests. In addition, clearly visible booking categories and reservation options are prominently displayed on all three websites.

Table 3 shows the selected hotel patterns thru different dimensions. All selected hotels have highly rated organizational aspects (innovation and coordination) such as innovative culture and interfunctional orientation. By closely examining hotel

websites, it can be concluded that all selected hotels have narrative driven rich content with the curated descriptions. Furthermore, all selected websites do not have excessive technical complexity, they are all clear, easy to read, with simple color schemes and text fonts. They do not have too many topics or functionalities. As for the social media, they all have integrated and active social media.

Table 3. Case hotel patterns (source: Author's work)

Dimensions	Observed patterns
Organizational culture	High
Content strategy	Narrative driven
Technical complexity	Moderate
Social media	Active
Distribution outcome	High direct booking ratio

Based on the results of the cross-case comparison and as an additional contribution of this paper, a conceptual model is proposed. The model implies the relationship between organisational culture within the hotel in terms of adopting innovative culture interfunctional coordination and digital content strategy as in content richness, digital coherence and hotel website quality with direct booking performance. The model is proposed in the Figure 1.

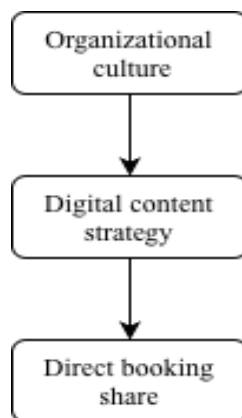


Figure 1. Proposed model (source: Author's work)

The cross-case analysis revealed several recurring characteristics in the website content of the analyzed hotels. Their websites are visually clean, easy to navigate, and avoid excessive functionalities or overly complex structures. They employ calm and consistent color schemes while maintaining a strong focus on aesthetic coherence. Furthermore, all analyzed hotels feature significantly richer textual content than the industry average. The descriptions are carefully curated and strongly oriented toward

storytelling and experiential narratives, which emerges as one of the key distinguishing elements of successful website communication. In addition, all hotels demonstrate a very active presence on social media platforms. Based on the insights obtained from the analysis, this study proposes a conceptual model linking organizational characteristics, digital content strategy, and direct booking share.

5. Conclusion

The hotel industry operates in a highly competitive and technologically dynamic environment, where the rapid expansion of online travel agencies (OTAs) has intensified distribution challenges and increased hotels' dependence on intermediary platforms. Hotels have to pay large commissions to OTA's, also they influence the personalized approach and communication between hotels and hotel guests and decrease hotel distinctiveness on the market. As a result, many hotels are seeking ways to strengthen direct booking channels and reduce reliance on third-party intermediaries.

The aim of this study was to identify potential patterns in the website content of Croatian hotels with a high share of direct bookings through a comparative case study analysis. Three hotels were selected for the analysis. Although they differ in terms of type, location, rating, and strategic positioning, they share several organizational characteristics, including a strong performance-oriented culture, a high level of interfunctional connectivity, and innovation-oriented management practices.

The findings contribute to the existing literature on hotel distribution strategies and digital marketing by emphasizing the role of website content characteristics in supporting direct booking performance. While previous research has predominantly focused on the technical quality and functional features of hotel websites, the present study indicates that content richness, narrative communication, and experiential storytelling may play an equally important role in influencing guest decision-making. At the same time, the results highlight the importance of organizational readiness and innovation-oriented culture as contextual factors that enable hotels to successfully implement digital distribution strategies. In this sense, the study extends the discussion on hotel website effectiveness by linking website characteristics with broader organizational capabilities and strategic distribution management. From a managerial perspective, the findings suggest that hotels aiming to increase the share of direct bookings should not focus exclusively on introducing additional technological functionalities. Instead, greater emphasis should be placed on the development of rich, descriptive, and experience-oriented content that communicates the atmosphere, identity, and uniqueness of the hotel. Clear booking options, visual consistency, and the integration of social media channels can further support guest engagement and facilitate the direct reservation process. In particular, the study highlights storytelling as a strategically relevant yet often underestimated element of hotel website communication.

Despite the insights provided, this study has several limitations that should be acknowledged. First, the research is based on a limited number of case studies, which restricts the generalizability of the findings. Future research could test the proposed model on larger samples and statistically examine the relationships between website content characteristics and direct booking performance. Second, the analysis focuses primarily on observable website characteristics and organizational aspects, while guest perceptions and behavioral.

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Algorithms, Impulses, and Unhealthy Bites: Examining TikTok's Food Content and Consumer Decision-Making

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Abstract

The rapid rise of TikTok has transformed food discovery into an algorithmically curated and visually immersive experience, raising concerns about the normalisation of unhealthy eating behaviours among digitally active consumers. Although prior research acknowledges the influence of social media on food choices, limited empirical attention has been given to the cognitive mechanisms through which short-form, algorithm-driven food content shapes decision-making, particularly within emerging market contexts. This study investigates the influence of exposure to unhealthy TikTok food content on cognitive impulsivity and unhealthy food choices, as well as the reciprocal relationship between impulsive cognition and consumption behaviour. Using a quantitative cross-sectional design, data were collected through a structured self-administered questionnaire completed by 250 South African TikTok users and analysed using correlation and multiple regression techniques in SPSS. The findings indicate that exposure to unhealthy food content significantly predicts cognitive impulsivity, and cognitive impulsivity strongly predicts unhealthy food choices. Exposure does not directly predict consumption behaviour when impulsivity is included in the model, highlighting the central role of impulsive cognitive activation in shaping behavioural outcomes. Evidence also supports a reciprocal relationship, whereby unhealthy food choices are positively associated with heightened cognitive impulsivity. Gender was not found to significantly influence these relationships. By foregrounding the dynamic interaction between cognition and behaviour, this study extends dual process and social cognitive perspectives into the context of short-form video platforms. Practically, the findings underscore the role of algorithmic repetition and visual salience in reinforcing cognitive-behavioural consumption patterns and highlight the need for greater accountability in digital food content curation. The study contributes to broader debates on platform governance, digital consumption, and consumer well-being in emerging economies.

Keywords: Unhealthy food content; cognitive impulsivity; consumer decision-making; social media algorithms; emerging markets

1. Introduction

Short-form video platforms have become influential actors in shaping contemporary food consumption environments, not merely through content dissemination but through the operation of opaque, engagement-driven algorithmic systems (Xiong, Chen, Yao, 2024). Among these platforms, TikTok occupies a particularly powerful position due to its highly personalised “For You” feed, which continuously curates content based on inferred user preferences, viewing behaviours, and interaction signals. Within this environment, food-related content, often featuring indulgent, visually exaggerated, and nutritionally poor foods, circulates extensively, raising concerns about how algorithmic exposure may shape consumer cognition and behaviour in subtle yet persistent ways (Baccarella, Wagner, Kietzmann & McCarthy, 2018).

Unlike earlier forms of digital food marketing that relied on active search, follower networks, or identifiable advertising formats, TikTok's algorithm operates through passive and repeated exposure. Users are not required to seek out food-related content; instead, algorithmic systems anticipate and reinforce engagement by delivering increasingly salient stimuli. This shift marks an important departure from traditional persuasive communication models, as exposure becomes continuous, rapid, and largely decoupled from conscious choice (Li, Qian, & Guo, 2023). As such, TikTok functions less as a neutral content platform and more as a behaviour-shaping environment, in which commercial and user-generated food content is algorithmically amplified according to its capacity to capture attention (Qutteina, Hallez, Raedschelders, De Backer, & Smits, 2021).

Existing research on social media food exposure has predominantly examined outcomes such as brand attitudes, consumption intentions, and self-reported eating behaviours (Molenaar, Saw, Brennan, Reid, Lim, & McCaffrey, 2021; Van Der Bend, Jakstas, Van Kleef, Shrewsbury, & Bucher, 2022; Wu, Kemps, & Prichard, 2023). While these studies offer valuable descriptive insights, they often underplay the role of platform architecture in shaping how consumers process information (Filippone, Shankland, & Hallez, 2022). By focusing on outcomes rather than mechanisms, much of the literature implicitly assumes that users engage with food content through reflective, deliberative evaluation (Filippone et al., 2022). This assumption is increasingly untenable in algorithmically curated environments characterised by rapid content sequencing, sensory intensity, and social reinforcement cues, all of which are designed to minimise cognitive friction (Hawkins, Farrow, & Thomas, 2021).

Cognitive impulsivity provides a critical theoretical lens for understanding how algorithmic systems may influence consumer decision-making within such environments (Cui, Liu, & Gu, 2022). Rather than viewing impulsivity as an individual trait, cognitive impulsivity can be conceptualised as a contextually activated cognitive state shaped by structural features of digital platforms (Fadilah, Masarroh, & Wildan, 2025). TikTok's design, combining autoplay functionality, infinite scrolling, audiovisual immediacy, and real-time social validation, creates conditions that privilege speed, affect, and immediacy over deliberation (Qin, Omar, & Musetti, 2022). In this sense, impulsive cognitive processing is not an unintended by-product of platform use, but a predictable outcome of algorithmic optimisation strategies that prioritise engagement (Conte, Iorio, Esposito, Romano, Panvino, Maggi, Altomonte, Casini, Ferrara, & Terrinoni, 2024).

Despite increasing concern about the societal and health implications of algorithmically mediated food environments, empirical research examining the cognitive processes through which such exposure operates remains limited. There is a lack of studies that position cognitive impulsivity as a mediating mechanism linking algorithmic food exposure to behavioural responses. This gap is especially pronounced in relation to TikTok, where the scale, intensity, and personalisation of exposure differentiate it from earlier social media platforms.

Against this backdrop, the present study investigates the influence of unhealthy TikTok food exposure on cognitive impulsivity and subsequent behavioural responses. By foregrounding the role of algorithmic systems in shaping cognitive processing, this research moves beyond descriptive accounts of social media influence and offers a more critical, platform-aware understanding of consumer behaviour. The study contributes to emerging debates on digital platform governance and consumer wellbeing by demonstrating how algorithmic exposure may intensify impulsive cognitive states, thereby reshaping food-related decision-making in contemporary digital environments.

1.1. Primary Objective

The primary objective of this study is to examine how exposure to unhealthy food content on TikTok influences consumer decision-making by activating cognitive impulsivity within an algorithmically curated digital environment.

1.2. Secondary Research Objectives

- To determine the extent to which exposure to unhealthy food-related content on TikTok predicts cognitive impulsivity among users.
- To assess the relationship between cognitive impulsivity and unhealthy food choices in a short-form video context.

- To examine whether cognitive impulsivity mediates the relationship between TikTok food exposure and unhealthy food choices.
- To evaluate whether gender moderates the relationships between TikTok exposure, cognitive impulsivity, and unhealthy food choices.
- To empirically test whether exposure directly influences unhealthy food choices, or whether its effect operates primarily through cognitive mechanisms.

2. Conceptual and theoretical positioning

2.1. Dual process theory and impulsive cognition in algorithmic environments

This study is theoretically grounded in dual process theory, which explains human judgment and decision-making as the outcome of two interacting cognitive systems. The theory emerged to account for variation in how individuals process information, distinguishing between rapid, intuitive responses and slower, deliberative reasoning. System 1 is characterised by fast, automatic, and affect-driven processing that relies on heuristics and associative thinking, while System 2 involves slower, effortful, and reflective processing associated with analytical evaluation and self-regulation (Zhang, Huang, Wang and Lowry 2024; Gronchi, Gavazzi, Viggiano and Giovannelli 2024). Dual process theory is particularly relevant in contemporary digital contexts, as algorithmically curated environments privilege immediacy and emotional salience, thereby increasing reliance on System 1 processing and constraining opportunities for reflective System 2 engagement.

Short-form video platforms such as TikTok represent environments in which System 1 processing is consistently prioritised. Algorithmic design features, including personalised content feeds, autoplay functionality, infinite scrolling, and visually and emotionally salient stimuli, significantly reduce opportunities for reflective evaluation. These features compress decision-making time and encourage intuitive responses, thereby weakening the engagement of System 2 processing (Lawrie, Flus Olechowski, Hay & Wodehouse, 2023; Mahammed & Louis, 2024). As a result, consumer behaviour in such environments is more likely to be driven by automatic cognitive responses rather than deliberate reasoning.

Within this framework, cognitive impulsivity is conceptualised not as a stable personality trait but as a contextually activated cognitive mechanism. Exposure to highly salient food cues, particularly those depicting indulgent and energy-dense foods, can trigger rapid affective responses that bypass reflective control processes. This effect is intensified under conditions of emotional arousal or cognitive load, which are common within fast-paced digital environments (Steinert, Marin & Roeser 2022; Vanwesenbeeck, Bouw, van der Waal, Uyttenhove, Croes & Folkvord 2024). Dual process theory, therefore, provides a robust explanation for how unhealthy TikTok

food content may activate impulsive cognitive processing and influence subsequent food-related decisions.

2.2. Social cognitive theory and observational learning on TikTok

While dual process theory explains how impulsive cognition is activated, social cognitive theory explains how behaviours are learned, normalised, and reproduced within social environments. Social cognitive theory posits that behaviour is shaped through reciprocal interactions between personal factors, environmental influences, and observed behaviours, with observational learning and self-efficacy occupying central roles (Riaz, Jie, Sherani, Ali, Boamah and Zhu 2023).

TikTok functions as a powerful observational learning environment in which users are repeatedly exposed to influencers and content creators who model food consumption behaviours. These behaviours are often presented in emotionally engaging and socially rewarding contexts, making them particularly influential. Unhealthy eating practices are frequently portrayed as pleasurable, normative, and socially endorsed, especially within popular content genres such as Mukbang and fast food challenges (Kim and Oh 2024; Choi, Park, Han and Lee 2024). Repeated exposure to such content may shape users' outcome expectations and increase the likelihood of behavioural imitation.

Social cognitive theory further emphasises the role of emotional arousal and social reinforcement in shaping cognitive processing. On TikTok, likes, comments, and shares function as immediate feedback mechanisms that validate engagement and reinforce observed behaviours. These social signals are closely integrated with algorithmic recommendation systems, which further amplify exposure to emotionally salient content (Dust, Merchant, Wang and Yao 2025). Consequently, TikTok not only facilitates observational learning but also intensifies impulsive cognitive responses by embedding social reinforcement within its algorithmic structure.

2.3. Integrating dual process theory and social cognitive theory

Integrating dual process theory and social cognitive theory provides a comprehensive framework for understanding how unhealthy food exposure on TikTok influences consumer behaviour. Dual process theory explains how algorithmic environments promote automatic and impulsive cognitive processing, while social cognitive theory explains how socially modelled behaviours are internalised and reproduced through repeated exposure and reinforcement.

Together, these perspectives position TikTok as a behavioural accelerator that simultaneously activates impulsive cognitive mechanisms and reinforces socially learned eating behaviours. Cognitive impulsivity, therefore, operates as a key

mediating mechanism through which algorithmic exposure to unhealthy food content translates into unhealthy food choices. This integrated theoretical positioning moves beyond descriptive accounts of social media influence and offers a systems-level explanation of how platform design, cognitive processing, and social learning interact to shape consumer behaviour in digital food environments.

2.4. Cognitive impulsivity as a contextually activated mechanism

Within consumer behaviour research, impulsivity has traditionally been conceptualised as a relatively stable individual difference associated with self-control deficits, sensation seeking, or personality traits. While this perspective has generated important insights, it is increasingly insufficient for explaining behaviour in digitally mediated environments where decision contexts are dynamically engineered. Recent scholarship has begun to reconceptualise impulsivity as a situated cognitive mechanism that can be activated, intensified, or dampened by environmental cues and system-level design features rather than residing solely within the individual (Sun, Zhang, Wang, & Shen, 2023; Montag, Lachmann, Herrlich, & Zweig, 2023).

Cognitive impulsivity, in this context, refers specifically to reductions in reflective processing, increased reliance on affective cues, and a preference for immediate gratification over delayed outcomes. Crucially, this form of impulsivity does not imply irrationality or pathology; rather, it reflects adaptive cognitive shortcuts that become problematic when repeatedly triggered by environments optimised for speed, stimulation, and engagement. Algorithmically curated platforms such as TikTok are particularly effective at activating these shortcuts, as they compress decision time, minimise cognitive effort, and reward rapid attentional shifts (Montag et al. 2023).

Emerging research on problematic short-video use supports this reconceptualisation by demonstrating that impulsive engagement patterns are not solely driven by user predispositions but are co-produced through interactions between individual vulnerabilities, social reinforcement, and platform architecture (Xiong, Chen, & Yao 2024). From this perspective, cognitive impulsiveness functions less as an antecedent trait and more as a mediating cognitive process through which algorithmic exposure exerts behavioural influence.

2.5. Short-form video environments as behavioural accelerators

Short-form video platforms represent a distinct class of digital environments characterised by continuous content flow, autoplay functionality, algorithmic personalisation, and affectively charged audiovisual stimuli. These features collectively operate as behavioural accelerators, intensifying cognitive processing speed while reducing opportunities for deliberation. Unlike earlier social media platforms that relied on user choice, follower networks, or discrete content interactions, short-video

platforms are designed to maintain uninterrupted engagement by systematically anticipating and reinforcing user responses.

Recent studies highlight that algorithmic recommendation systems on platforms such as TikTok prioritise content with high emotional salience, visual intensity, and reward potential, particularly within food, lifestyle, and entertainment domains (Kaye, Chen & Zeng 2022; Li, Qian & Guo 2023). These characteristics are especially conducive to impulsive cognitive processing, as they amplify immediate affective responses while suppressing reflective evaluation. The result is an environment in which exposure is not merely frequent, but cumulatively persuasive.

Importantly, behavioural acceleration on short-form video platforms is reinforced through social-environmental cues such as likes, shares, and comment visibility. These signals operate as rapid feedback mechanisms that validate impulsive engagement while discouraging disengagement or critical reflection. As Xiong et al. (2024) argue, such environments blur the boundary between voluntary engagement and algorithmically sustained attention, making it increasingly difficult for users to regulate their exposure or cognitive responses.

2.6. Towards a synthesis: Algorithmic exposure and impulsive cognition

Taken together, recent literature suggests that the behavioural effects of short-form video platforms cannot be adequately explained through exposure or persuasion models alone. Instead, algorithmic systems should be understood as cognitive infrastructures that shape how information is processed, not just what information is encountered. Within this framework, cognitive impulsivity emerges as a central explanatory mechanism linking algorithmic exposure to downstream behavioural responses.

This synthesis advances existing research in three keyways. First, it shifts analytical focus away from individual blame narratives by recognising the role of platform design in structuring cognitive conditions. Second, it reframes impulsivity as a dynamic cognitive state that is systematically activated through algorithmic reinforcement rather than a fixed personal attribute. Third, it highlights the need to examine food-related content not only in terms of nutritional messaging or persuasion tactics, but as part of a broader digital ecosystem that prioritises immediacy, affect, and engagement.

By positioning cognitive impulsivity at the intersection of individual cognition and platform architecture, this study contributes to a growing body of work calling for more critical, systems-level analyses of consumer behaviour in algorithmically mediated environments (Kaye et al. 2022; Montag et al. 2023; Xiong et al. 2024). This perspective provides a robust conceptual foundation for examining how unhealthy

food exposure on TikTok may influence behavioural responses through intensified impulsive processing.

3. Literature review and hypothesis development

3.1. TikTok exposure and cognitive impulsivity

Digital platforms increasingly function as environments that shape cognitive processing rather than merely channels for information transmission. TikTok is distinguished by its algorithmically curated content feed, which continuously exposes users to personalised and highly salient short-form videos with minimal user effort. Recent studies suggest that repeated exposure to algorithmically optimised content can significantly influence attentional control and decision-making processes, particularly by increasing reliance on automatic cognitive responses (Zhang, Huang, Wang and Lowry 2024; Montag, Lachmann, Herrlich and Zweig 2023).

Empirical research examining short-form video platforms indicates that exposure to food-related content is strongly associated with impulsive cognitive reactions, including heightened cravings, reduced self-control, and preference for immediate rewards (Yanyan, Pek and Cham 2023; Choi, Park, Han and Lee 2024). These effects are amplified when food content is presented in visually intense and emotionally engaging formats, such as Mukbang videos and influencer-driven consumption narratives (Kim and Oh 2024). From a dual process perspective, such exposure biases cognitive processing towards System 1 dominance, increasing susceptibility to impulsive responses.

Recent platform-focused studies further suggest that TikTok algorithmic systems may intensify impulsive cognition by reinforcing repeated exposure to content that elicits strong affective reactions (Xiong, Chen and Yao 2024). As users engage with food-related videos, the algorithm adapts by increasing the frequency of similar content, thereby sustaining impulsive cognitive activation over time. Based on this evidence, it is expected that greater exposure to TikTok content will increase cognitive impulsivity among users.

H1: TikTok exposure increases cognitive impulsivity, which in turn leads to more unhealthy food choices.

H2: Higher exposure to TikTok content leads to more impulsive thinking and reduced self-control in decision-making.

3.2. Cognitive impulsivity and unhealthy food choices

Cognitive impulsivity has been consistently linked to maladaptive eating behaviours and unhealthy food choices across a range of consumption contexts. Defined as a

tendency toward rapid decision-making with limited consideration of long-term consequences, cognitive impulsivity is associated with a preference for immediate gratification and diminished inhibitory control (Mattavelli, Gorrino, Tornaghi & Canessa, 2024; Crisp & Grant, 2023).

Recent research demonstrates that individuals exhibiting higher levels of cognitive impulsivity are more likely to engage in emotional eating, binge eating, and frequent consumption of energy-dense foods, particularly under conditions of stress or cognitive overload (Mroz, Gross & Brytek Matera, 2023; Hansen, 2024). In digital environments, impulsivity is further reinforced by repeated exposure to rewarding stimuli, which strengthens habitual consumption patterns and weakens reflective regulation (Filippone, Shankland and Hallez 2022).

Within social media contexts, impulsive cognitive processing has been shown to mediate the relationship between content exposure and eating behaviour. Exposure to food-related digital content increases reward sensitivity and craving responses, which in turn predict unhealthy food choices (Yanyan, Pek and Cham 2023). These findings support the argument that cognitive impulsivity functions as a key mechanism through which digital food environments influence consumption behaviour.

H3: Individuals with higher cognitive impulsivity are more likely to choose unhealthy foods.

3.3. TikTok exposure, cognitive impulsivity, and unhealthy food choices

The preceding literature suggests that the relationship between TikTok exposure, cognitive impulsivity, and unhealthy food choices may not be strictly unidirectional. While exposure to algorithmically amplified food content is expected to activate impulsive cognitive processing (H1), and impulsive cognition is expected to increase unhealthy food choices (H3), prior research also indicates that behavioural engagement may further reinforce impulsive cognitive states.

Repeated indulgent consumption can strengthen reward sensitivity and reduce reflective control over time. In digitally accelerated environments, behavioural enactment may feedback into cognitive processing, intensifying cue responsiveness and impulsive tendencies. Thus, unhealthy food choices may not merely be outcomes of impulsive cognition but may also reinforce and amplify impulsive cognitive activation.

Empirical evidence supports this dynamic relationship. Studies examining digital food environments suggest that engagement in unhealthy consumption behaviours increases subsequent craving intensity and reduces self-regulatory capacity, creating a reinforcing cycle between cognition and behaviour (Crisp & Grant, 2023; Mattavelli

et al., 2024). In short-form video contexts, this feedback loop may be intensified by algorithmic reinforcement, which continues to supply similar stimuli based on prior engagement.

Accordingly, the present study proposes a reciprocal relationship between cognitive impulsivity and unhealthy food choices.

H4: Higher levels of unhealthy food choices are associated with increased cognitive impulsivity.

3.4. Gender differences in cognitive impulsivity and food choices

Gender has been identified as an important moderating factor in the relationship between impulsivity and eating behaviour. Although men often score higher on global impulsivity measures, women tend to exhibit stronger associations between cognitive impulsivity and maladaptive eating behaviours, including emotional eating and binge consumption (Magdalena, Gross & Brytek Matera, 2022; Gaspar Pérez, Paslakis, Rosinska, Munguja & Reque, 2023).

Recent studies suggest that women may be more cognitively and emotionally responsive to food-related social media content, particularly content linked to body image, social comparison, and emotional regulation (Kuster Boluda & Vila Lopez, 2022; Maldoy, Poels & De Backer, 2025). Within digital environments, these factors may increase vulnerability to impulsive eating responses when exposed to unhealthy food representations.

Evidence also indicates that women spend more time engaging with social media platforms and may experience greater emotional arousal during content consumption, which can intensify impulsive cognitive processing (Mushtaq, Ashraf, Hameed, Irfan, Shahid, Kanwal, Aslam, Shahid, E Noor, Shazly, Khan & Jordan 2023). These patterns suggest that gender moderates the relationship between TikTok exposure, cognitive impulsivity, and unhealthy food choices.

H5: Females are more cognitively affected by TikTok exposure, showing greater impulsivity than males.

H6: Females with higher impulsivity are more likely than males to make unhealthy food choices.

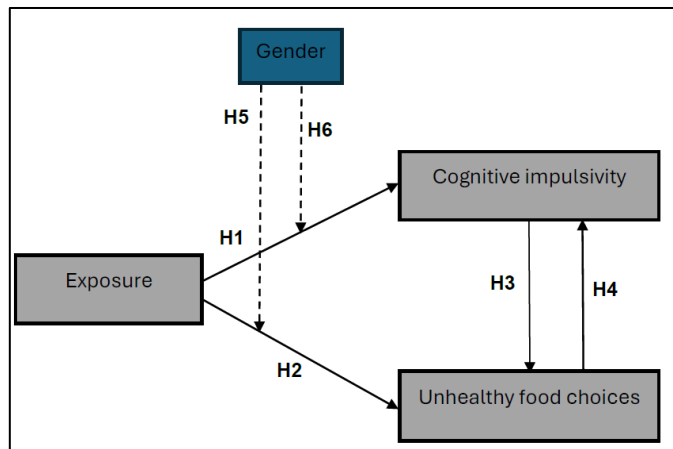


Figure 1. Proposed Conceptual Model (source: Author)

4. Methodology

4.1. Research design and philosophical orientation

This study adopts a positivist research philosophy, which assumes that relationships between social phenomena can be objectively measured and empirically tested. Positivism is appropriate as the study seeks to test theory-driven hypotheses concerning the relationships between TikTok exposure, cognitive impulsivity, unhealthy food choices, and gender differences.

Consistent with this philosophical stance, the study follows a deductive research approach, whereby hypotheses derived from dual process theory and social cognitive theory are statistically tested using quantitative data. A quantitative cross-sectional research design was employed to examine these relationships at a single point in time. This design is suitable for identifying patterns of association, testing moderation effects, and evaluating theoretical predictions.

4.2. Population and sampling

The target population comprises South African TikTok users aged between 18 and 65 years. Both male and female respondents were included to enable the examination of gender differences.

Due to the absence of a comprehensive sampling frame, non-probability purposive sampling was used. Respondents were selected based on their active use of TikTok and exposure to food-related content on the platform. A total of 250 respondents were recruited within Gauteng over three weeks in July 2025. While non-probability

sampling limits population generalisability, it is appropriate for theory testing within digitally mediated consumption contexts.

4.3. Measurement and data collection

Data were collected using a self-administered online questionnaire distributed via Google Forms. Before participation, respondents were informed about the purpose of the study, assured of anonymity and confidentiality, and provided informed consent.

The questionnaire consisted of four sections measuring TikTok exposure, cognitive impulsivity, unhealthy food choices, and demographic variables, including gender. All constructs were measured using seven-point Likert-type scales, adapted from established literature to ensure content validity. Screening questions ensured that only eligible TikTok users completed the survey.

4.4. Analytical strategy and hypothesis alignment

Data were analysed using the Statistical Package for the Social Sciences (SPSS). Analysis proceeded in stages aligned directly with the study hypotheses.

Descriptive statistics were computed to profile respondents and TikTok usage patterns. Scale reliability was assessed using Cronbach's alpha coefficients, with values of 0.70 or higher indicating acceptable internal consistency. Construct validity was evaluated through exploratory factor analysis using principal component extraction and varimax rotation.

To test H1 and H2, which propose that TikTok exposure increases cognitive impulsivity and impulsive thinking, Pearson correlation analysis and multiple regression analysis were conducted with TikTok exposure as the independent variable and cognitive impulsivity as the dependent variable.

To test H3, which predicts that higher cognitive impulsivity leads to unhealthy food choices, regression analysis was performed with cognitive impulsivity as the predictor and unhealthy food choice as the outcome variable.

To test H4, which proposes a reciprocal relationship between unhealthy food choices and cognitive impulsivity, multiple regression analysis was conducted. Cognitive impulsivity was specified as the dependent variable, with unhealthy food choices entered as the predictor variable to assess the reverse directional effect. This analysis allowed for examination of whether behavioural engagement in unhealthy food consumption significantly predicts increased impulsive cognitive processing, thereby supporting the proposed bidirectional relationship between cognition and behaviour.

To test H5 and H6, which examine gender differences, a moderation analysis was conducted by including interaction terms in the regression models. Gender was tested as a moderator of the relationship between TikTok exposure and cognitive impulsivity, as well as between cognitive impulsivity and unhealthy food choices.

4.5. Ethical considerations

Ethical approval was obtained before data collection. Participation was voluntary, and respondents could withdraw at any time without penalty. No personally identifiable information was collected. Data were securely stored on password-protected devices and accessed only by authorised researchers. The study posed minimal risk to participants and complied fully with institutional ethical guidelines.

5. Results and empirical findings

This section presents and interprets the empirical results of the study. The analysis proceeds in four stages: respondent demographics, reliability analysis, descriptive statistics, and inferential testing using correlation and regression analyses. All analyses were conducted using SPSS.

5.1. Demographic profile of respondents

Table 1. presents the demographic characteristics of the respondents (source: Authors).

Demographic	Category	Frequency	Percentage (%)
Gender	Male	122	40.7
	Female	175	58.3
	Prefer not to say	3	1.0
	Total	300	100.0
Age group	18–25 years	219	73.0
	26–35 years	57	19.0
	36–45 years	16	5.3
	46–55 years	7	2.3
	Prefer not to say	1	0.3
	Total	300	100.0
Education	Less than matric	7	2.3

Demographic	Category	Frequency	Percentage (%)
	Matric (Grade 12)	143	47.8
	Post-matric certificate	20	6.7
	Diploma (NQF 6)	37	12.4
	Degree or Advanced diploma (NQF 7)	65	21.7
	Postgraduate diploma or Honours	14	4.7
	Master's degree	4	1.3
	Doctorate	1	0.3
	Prefer not to say	8	2.7
	Total	300	100.0

The sample is predominantly female and largely concentrated in the 18–25 age group, reflecting TikTok's core user base. This demographic concentration is theoretically relevant to the study's primary objective, as younger users are typically more digitally immersed and therefore more consistently exposed to algorithmically curated food content. The sample, therefore, represents a high-exposure environment appropriate for examining whether unhealthy TikTok content activates cognitive impulsivity rather than reflective decision-making.

The educational profile, with nearly half of respondents reporting matric as their highest qualification, further contextualises the findings. Variation in educational attainment may influence digital literacy and critical evaluation capacity, which is particularly relevant in environments characterised by rapid, passive, and visually salient exposure. This supports the investigation of whether exposure influences behaviour indirectly through cognitive mechanisms.

The gender distribution enables testing of the moderating role of gender, aligning directly with the study's fourth secondary objective. Overall, the demographic profile situates the findings within a digitally immersed population, strengthening the relevance of examining the pathway from exposure to cognitive impulsivity and subsequent food choices.

5.2. Reliability analysis

Internal consistency of the measurement scales was assessed using Cronbach's alpha coefficients. Values above 0.70 indicate acceptable reliability.

Table 2. Reliability analysis (source: Author's)

Construct	Number of items	Cronbach's alpha
TikTok exposure	5	0.90
Cognitive impulsivity	11	0.87
Unhealthy food choices	10	0.92

All constructs demonstrate strong internal consistency, exceeding recommended thresholds. Importantly, the robustness of the cognitive impulsivity scale strengthens the study's primary objective, which positions impulsivity as a mediating cognitive mechanism rather than a peripheral variable. The high reliability of the exposure and unhealthy food measures further supports the validity of testing the hypothesised pathway from exposure to cognition to behaviour.

Given that the study seeks to determine whether exposure influences food choices directly or indirectly through cognitive impulsivity, reliable measurement is essential to isolate these relationships with confidence. The strong internal consistency across constructs therefore, provides a sound empirical foundation for addressing the secondary objectives related to moderation.

5.3. Descriptive statistics

Following confirmation of scale reliability, descriptive statistics were examined to contextualise the levels of exposure, cognitive impulsivity, and unhealthy food choices within the sample. This step provides an empirical baseline before proceeding to hypothesis testing

Table 3. Descriptive statistics for TikTok exposure (source: Author's)

Measure	Mean	Standard deviation
Overall exposure score	4.47	1.40

The relatively high exposure mean indicates that respondents are frequently encountering unhealthy food content on TikTok. Importantly, the strongest agreement was associated with viral food trends and fast-food promotions, suggesting that exposure is driven primarily by algorithmically amplified commercial and trend-based content rather than isolated influencer behaviour.

This distinction is theoretically significant for the study's primary objective. It indicates that exposure is structurally embedded within the platform's

recommendation system rather than dependent on active search or specific creator loyalty. In other words, exposure appears to be systemic rather than incidental. This strengthens the premise that TikTok functions as an algorithmically curated environment capable of repeatedly activating cognitive responses.

By establishing that unhealthy food exposure is frequent and platform-driven, these findings provide the necessary empirical foundation for examining whether such exposure predicts cognitive impulsivity, as outlined in the first and second secondary research objectives.

5.4. Cognitive impulsivity

Having established that respondents are frequently exposed to algorithmically amplified unhealthy food content, the analysis now turns to whether such exposure is associated with elevated levels of cognitive impulsivity. Table 8.3.2 summarises the descriptive statistics for cognitive impulsivity.

Table 4 Descriptive statistics for cognitive impulsivity (source: Author's)

Measure	Mean	Standard deviation
Overall cognitive impulsivity score	3.35	1.60

The overall mean indicates moderate levels of cognitive impulsivity within the sample. However, respondents reported a noticeable tendency to experience urges to eat after exposure to viral food trends, suggesting that impulsive activation occurs at the level of craving and desire rather than overt behavioural dysregulation.

Importantly, lower agreement on statements reflecting loss of control indicates that impulsivity is not necessarily expressed as extreme or compulsive behaviour. Instead, it appears as a cognitive shift characterised by heightened responsiveness to food cues. This distinction is theoretically significant. It supports the study's conceptualisation of cognitive impulsivity as a contextually activated cognitive state rather than a fixed behavioural outcome.

For the study's primary objective, this finding reinforces the argument that TikTok exposure may influence decision-making indirectly by shaping internal cognitive processes. Establishing the presence of cue-driven impulsive cognition provides the necessary foundation for testing whether exposure predicts impulsivity and whether impulsivity mediates the relationship between exposure and unhealthy food choices.

5.5. Unhealthy food choices

Having examined levels of exposure and cognitive impulsivity, the analysis now turns to behavioural outcomes to determine whether exposure directly translates into unhealthy food consumption. Table 8.3.3 reports the descriptive statistics for unhealthy food choices.

Table 5. Descriptive statistics for unhealthy food choices (source: author's)

Measure	Mean	Standard deviation
Overall unhealthy food choice score	2.50	1.40

The relatively low mean indicates that respondents do not consistently translate exposure into overt unhealthy consumption. Exposure alone, therefore, does not automatically produce behavioural change.

This is theoretically significant for the study's objectives. Although respondents report moderate exposure and cue-driven impulsive reactions, these do not directly manifest as strong behavioural outcomes. Instead, the pattern suggests that behavioural effects operate through internal cognitive processes.

Unhealthy food choices appear to depend less on exposure intensity alone and more on impulsive cognitive activation in algorithmic environments. The results support a direct-effects and reciprocal framework: exposure is associated with both impulsivity and unhealthy choices, while impulsivity and unhealthy choices mutually reinforce one another, indicating a cognitive-behavioural feedback loop rather than a mediated pathway.

5.6. Pearson correlation analysis

To examine preliminary relationships among the constructs and assess alignment with the study objectives, Pearson correlation coefficients were calculated. Table 8.4 presents Pearson correlation coefficients among the study variables.

Table 6. Correlations between constructs (source: Authors)

Variable	Exposure	Cognitive impulsivity	Unhealthy food choices
Exposure	1	0.423**	0.353**
Cognitive impulsivity		1	0.702**
Gender	0.090	0.046	-0.039

P<0.01

Exposure is positively associated with both cognitive impulsivity and unhealthy food choices. However, the strongest relationship is between cognitive impulsivity and unhealthy food choices ($r = 0.702$), indicating that impulsive cognitive processing is more directly linked to behaviour than exposure itself.

This pattern aligns with the study's primary objective, supporting the positioning of cognitive impulsivity as the central mechanism through which algorithmic exposure influences decision-making. While exposure shows a moderate association with behaviour, its weaker correlation relative to impulsivity suggests an indirect rather than direct effect.

Gender is not significantly associated with any construct, providing preliminary evidence against demographic moderation and suggesting that vulnerability to digital food cues may operate through broadly shared cognitive processes.

Overall, the correlation findings provide initial support for the hypothesised pathway from exposure to impulsivity to unhealthy food choices, warranting further testing through regression and mediation analysis.

5.7. Multiple regression analysis

Multiple regression analysis was conducted to test the predictive relationships proposed in the conceptual model, including both direct and reciprocal effects between cognitive impulsivity and unhealthy food choices.

Table 7. Dependent Variable: Cognitive Impulsivity (source: Author)

Dependent Variable	Predictor	β	p	Interpretation
Cognitive impulsivity	Exposure	0.184	< 0.001	Significant
Cognitive impulsivity	Gender	0.047	0.256	Not significant
Unhealthy food choices	Cognitive impulsivity	0.672	< 0.001	Strong predictor
Unhealthy food choices	Exposure	0.074	0.109	Not significant
Unhealthy food choices	Gender	-0.057	0.177	Not significant

The findings indicate that exposure significantly predicts cognitive impulsivity, supporting H1. Cognitive impulsivity, in turn, strongly predicts unhealthy food choices, supporting H3. Exposure does not directly predict unhealthy food choices once cognitive impulsivity is included in the model, suggesting that impulsive cognitive activation plays a more substantial explanatory role in behavioural outcomes than exposure intensity alone.

Importantly, gender remains non-significant across all models, indicating that the observed relationships operate consistently across male and female respondents.

Collectively, the regression results support a dual-path structure in which TikTok exposure is associated with heightened cognitive impulsivity, and impulsive cognitive processing is strongly associated with unhealthy food choices. Rather than demonstrating a mediated pathway, the findings highlight the central role of impulsive cognition as a primary behavioural driver within algorithmically curated digital environments.

6. Discussion of results

This study set out to examine whether unhealthy food exposure on TikTok influences consumer decision-making directly or whether its effects operate through a cognitive mechanism activated within algorithmically curated environments. The findings provide clear and theoretically coherent support for the latter explanation.

6.1. Algorithmic exposure as cognitive activation, not direct persuasion

Consistent with the primary objective, exposure significantly predicted cognitive impulsivity but did not directly predict unhealthy food choices once impulsivity was accounted for. This pattern is theoretically consequential. It suggests that TikTok's influence does not operate through straightforward persuasive effects, but through the activation of fast, affect-driven cognitive processing.

In other words, algorithmic repetition and visual salience do not compel behaviour directly. Rather, they reshape how decisions are processed. Exposure appears to prime System 1 processing, increasing cue responsiveness and craving activation, which then drives consumption outcomes. This finding extends dual process theory into platform-mediated environments by demonstrating that digital architecture systematically biases cognitive processing toward automaticity.

The implication is critical: the behavioural impact of TikTok is infrastructural rather than message-based. It lies in the structuring of attention and cognition, not simply in the content itself.

6.2. Cognitive impulsivity as the central explanatory mechanism

Across correlation and regression analyses, cognitive impulsivity emerged as the strongest predictor of unhealthy food choices. The magnitude of this relationship indicates that impulsive cognitive processing is the proximal driver of behavioural outcomes.

This supports the reconceptualisation of impulsivity advanced in the theoretical section. Rather than treating impulsivity as a stable personality deficit, the findings show that it functions as a contextually activated cognitive state. Exposure increases impulsive cognition, and impulsive cognition predicts behaviour. The behavioural pathway is therefore mediated, not direct.

This contribution moves beyond descriptive social media research that focuses on exposure intensity or time spent online. It demonstrates that what matters is not how much users see, but how platform design conditions how they process what they see.

By empirically validating impulsivity as a mediator, the study advances social cognitive theory and dual process theory into the domain of short-form algorithmic systems. TikTok becomes a behavioural accelerator precisely because it simultaneously amplifies exposure and compresses deliberative processing time.

6.3. The absence of gender moderation

Contrary to some prior research suggesting gender differences in impulsive eating responses, gender did not moderate any of the tested relationships. This finding challenges individual-level vulnerability narratives and suggests that the cognitive pathway identified in this study operates broadly across users.

From a platform governance perspective, this is particularly significant. It implies that the cognitive effects of algorithmic food exposure may be structurally embedded and not confined to specific demographic subgroups. The mechanism appears systemic rather than segment-specific.

This reinforces the argument that vulnerability in digital food environments should not be framed primarily as a matter of personal susceptibility, but as an outcome of algorithmic optimisation strategies designed to sustain engagement.

6.4. Theoretical integration and systems-level contribution

The findings provide empirical support for the integrated theoretical framework proposed in this study. Dual process theory explains how algorithmic exposure increases reliance on automatic processing. Social cognitive theory explains how repeated, socially reinforced food representations normalise and legitimise consumption cues. Together, these frameworks illuminate how platform architecture and social modelling interact to activate impulsive cognition.

Importantly, the mediated pathway supported by the data mirrors the Stimulus–Organism–Response logic: exposure functions as the stimulus, cognitive impulsivity as the organismic state, and unhealthy food choices as the response. However, the study extends this framework by demonstrating that in algorithmically curated

environments, the stimulus is not static. It is dynamically personalised and continuously reinforced.

This positions TikTok not as a passive communication channel but as a cognitive environment that shapes decision architecture. The behavioural effects observed are therefore systemic consequences of algorithmic design rather than isolated persuasive outcomes.

6.5. Implications for digital food environments in emerging markets

Conducted within a South African context, the study contributes to emerging market scholarship by showing that algorithmic food exposure operates similarly in digitally immersive but resource-diverse environments. In settings where digital literacy may vary, algorithmic acceleration may further reduce reflective engagement, amplifying reliance on impulsive processing.

This has implications beyond food marketing. It raises broader concerns about how engagement-driven platforms structure consumption environments in emerging economies, where regulatory oversight of digital food marketing remains limited.

7. Limitations and Future Research

This study is subject to several limitations. The cross-sectional design limits causal inference, and future research should employ longitudinal or experimental designs to better establish temporal sequencing between exposure, cognitive impulsivity, and behavioural outcomes. The reliance on self-reported data may also introduce bias; incorporating behavioural tracking or digital usage data would strengthen validity.

In addition, the use of non-probability sampling limits generalisability beyond the current sample. Future studies should test the proposed mediated pathway across different cultural and regulatory contexts. Extending the model to include additional cognitive or platform-level moderators, such as digital literacy or algorithmic transparency, would further advance understanding of how algorithmic systems shape consumer decision-making.

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Appendix A. Informed consent

Biometrics, AI-driven health content, and unhealthy food exposure on TikTok: insights on consumer perceptions and behaviour

Dear Sir/Madam,

You are invited to participate in an important research study exploring how biometric data collection, personalised health content, and exposure to unhealthy food on TikTok influence consumer perceptions and behaviours.

As a valued participant, your insights and experiences will be instrumental in helping us understand the impact of social media on consumer decision-making. The questionnaire will take approximately 25 minutes to complete.

Please take note of the following:

1. Your participation is completely voluntary, and you can withdraw at any stage without penalty.
2. Your participation is anonymous, and the data collected will be kept confidential and analysed in aggregate form.
3. The questionnaire responses will be stored in a secure location (e.g., a password-protected device and folder) for five years, after which the questionnaires will be deleted and destroyed.
4. Electronic datasets will be completely anonymous and stored on a password protected electronic device for an indefinite period.
5. The researchers involved in this study will be the only individuals granted access to the raw data collected.
6. The dataset may potentially be utilised in future research studies, however, the same confidentiality applied in this data collection process will be applied in those instances.
7. By completing the survey, you indicate that you are participating voluntarily in this research.
8. In the case of electronically completed questionnaires, NO personal identifying information will be recorded.
9. There are no significant risks linked with this research project.
10. As a willing respondent, there are no direct benefits to you, however your participation will aid in providing insights that will add to the body of academic knowledge regarding consumer perceptions and behaviour. This knowledge may be disseminated to the academic community via journal articles, conference papers and other publications.

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If you have any questions or concerns regarding the research or questionnaire, please contact the lead researchers in this project using the contact details provided below.

Thank you for considering this opportunity to contribute to knowledge on behaviours in the context of the TikTok social media platform.

Kind regards,

Prof Mercy Mpinganjira

mmpinganjira@uj.ac.za

Dr T. Mofokeng

tmofokeng@uj.ac.za

Ms J. Turner

jturner@uj.ac.za

THE RESPONDENT CONSENT

I have been requested to take part in the above-mentioned study. I have been informed about my involvement in this research study and what is required of me. I understand that:

- My participation in the research study is completely voluntary.
- My responses will not be utilised if I do not provide written or informed consent.
- I am able to withdraw from the research at any point with no negative consequences to myself.
- In order to record all feedback required, my responses will be documented on a questionnaire. No personal identifying information will be recorded on the questionnaire, and the original data will be securely stored for a five-year period, after which it will be destroyed.
- My responses will be treated as confidential, and the anonymised data will be safely kept on a password-protected electronic device.
- The data and results from this study may be utilised for journal publications and/or conference presentations.
- The data collected may be used in similar or related studies conducted in future.
- Other researchers may have access to the data collected; however, my name (the respondent) will not appear on any of the data that is sent or shared with other researchers.
- I am aware that I will not receive any personal reports or feedback on individual results, but I am able to request feedback on the overall findings of the study.

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- If I have any uncertainties or concerns that may arise relating to the study and/or the items in the questionnaire, I am able to contact the researchers, whose details have been provided above.
- I have received the contact details of the researcher/s on the participant information sheet.
- All my questions about the research have been answered and I therefore grant consent for my responses from the questionnaires to be utilised for the research.

I have read the above-mentioned information and agree to participate as per the above conditions. I understand the information provided and consent voluntarily to participate in this study. I hereby, agree to participate in the research as set out above and provide consent to complete this questionnaire by ticking the box below.

Tick (✓) the box

☐

Appendix B. POPIA protection form



DEPARTMENT OF MARKETING MANAGEMENT

PERSONAL INFORMATION LETTER

REC 19.0

June 2025

Good Day

My name is Jade Turner. **I WOULD LIKE TO INFORM YOU** about personal information of yours that I would like to collect as part of a research study on Examining Consumer Trust, Cognitive Impulsivity, and Resistance to AI Influence on TikTok

Before you decide on whether to allow me to collect and process (use) your personal information, I would like to explain to you why I would like to do this, and other details related to your personal information. You should think about this information together with the information about participating in the research, which you will have just been told about.

Below, I have compiled a set of questions and answers that I believe will assist you in understanding the relevant details of the collection and processing of your personal information for this research. Please read through these. If you have any further questions, I will be happy to answer them for you.

- 1. WHAT IS PERSONAL INFORMATION?** Personal information is any information that relates to an identifiable, living person (or an identifiable company or other organisation). Examples include your name, date of birth, ID number, phone

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number, email address etc. or a wide range of other information that can be linked to these identifiers.

1. **WHY DO YOU NEED TO COLLECT AND PROCESS MY PERSONAL INFORMATION?** I need to collect and process your personal information for the purposes of your participation in the research that has been explained in the title above.
2. **HOW WILL MY PERSONAL INFORMATION BE COLLECTED AND PROCESSED?** Personal information will be collected from participants using an online survey.
3. **HOW AND WHERE WILL MY PERSONAL INFORMATION BE STORED?** The data collected will be stored within the UJ Intranet, Department of Marketing Management folder, which only allows access through a request.
4. **FOR HOW LONG WILL MY PERSONAL INFORMATION BE STORED?** Your personal information will be stored for as long as it is needed for the research process. I estimate that this will be 18 MONTHS
5. **WHO WILL HAVE ACCESS TO MY PERSONAL INFORMATION?** Your personal information will be accessible to UJ Supervisors
6. **WHAT MUST I DO IF I WANT ACCESS TO MY OWN PERSONAL INFORMATION?** If you want access to your own personal information, you should contact me using the contact details given below.

Email address: jturner@uj.ac.za or mmpinganjira@uj.ac.za or tmofokeng@uj.ac.za

7. **WHAT MUST I DO IF I DON'T WANT MY PERSONAL INFORMATION TO BE USED ANYMORE?** If you do not want your personal information to be used in the research anymore, you should contact me immediately using the contact details given below and I will explain to you how your personal information will be removed and what will happen after that. You can request that your personal information be removed at any time (for as long as the personal information is kept by me) without any consequences.
8. **WHAT HAPPENS IF OTHER PEOPLE POSSIBLY GET ACCESS TO MY PERSONAL INFORMATION?** If this happens, I will first assess the risk of what has happened and how likely it is that your personal information can actually be accessed by other people (precautions are taken as described above to protect your personal information even if someone gets access to where it is stored). If there is a risk that your personal information can be accessed by others, I will contact you and tell you about the details and what I am doing about the situation.

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My details, if you need to contact me, are:

Jade Turner, email: jturner@uj.ac.za

Dr Thabang Mofokeng, email: tmofokeng@uj.ac.za

Prof Mercy Mpinganjira, email: mmpinganjira@uj.ac.za

You may also contact my research supervisor:

Prof Mercy Mpinganjira

Email: mmpinganjira@uj.ac.za

If you feel that any questions or complaints regarding the collection and processing of your personal information for this study have not been dealt with adequately, you may contact the Chairperson of the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg:

Prof. Christopher Stein

Tel: 011 559-6564

Email: cstein@uj.ac.za



DEPARTMENT OF MARKETING
PERSONAL INFORMATION CONSENT FORM
REC 19.0

Examining Consumer Trust, Cognitive Impulsivity, and Resistance to AI Influence
on TikTok

Please initial each box below:

I confirm that I have read and understand the personal information letter dated June 2025 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

I agree to my personal information being collected and processed for the above research.

Name of Participant
Date

Signature of Participant

Name of Researcher
Date

Signature of Researcher

Appendix C. Questionnaire**SCREENING QUESTIONS**

Please indicate **yes** or **no** by ticking **✓** the box with the most appropriate answer.

	Yes	No
Do you use Tik Tok?	1	2
Have you come across food-related content on the TikTok platform?	1	2
Are you aged between 18 – 65 years?	1	2

If you answered **NO** to any of the above questions, please **DO NOT** complete the questionnaire. *Thank you for your time.*

If you answered **YES** to all of the above questions, please continue to complete the rest of the questionnaire.

SECTION A

Please indicate your answer by ticking (✓) the most appropriate answer. (**Only ONE box may be selected unless advised otherwise**)

A1. Please indicate your gender.

Male	1
Female	2
Prefer not to say	3

A2. Please indicate your age group

18–25 years	1
26–35 years	2
36–45 years	3
45–55 years	4
56–65 years	5
Prefer not to say	6

A3. What is your highest level of education obtained

Less than Matric	1	Post-Graduate Diploma or Honours Degree (NQF 8)	5
Matric (Grade 12)	2	Master's Degree (NQF 9)	6
Post Matric Certificate	3	PhD or Doctorate	7
Diploma (NQF 6)	4	Prefer not to say	8
Degree or Advanced Diploma (NQF 7)	5		

A4. Please indicate your employment status.

Student	1	Self-employed	4
Employed full-time	2	Unemployed	5
Employed part-time	3	Prefer not to say	6

A5. Please indicate your gross monthly income (before deductions)

R0 – R5,000		R30,001 – R40,000	
R5,001 – R10,000		R40,001 – R60,000	
R10,001 – R20,000		R60,001 or more	
R20,001 – R30,000		Prefer not to say	

A6. On average, how often do you use TikTok?

Multiple times a day		A few times a month	
Daily		Monthly	
A few times a week		Less than once a month	
Weekly		Prefer not to say	

SECTION D: EXPOSURE TO UNHEALTHY FOOD ON TIKTOK AND BEHAVIOURAL OUTCOMES

Social media platforms like TikTok expose users to food-related content, including unhealthy foods. The statements below relate to your exposure to unhealthy food content on TikTok and the effect that this has on your behaviour.

Studies suggest frequent exposure to unhealthy food content on TikTok may heighten cognitive impulsivity, influencing poor dietary choices. Gender differences in impulsive food-related decision-making indicate that men and women may respond differently to such stimuli. Understanding these variations could inform targeted interventions for healthier digital consumption habits.

Using a 7-point scale, where 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Sometimes, 5 = Often, 6 = Very often, 7 = Always, please indicate how frequently you come across the following types of content on TikTok.

	Never Always						
Exposure - How often do you come across the following types of content on TikTok?							
E1: Videos of people consuming large amounts of food (e.g., mukbangs).	1	2	3	4	5	6	7
E2: Videos promoting highly processed or fast food.	1	2	3	4	5	6	7
E3: Videos featuring extreme or unusual food challenges.	1	2	3	4	5	6	7

E4: Videos showcasing high-sugar or high-fat foods being eaten.	1	2	3	4	5	6	7
E5: Videos encouraging binge eating or excessive food consumption.	1	2	3	4	5	6	7
E6: Videos portraying unhealthy food as an indulgence or comfort food.	1	2	3	4	5	6	7
E7: Viral food trends featuring unhealthy ingredients (e.g., deep-fried snacks, loaded desserts).	1	2	3	4	5	6	7
E8: Content where influencers promote unhealthy eating habits.	1	2	3	4	5	6	7
E9: Videos comparing unhealthy and healthy food choices.	1	2	3	4	5	6	7
E10: Fast food marketing or promotional content featured on TikTok.	1	2	3	4	5	6	7
E11: Content that glamorises junk food or unhealthy eating behaviours.	1	2	3	4	5	6	7

Using a 7-point scale, where 1 = **very strongly disagree** and 7 = **very strongly agree**, please indicate the extent to which you agree or disagree with each statement below.

Cognitive Impulsivity							
C11: When I see a viral food trend on TikTok, I feel the urge to eat, even if I'm not hungry.	1	2	3	4	5	6	7
C12: Watching TikTok food videos makes it harder for me to control my cravings.	1	2	3	4	5	6	7
C13: When I feel anxious or stressed, TikTok food content makes me want to eat.	1	2	3	4	5	6	7
C14: If I see someone eating on TikTok, I often feel hungry enough to eat, too.	1	2	3	4	5	6	7
C15: Once I start eating after watching food-related TikTok content, I find it hard to stop.	1	2	3	4	5	6	7
Unhealthy food choices							
UFC1: I feel a strong urge to eat unhealthy foods after seeing them promoted on TikTok.	1	2	3	4	5	6	7
UFC2: I spend a lot of time thinking about the foods I see on TikTok and how to get them.	1	2	3	4	5	6	7
UFC3: I avoid work, school, or social activities because I focus on finding or eating foods I see on TikTok.	1	2	3	4	5	6	7
UFC4: I feel emotionally distressed or anxious when I cannot eat the foods I see on TikTok.	1	2	3	4	5	6	7
UFC5: My eating behaviour changes significantly after watching TikTok food content.	1	2	3	4	5	6	7
UFC6: I frequently give in to cravings triggered by TikTok food content, even when I am not hungry.	1	2	3	4	5	6	7
UFC7: My unhealthy food choices after seeing TikTok content cause problems in my daily life (e.g., health, finances, relationships).	1	2	3	4	5	6	7
UFC8: I feel guilty or regretful after eating foods I see on TikTok.	1	2	3	4	5	6	7

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UFC9: I find that the more I watch TikTok food content, the more I need to consume similar foods to feel satisfied.	1	2	3	4	5	6	7
UFC10: I have difficulty controlling my urges to eat foods I see on TikTok, even when trying to stop	1	2	3	4	5	6	7

Thank you for your time

PART IV: SUSTAINABILITY, GREEN TRANSITION, AND MOBILITY

Sustainability has become a central concern for businesses, public authorities, and society. Climate change, resource scarcity, pollution, and the environmental consequences of production and transport require organizations to reconsider established strategies and operational practices. At the same time, the green transition creates opportunities for innovation, new forms of mobility, more efficient use of resources, and the development of sustainable competitive advantages.

The papers in this section examine sustainability across aviation, urban mobility, manufacturing, energy, and economic development. They consider the strategic management of sustainable aviation fuel, students' perceptions of micromobility and transport transformation, the reuse of cardboard waste in manufacturing, and the relationship between pollution, energy consumption, corruption, and economic growth.

Although the studies address different sectors and levels of analysis, they share an understanding that environmental sustainability cannot be separated from managerial and economic decision-making. The transition towards more sustainable systems requires technological solutions, organizational commitment, supportive policies, responsible resource management, and changes in stakeholder behaviour. This section therefore presents sustainability not only as an environmental obligation but also as a strategic and developmental challenge.

SENGUR, F. K. / Competing on Sustainability: Strategic Management of Sustainable Aviation Fuel in the Aviation Industry

Competing on Sustainability: Strategic Management of Sustainable Aviation Fuel in the Aviation Industry

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Abstract

While sustainability has become a key industry challenge, it has also become a defining dimension of competition in the aviation industry, reshaping strategic priorities, investment decisions, and inter-organizational relationships. Within this evolving landscape, Sustainable Aviation Fuel (SAF) has emerged as a central instrument in the industry's decarbonisation agenda. This paper examines SAF adoption from an industry-level management and strategy perspective, arguing that the ability to organise, govern and scale SAF across the aviation ecosystem constitutes a new arena of competitive differentiation. Rather than treating SAF as a purely technological or regulatory solution, the study conceptualises it as an industry-wide strategic challenge involving airlines, airports, fuel suppliers, investors and public authorities. The discussion highlights how SAF reshapes competitive dynamics by influencing cost structures, market access, reputational positioning and long-term strategic alignment with climate policies. Particular emphasis is placed on logistics and supply chain coordination, which emerge as critical bottlenecks to scaling SAF adoption at the industry level. Limited production capacity, fragmented distribution networks and uneven geographical availability create asymmetries among industry actors and regions. The paper argues that those actors capable of securing reliable SAF supply through long-term contracts, infrastructure investments and cross-sector partnerships are better positioned to transform sustainability constraints into strategic advantage. The paper concludes that competition in aviation is increasingly shaped not only by operational efficiency or network reach, but also by the capacity to strategically manage sustainability transitions.

Keywords: Sustainable Aviation Fuel (SAF), Aviation Industry, Strategic Management, Sustainability Competition, Supply Chains

JEL Classification: L93, M10, Q56, R40

1. Introduction

The aviation industry is entering a period in which sustainability is no longer a peripheral environmental concern, but a central strategic issue. For decades,

competition in aviation has been discussed mainly in terms of cost efficiency, network reach, fleet planning, service quality, operational performance, and so on. While these factors remain crucial in the industry, the transition toward net-zero aviation is adding a new dimension to competition: the capacity to manage sustainability in a credible, coordinated, and operationally integrated way.

Sustainable Aviation Fuel (SAF) exhibits one of the clearest examples of this shift. SAF is widely recognised as a key instrument for reducing aviation-related emissions because it can be used as a drop-in fuel within existing aircraft and fuel systems, while offering substantial lifecycle emissions reductions compared with conventional jet fuel depending on feedstock and production pathway (Braun, Grimme and Oesingmann, 2024; Klimczyk et al., 2025). At the same time, SAF remains scarce, costly and unevenly available across regions. This creates a gap between the industry's sustainability commitments and the operational capacity to deliver them.

This paper discusses that SAF should be viewed not only as a technical fix or regulatory mandate but also as a strategic management challenge. The focus is not only on SAF's potential to reduce emissions but also on how the ability to acquire, organize, govern, and scale SAF could alter competitive dynamics within the aviation sector. This perspective is especially significant for management research, as adopting SAF requires strategic cooperation among organizations, industries, and institutions, going beyond simple technological implementation.

2. SAF and the changing nature of competition

Sustainability is increasingly becoming a source of legitimacy and differentiation in aviation. Airlines are expected to demonstrate credible climate action, and airports are under pressure to align infrastructure and operations with environmental goals. Investors increasingly evaluate firms through environmental, social and governance criteria. Regulators are introducing mandatory requirements such as the European Union's ReFuelEU Aviation Regulation, which establishes minimum SAF supply shares from 2025 and progressively increases them toward 2050 (European Commission, 2023).

This regulatory and market environment shifts the way aviation players compete. Previously, environmental performance was generally seen as a component of corporate social responsibility. However, now an airline's sustainability approach can impact its reputation, stakeholder confidence, funding opportunities, and readiness for upcoming regulations. Similarly, an airport's sustainable infrastructure can influence its appeal to airlines and its position within regional aviation systems. This also applies to other industry players, such as ground handling agencies, fuel suppliers, producers, and infrastructure providers. Therefore, it is increasingly viewed as a key element of competitive advantage.

SAF is strategically important because it lies at the intersection of these pressures. It connects climate policy, fuel procurement, infrastructure, logistics, communication

and long-term investment. It also creates new asymmetries. Large airlines and major hubs may be able to secure supply earlier, while smaller actors and peripheral regions may face higher costs and weaker access. In this respect, SAF may serve as a mechanism for distributing sustainability advantages and disadvantages across the industry.

3. SAF as a strategic capability

Strategic management theory approaches the significance of SAF adoption as more than mere compliance with environmental rules. From the Resource-Based View, a competitive advantage depends on resources and capabilities that are valuable, rare, inimitable, and embedded within the organization (VRIO) (Barney, 1991). While SAF itself is not proprietary, the ability to access, manage, and incorporate SAF into corporate strategies could become strategically valuable. This is where the VRIO framework helps clarify the link between environmental sustainability and strategic advantage. Reliable SAF supply is valuable as it ensures compliance, enhances reputation, and aligns with long-term climate goals. It is relatively rare due to limited global production capacity and uneven geographic distribution. Imitation may be difficult because it often requires long-term contracts, infrastructure investments, partnerships with fuel producers, and organizational expertise. Ultimately, it becomes strategically significant only when the organization is structured to utilize it effectively across procurement, operations, finance, communication, and stakeholder management.

Additionally, dynamic capabilities also provide an insightful perspective on SAF adaptation in aviation. As Teece (2018) notes, dynamic capabilities are skills to identify opportunities and threats, act on them, and adapt organizational resources accordingly. Implementing SAF requires abilities such as detecting regulatory and market shifts, leveraging partnerships, and modifying procurement, infrastructure, and governance. Companies that respond quickly and consistently may gain a competitive edge in the evolving net-zero aviation landscape.

4. Governance, logistics and ecosystem management

The primary consideration regarding SAF is that its development cannot be undertaken by a single entity independently. Although an airline may commit to utilizing SAF, it cannot singularly ensure the supply of feedstock, establish refineries, certify fuel pathways, coordinate airport storage, finance production facilities, or guarantee regulatory stability. Therefore, deploying SAF requires managing a complex ecosystem. This makes SAF as much a governance challenge as a fuel issue. The supply chain includes fuel producers, energy companies, logistics providers, airports, airlines, aircraft manufacturers, investors, regulators, and governments, among others, all with different incentives, timelines, and risk perceptions. Fuel producers may be hesitant to invest without long-term demand certainty, while airlines might avoid signing long-term deals if costs stay high. Airports in this environment could delay infrastructure

upgrades amid supply uncertainties. Governments might implement mandates, but mandates alone will not create sufficient production capacity.

Beyond individual firm capabilities, the uneven development of SAF ecosystems worldwide can be viewed through Porter's Diamond Model of national competitiveness, which considers factors such as feedstock availability, technology, supporting industries, infrastructure, regulation, and domestic demand (Porter, 1990). Leadership in SAF deployment therefore depends not only on organizational capabilities but also on the broader national and regional environments that facilitate innovation, investment, and collaboration. Consequently, differences in SAF adoption may increasingly reflect ecosystem competitiveness rather than solely firm-level strategic choices.

This perspective is consistent with recent SAF studies that identify high production costs, infrastructure gaps, feedstock constraints, and supply-chain coordination challenges as major barriers to large-scale deployment (Braun, Grimme, and Oesingmann, 2024; Uddin et al., 2025; Klimczyk et al., 2025). Therefore, aviation management should move beyond assertions focused solely on environmental sustainability. Strategies involving SAF must be integrated into long-term procurement plans, airport development, supplier relationships, investments, and stakeholder collaboration. Achieving this alignment could become a crucial managerial capability in the industry's increasingly competitive environment.

In practice, SAF readiness is more than a technical issue; it reflects how effectively an aviation actor can govern and coordinate the sustainability transition. This underscores the importance of industry collaboration, policy alignment, and multi-stakeholder engagement in achieving net-zero aviation goals (Sengur and Altuntas, 2023). Supporting this view, recent evidence from a hub airport ecosystem demonstrates that organisational trust, inter-organisational collaboration, and network positioning are closely associated with aviation firm performance, including environmental and social performance outcomes (Akinet and Sengur, 2026). These findings reinforce the argument that SAF deployment depends not only on technological progress but also on the extent to which stakeholders coordinate investments, align incentives, and establish long-term partnerships.

Institutional pressures further influence SAF adoption. Regulations such as ReFuelEU Aviation create expectations and obligations that shape strategic choices across the industry. Institutional theory suggests that organizations respond not only to efficiency considerations but also to legitimacy pressures originating from regulators, professional bodies, and society (DiMaggio and Powell, 1983). In this respect, SAF adoption reflects a dual logic: it is simultaneously an operational decision, a strategic investment, and a response to evolving institutional norms.

5. Strategic implications for aviation actors

The strategic implications of SAF are different for industrial stakeholders. SAF presents an additional dimension of strategic procurement and risk management for airlines. It can enhance environmental credibility and regulatory preparedness, but also raises sensitivity to fuel cost volatility and supply uncertainty. Airlines that sign long-term contracts and incorporate SAF into wider decarbonisation strategies could be at a competitive advantage relative to those that treat SAF as a reporting figure only.

For airports, SAF is an opportunity to increase their strategic role. Airports are no longer just physical infrastructure for aviation operations but are increasingly becoming platforms for orchestrating sustainability transformations. SAF-ready storage, blending, and delivery systems can enhance airport competitiveness, particularly for hubs serving airlines that are working to comply with their climate action plans.

For fuel manufacturers and energy companies, SAF is a new market opportunity, but one that requires investment and carries uncertainty. Those stakeholders require stable demand, sound regulations, and offtake agreements.

Governments and regulators find it hard to design policy frameworks that encourage output, reduce uncertainty, and avoid imposing unfair competitive burdens. While mandates can boost demand, without incentives, infrastructure, and investment certainty, they risk widening the gap between ambition and delivery. Stakeholder theory is relevant in this context because the deployment of SAF depends on players aligning around interdependent interests (Freeman, 1984).

6. Conclusion

SAF is often considered an alternative fuel, but it should also be viewed as a strategic management issue for the stakeholders of the aviation industry. It is not just a matter of aircraft decarbonization, but also impacts on competition, governance, and inter-organizational dynamics. This discussion contributes to the strategic management literature on sustainability transitions by conceptualizing SAF as a strategic competency rather than a technological or environmental solution per se. It highlights governance, ecological coordination, and competitive dynamics, thereby extending the current discourse beyond production technology and regulatory compliance.

As sustainability emerges as a key value driver in competition, the ability to organize and scale SAF may become a major strategic advantage. The future competition in aviation will be a matter not only of operational efficiency, network expansion, or service excellence, but also of the ability to master sustainability transitions. SAF is therefore not only about changing the fuel but also about changing the competitive and collaborative dynamics of value creation in the race for net-zero aviation.

Acknowledgements

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Micromobility as a Catalyst for Transport Transformation from a Students' Perspective

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Abstract

Micromobility is increasingly recognized as an important driver of contemporary transport transformation, supporting sustainability goals, urban accessibility, and innovation in mobility systems. This article examines micromobility as a catalyst for transport transformation from a students' perspective, focusing on how future economists and managers perceive its role, opportunities, and challenges within modern transport systems. The research is based on a quantitative survey conducted among 174 students at the Faculty of Business Management, Bratislava University of Economics and Business. The article explores students' awareness of micromobility concepts, their attitudes toward its economic, environmental, and managerial implications, and their assessment of its potential contribution to sustainable transport development. By adopting a systemic perspective, the paper highlights how micromobility is understood not only as a technological innovation but also as an interconnected element of broader economic and policy frameworks. The findings provide insights into students' readiness to engage with transport transformation issues and underline the importance of integrating micromobility topics into economics and management education.

Keywords: micromobility; transport transformation; electromobility systems; economics and management education

JEL Classification: Q01, R41, O33

1. Introduction

Transport today is not merely a technical or infrastructural issue; it is increasingly also an economic, social, and values-based challenge. Cities are facing growing pressure to reduce emissions, alleviate traffic congestion, and identify forms of mobility that are flexible, accessible, and sustainable. In this context, micromobility is gradually becoming one of the most visible manifestations of the changing transport

landscape. However, micromobility is significant not only because it introduces new modes of transport into urban environments. More importantly, it raises new questions about how people understand mobility, which forms of transport they consider promising, and the extent to which they are prepared to change their established travel habits. For this reason, it is important to monitor not only the technological development of micromobility but also the ways in which it is socially perceived and interpreted. This issue is particularly relevant for students, as they are not only active users of mobility services but also represent a generation that will assume economic, managerial, and public policy roles in the future.

The university environment provides a particularly suitable setting for exploring these issues. Cattaneo et al. (2018) demonstrate that students constitute a mobility-specific group whose travel behaviour is relatively flexible and responsive to environmental incentives. This is further supported by the findings of Joly et al. (2026), who argue that students' sustainable travel behaviour is shaped not only by individual preferences but also by the broader cultural and institutional environment of their educational institution. Consequently, students' attitudes towards micromobility can be understood not only as an expression of current travel behaviour but also as an indicator of the younger generation's broader willingness to consider transport within the context of sustainability, innovation, and systemic change.

This article therefore examines micromobility as a catalyst for transport transformation from the perspective of students at the Faculty of Business Management, University of Economics in Bratislava, Slovak Republic. Its aim is to analyse how future economists and managers perceive the concept of micromobility, what opportunities and risks they associate with it, and the extent to which they understand it as part of a broader transformation of transport towards sustainability, accessibility, and innovation. The article is based on a quantitative questionnaire survey conducted among 174 students and seeks to contribute to a better understanding of how the younger generation of future professionals interprets emerging forms of mobility in the context of economic, environmental, and managerial considerations.

2. Theoretical background

The current transformation of transport is closely linked to the search for mobility solutions capable of reducing environmental impacts, traffic congestion, and dependence on private car travel, whilst maintaining or improving the accessibility and flexibility of movement. In this context, the literature identifies shared mobility and transport electrification as two major trends. As noted by Liao and Correia (2022), it is precisely the combination of these trends that has the potential to reduce journeys undertaken by private cars, lower greenhouse gas emissions, and improve mobility accessibility. At the intersection of these developments, micromobility is emerging as

a significant component of the broader shared e-mobility ecosystem and as one manifestation of contemporary innovation in urban transport.

Micromobility is generally associated with lightweight vehicles designed primarily for short urban journeys. One of the more recent syntheses defines it as a category of light vehicles travelling at speeds below 25 km/h, typically used for distances of up to approximately 10 kilometres, including bicycles, e-bikes, scooters, and e-scooters. Understood in this way, micromobility is regarded as a potential instrument for reducing car dependency and promoting sustainable transport, particularly in urban environments facing increasing energy consumption and CO₂ emissions resulting from individualised travel behaviour (Fuady et al., 2025). Similarly, Liao and Correia (2022) emphasise that e-bikes and e-scooters currently represent the two most significant forms of shared electric micromobility.

From the perspective of the transport system, micromobility is significant because it can function both as a complement to and a partial substitute for existing modes of transport. The literature most frequently highlights its role in addressing the so-called first-mile/last-mile problem, namely connecting the initial or final stage of a journey to public transport services. As noted by Kazemzadeh and Sprei (2022), e-scooters are considered particularly suitable for these short connecting trips. At the same time, however, Kazemzadeh, Haghani and Sprei (2023) argue that, under certain conditions, e-scooters may also substitute for public transport or private car journeys. Consequently, micromobility should not be viewed merely as a marginal technological innovation but rather as an element that influences modal split patterns, reshapes the logic of urban travel, and affects the integration of transport modes within the wider transport system.

The literature further demonstrates that micromobility has the potential to contribute to sustainable transport objectives through several mechanisms. Liao and Correia (2022) note that shared e-mobility can reduce car usage, car ownership, and greenhouse gas emissions whilst simultaneously increasing the accessibility and flexibility of mobility, particularly for shorter urban journeys. From a broader shared mobility perspective, Martinez, Pritchard and Crist (2024) argue that environmental benefits are reflected primarily in potential reductions in CO₂ emissions, other pollutants, noise levels, energy consumption, and pressure on public space, particularly when such services are developed as part of a systemic transformation of mobility rather than in isolation. Micromobility can therefore serve as a practical instrument for supporting transport decarbonisation, but only if it is effectively integrated with other elements of the urban transport system.

Despite this potential, the literature also highlights that the transformative impact of micromobility is not automatic. Liao and Correia (2022) explicitly state that the

positive effects of shared e-mobility on transport systems and the environment depend on specific operational conditions, the type of service provided, the characteristics of the vehicles used, their lifespan, and, importantly, whether micromobility replaces journeys that would otherwise be undertaken by car. Fuady et al. (2025) likewise emphasise the systemic dimension of this transformation, arguing that micromobility can act as a catalyst for sustainable urban transport, particularly when integrated into a broader framework encompassing public transport, decarbonisation strategies, and measures aimed at reducing car dependence. From a theoretical perspective, this implies that micromobility should not be assessed in isolation but rather as a component of a wider socio-technical transport system.

The determinants of micromobility adoption and use therefore constitute a major topic of theoretical discussion. A scoping review of electric micromobility indicates that users often perceive this mode of transport as cost-effective, flexible, rapid, and practical, whilst also improving accessibility and urban connectivity (Bretones et al., 2023). However, the same authors identify several barriers, including inadequate infrastructure, insufficient end-of-trip facilities, technical malfunctions, limited usability in certain terrains and traffic conditions, and safety concerns. Consequently, understanding the interaction between contextual factors and individual user motivations is essential for the sustainable expansion of micromobility.

Closely related to these determinants is the issue of the built environment and public space. As demonstrated by Zhang, Kasraian and van Wesemael (2023), the relationship between micromobility and the built environment manifests itself at the level of nodes, routes, and entire transport networks and encompasses urban design, land use, and transport infrastructure. The growth of micromobility creates demand for parking facilities, new or adapted traffic lanes, enhanced pedestrian protection measures, and a broader redistribution of public space aimed at creating a safe and inclusive urban environment. Theoretical reflections on micromobility are therefore not limited to users and vehicles but also encompass the question of how urban environments enable or constrain its safe and effective use.

Safety and regulatory considerations likewise warrant particular attention. Kazemzadeh, Haghani and Sprei (2023) note that whilst e-scooters effectively address first-mile and last-mile mobility needs, their proliferation has been accompanied by significant safety concerns. These include frequent conflicts with pedestrians, problems associated with improper parking, and a growing number of accidents, with head and facial injuries among the most common consequences. The authors further argue that the absence of uniform regulations may hinder the safe adoption of this mode of transport. Kazemzadeh and Sprei (2022) similarly advocate a distinct approach to e-scooters, emphasising that they should be understood as a unique

mode of transport with specific characteristics relating to user comfort and spatial interactions, rather than merely as a variation of existing transport modes. Consequently, micromobility represents not only a technological and environmental challenge but also a regulatory and managerial one.

For the purposes of this article, however, the crucial issue is not only what micromobility objectively offers but also how it is perceived by students as a specific social group. The university environment provides a particularly suitable context for such research. Joly et al. (2026) demonstrate that mobility accounts for a substantial share of universities' carbon footprints and that students' commuting behaviour is shaped not only by individual preferences and infrastructure availability but also by the institution's cultural and normative environment. Their findings further indicate that a university's green organisational culture reduces environmentally harmful commuting behaviour, with personal norms emerging as some of the strongest determinants of sustainable mobility choices. Universities therefore represent not merely passive settings in which mobility occurs but active environments that can either encourage or discourage sustainable travel behaviour.

Equally important is the finding that students do not constitute a homogeneous group and that their attitudes towards mobility are influenced by individual, spatial, and psychological factors. In their study of university students, Cattaneo et al. (2018) found that greater awareness of environmental issues increases the likelihood of using sustainable modes of mobility whilst reducing reliance on private transport. They also observed that the effectiveness of sustainable mobility promotion may vary according to the specific campus environment and its spatial characteristics. These findings are particularly significant because they suggest that academic and cultural environments influence young people's mobility decisions. Students are therefore not only current transport users but also future decision-makers who may shape corporate, public, and urban mobility systems in the years to come.

From an economic and managerial perspective, the student viewpoint is especially relevant because future economists and managers will help shape transport policies, corporate mobility strategies, investment priorities, and the acceptance of new mobility-related business models. From this perspective, micromobility appears not merely as a mode of transport but also as a phenomenon with broader economic, environmental, and managerial implications. The theoretical foundations of this article are therefore grounded in an understanding of micromobility as a socio-technical component of transport transformation, the effects of which are conditioned by urban infrastructure readiness, safety and regulatory frameworks, integration with public transport, and users' values and normative attitudes. In this context, university students represent a particularly valuable analytical group because they

simultaneously occupy two roles: current actors within mobility systems and future economic and managerial decision-makers who will help shape the next phase of transport transformation.

3. Methodology

The research was conducted in two phases. First, a literature review of international scientific sources was carried out to establish the theoretical background of the study, focusing on micromobility, sustainable transport, transport transformation, and the economic and environmental implications of emerging mobility solutions.

Based on the theoretical findings, a structured questionnaire survey was developed and distributed among students of the Faculty of Business Management at the Bratislava University of Economics and Business, Slovak Republic. The empirical analysis is based on a sample of 174 respondents, comprising Bachelor's 1st year ($n = 48$), Bachelor's 2nd year ($n = 42$), Bachelor's 3rd year ($n = 38$), Master's 1st year ($n = 26$), and Master's 2nd year ($n = 20$) students. The questionnaire focused on students' awareness of micromobility, their perceptions of its economic and environmental benefits, its role in transport transformation, and the barriers to its wider adoption.

Data were processed using descriptive statistical methods. Frequency distributions and percentage shares were calculated for each response category in order to identify prevailing attitudes and perceptions regarding micromobility. The results were subsequently analysed according to respondents' year of study, allowing for the identification of similarities and differences between bachelor's and master's students.

4. Findings and Discussion

The opening question assessed respondents' self-reported awareness of the concept of micromobility, understood to encompass such modes as e-scooters, shared bicycles and e-bikes. The most common response, reported by 44.83 % of participants, indicated that they were aware of the concept and generally understood it, whilst the smallest proportion (8.62 %) stated that they were not aware of it at all. The remaining categories—being very aware and able to explain the concept in detail (24.71 %) and having heard of it but being unsure of its meaning (21.84 %)—attracted broadly similar proportions, differing by fewer than three percentage points. Being aware and generally understanding the concept was the predominant response across all groups, and the proportion reporting no awareness declined among the master's-level groups. When analysed by year of study, this response was proportionally most prevalent among third-year bachelor's students (47.37 %) and least prevalent among first-year bachelor's students (41.67 %).

Table 1. Awareness of the concept of micromobility (% within each year of study; n = 174) (source: the author's own processing)

Response option	Bachelor's 1st year	Bachelor's 2nd year	Bachelor's 3rd year	Master's 1st year	Master's 2nd year	Total
Very aware – can explain it in detail	16.67 %	21.43 %	28.95 %	30.77 %	35.00 %	24.71 %
Aware and generally understand it	41.67 %	45.24 %	47.37 %	46.15 %	45.00 %	44.83 %
Have heard of it, but not sure what it means	29.17 %	23.81 %	18.42 %	15.38 %	15.00 %	21.84 %
Not aware of it at all	12.50 %	9.52 %	5.26 %	7.69 %	5.00 %	8.62 %
Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %
Base (n)	48	42	38	26	20	174

This question examined students' predominant understanding of micromobility by asking them to choose between four alternative interpretations. The interpretation of micromobility as an integral element of a sustainable transport system proved the most prevalent, selected by 41.95 % of participants, whereas its dismissal as a temporary trend of limited relevance was the least frequent response at 12.07 %. The technological-innovation framing (24.14 %) and the recreational, leisure-oriented framing (21.84 %) were endorsed at broadly similar rates, differing by little more than two percentage points. This similarity between the two secondary interpretations was also evident across most years of study. When analysed by student group, the sustainable-system framing reached its highest proportion among second-year master's students (50.00 %) and its lowest among first-year bachelor's students (37.50 %).

Table 2. Predominant understanding of micromobility (% within each year of study; n = 174) (source: the author's own processing)

Response option	Bachelor's 1st year	Bachelor's 2nd year	Bachelor's 3rd year	Master's 1st year	Master's 2nd year	Total
A technological innovation in transport	25.00 %	26.19 %	23.68 %	23.08 %	20.00 %	24.14 %
An element of a sustainable transport system	37.50 %	40.48 %	42.11 %	46.15 %	50.00 %	41.95 %
A leisure or recreational option	25.00 %	21.43 %	21.05 %	19.23 %	20.00 %	21.84 %
A temporary trend of limited relevance	12.50 %	11.90 %	13.16 %	11.54 %	10.00 %	12.07 %

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Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %
Base (n)	48	42	38	26	20	174

Respondents were asked to state their level of agreement with the assertion that micromobility constitutes an important driver of contemporary transport transformation. Simple agreement was the dominant position at 46.55 %, complemented by strong agreement among 34.48 % of respondents, meaning that the two affirmative categories together accounted for the majority of responses. Disagreement remained comparatively rare, expressed by 13.79 %, whilst strong disagreement was the least common response at 5.17 %. This positive orientation was sustained, with only minor variation, across all five groups of students. The agreement response was most prevalent among second-year bachelor's students (47.62 %) and least prevalent among second-year master's students (45.00 %).

Table 3. Agreement that micromobility drives transport transformation (% within each year of study; n = 174) (source: the author's own processing)

Response option	Bachelor's 1st year	Bachelor's 2nd year	Bachelor's 3rd year	Master's 1st year	Master's 2nd year	Total
Strongly agree	31.25 %	33.33 %	34.21 %	38.46 %	40.00 %	34.48 %
Agree	45.83 %	47.62 %	47.37 %	46.15 %	45.00 %	46.55 %
Disagree	16.67 %	14.29 %	13.16 %	11.54 %	10.00 %	13.79 %
Strongly disagree	6.25 %	4.76 %	5.26 %	3.85 %	5.00 %	5.17 %
Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %
Base (n)	48	42	38	26	20	174

Participants were invited to identify the most significant economic benefit attributable to micromobility. The creation of new business models and markets was selected most frequently, by 36.21 % of respondents, whilst the view that micromobility generates no significant economic benefit received the lowest level of support at 10.92 %. The two intermediate options-reduced personal transport costs for users (27.59 %) and lower infrastructure and congestion costs (25.29 %)-attracted similar levels of support, differing by little more than two percentage points and together accounting for a share approaching that of the leading option. The creation of new business models and markets was selected most often by second-year master's students (40.00 %) and least often by first-year bachelor's students (33.33 %).

Table 4. Most significant economic benefit (% within each year of study; n = 174) (source: the author's own processing)

Response option	Bachelor's 1st year	Bachelor's 2nd year	Bachelor's 3rd year	Master's 1st year	Master's 2nd year	Total
Reduced personal transport costs	29.17 %	28.57 %	26.32 %	26.92 %	25.00 %	27.59 %
New business models and markets	33.33 %	35.71 %	36.84 %	38.46 %	40.00 %	36.21 %
Lower infrastructure and congestion costs	25.00 %	26.19 %	26.32 %	23.08 %	25.00 %	25.29 %
No significant economic benefit	12.50 %	9.52 %	10.53 %	11.54 %	10.00 %	10.92 %
Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %
Base (n)	48	42	38	26	20	174

Respondents were asked to identify the environmental aspect of micromobility they considered most important. The reduction of greenhouse gas emissions and the reduction of urban air and noise pollution emerged as joint leading priorities, each selected by 32.76 % of respondents. More efficient use of urban space accounted for 21.26 % of responses, whilst concern regarding the lifecycle and disposal of devices and batteries was the least frequently prioritised aspect, at 13.22 %. The equal prominence of the two leading environmental concerns was evident across all student groups, with only minor variation. A more detailed analysis shows that the reduction of greenhouse gas emissions was prioritised most frequently by second-year master's students (35.00 %), whereas the reduction of urban air and noise pollution received its highest level of support among third-year bachelor's students (34.21 %).

Table 5. Most important environmental aspect (% within each year of study; n = 174) (source: the author's own processing)

Response option	Bachelor's 1st year	Bachelor's 2nd year	Bachelor's 3rd year	Master's 1st year	Master's 2nd year	Total
Reduction of greenhouse gas emissions	31.25 %	33.33 %	31.58 %	34.62 %	35.00 %	32.76 %
Decrease in air and noise pollution	33.33 %	33.33 %	34.21 %	30.77 %	30.00 %	32.76 %
More efficient use of urban space	20.83 %	21.43 %	21.05 %	23.08 %	20.00 %	21.26 %

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Lifecycle and disposal of devices/batteries	14.58 %	11.90 %	13.16 %	11.54 %	15.00 %	13.22 %
Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %
Base (n)	48	42	38	26	20	174

Respondents rated the overall contribution of micromobility to sustainable transport development. A moderate contribution was the most frequently selected assessment, accounting for 43.68 % of responses, whilst a major contribution was recognised by a further 35.06 % of respondents. The view that micromobility makes no meaningful contribution was the least common response, at 5.17 %, whereas 16.09 % considered its contribution to be minor. The relative ranking of the four assessments remained consistent across all student groups. A moderate contribution was reported most frequently by second-year bachelor's students (45.24 %) and least frequently by second-year master's students (40.00 %).

Table 6. Overall contribution to sustainable transport development (% within each year of study; n = 174) (source: the author's own processing)

Response option	Bachelor's 1st year	Bachelor's 2nd year	Bachelor's 3rd year	Master's 1st year	Master's 2nd year	Total
A major contribution	33.33 %	33.33 %	34.21 %	38.46 %	40.00 %	35.06 %
A moderate contribution	43.75 %	45.24 %	44.74 %	42.31 %	40.00 %	43.68 %
A minor contribution	16.67 %	16.67 %	15.79 %	15.38 %	15.00 %	16.09 %
No real contribution	6.25 %	4.76 %	5.26 %	3.85 %	5.00 %	5.17 %
Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %
Base (n)	48	42	38	26	20	174

Participants identified the principal barrier impeding the wider adoption of micromobility. Insufficient or unsafe infrastructure was the most frequently cited obstacle, selected by 33.33 % of respondents, whilst cultural and behavioural resistance to change was identified least often, at 16.09 %. The two intermediate barriers-user concerns regarding safety and reliability (27.01 %) and regulatory uncertainty (23.56 %)-occupied adjacent positions, differing by fewer than four percentage points and together accounting for a substantial proportion of responses. The proportion of respondents identifying insufficient or unsafe infrastructure as the principal barrier was highest among first-year master's students (34.62 %) and lowest among second-year master's students (30.00 %).

Table 7. Principal barrier to wider adoption (% within each year of study; n = 174) (source: the author's own processing)

Response option	Bachelor's 1st year	Bachelor's 2nd year	Bachelor's 3rd year	Master's 1st year	Master's 2nd year	Total
Insufficient or unsafe infrastructure	33.33 %	33.33 %	34.21 %	34.62 %	30.00 %	33.33 %
Regulatory uncertainty	22.92 %	23.81 %	23.68 %	23.08 %	25.00 %	23.56 %
Safety and reliability concerns	27.08 %	26.19 %	26.32 %	26.92 %	30.00 %	27.01 %
Cultural and behavioural resistance	16.67 %	16.67 %	15.79 %	15.38 %	15.00 %	16.09 %
Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %
Base (n)	48	42	38	26	20	174

5. Conclusion

Micromobility is increasingly recognised as an important component of sustainable transport systems and a potential catalyst for wider transport transformation. Borne et al. (2025) argue that university mobility should not be viewed merely as a transport service issue, but rather as a strategic sustainability domain in which environmental, economic, technical and organisational dimensions intersect. Their study indicates that university campuses provide particularly favourable conditions for testing transport electrification, as shorter travel distances and more controlled operating environments facilitate implementation. Furthermore, the potential benefits extend beyond reductions in emissions to include lower noise levels, improved air quality, reduced long-term operating costs and wider institutional innovation.

At the same time, Borne et al. (2025) emphasise that the success of such transitions depends not only on the technology itself, but also on the availability of adequate charging infrastructure, financial viability, and the acceptance of the academic community and other stakeholders. In this context, students' perceptions of micromobility and transport transformation should be interpreted as only one component of a wider process of sustainable mobility transition. Whilst support for sustainable mobility may reflect a willingness to embrace change, its transformative potential will ultimately depend on whether universities can translate favourable attitudes into practical implementation through institutional commitment, strategic investment and supportive infrastructure.

This article examined micromobility as a catalyst for transport transformation from the perspective of students of the Faculty of Business Management at the Bratislava

University of Economics and Business, Slovak Republic. The primary objective was to analyse students' awareness of micromobility, their understanding of its role within contemporary transport systems, and their perceptions of its economic, and environmental implications.

The findings indicate that the majority of respondents demonstrate a relatively high level of awareness of the concept of micromobility. Most students perceive micromobility not merely as a technological innovation but primarily as an integral component of sustainable transport systems. Furthermore, a substantial majority consider micromobility to be an important driver of contemporary transport transformation, reflecting a generally positive attitude toward its future role in mobility systems. From an economic perspective, respondents most frequently identified the creation of new business models and markets as the principal benefit of micromobility, highlighting their awareness of its entrepreneurial and innovation potential. Environmental benefits were predominantly associated with the reduction of greenhouse gas emissions and the reduction of urban air and noise pollution, confirming that students recognize the contribution of micromobility to broader sustainability objectives. Most respondents also assessed the contribution of micromobility to sustainable transport development as either moderate or substantial. At the same time, students identified several important challenges that may hinder wider adoption. Insufficient or unsafe infrastructure emerged as the most significant barrier, followed by concerns related to safety, reliability, and regulatory uncertainty.

A limitation of the present article is that the research was carried out exclusively among students of the Faculty of Business Management at the Bratislava University of Economics and Business, Slovak Republic. This limitation reflects the fact that the article represents a partial output of a broader research project examining electromobility among students of the faculty.

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Removal of carton waste for greener luminaires manufacturing industry

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Abstract

This research paper will focus on the advantages of eliminating cardboard waste and recycling it within the lighting manufacturing industry. The study starts with an analysis of possible solutions, finding key areas for development. A major challenge spotlighted was the shortage of space and the commercial losses associated with damaged cardboard, which often accumulated as waste. To manage these problems, an operational procedure evolved for the effective recycling of cardboard. This procedure focuses on oversimplifying the production process, to reduce the waste, and to optimize the management resources. Once this practice is facilitated, the implementation stage begins. Firstly, was ensuring that all production staff have been trained and equipped to use recycled cardboard in their workflows. Three months after the implementation, the results were important: production value decreased by 30%. This reduction doesn't demonstrate the financial feasibility of recycling cardboard but also spotlighted the environmental advantage for waste reduction. The findings underline the importance of feasible practices in manufacturing; facilitate the way for too efficient resource use and savings of the cost in the industry. Overall, the research illustrates that by adopting innovative waste management strategies, companies can achieve both economic and ecological benefits.

Keywords: cardboard waste; reuse; manufacturing; cost reduction; sustainability

JEL Classification : M11, L15, L23, Q53, Q56

1. Introduction

Quality becomes one of the principal tools from competitive strategic perspective and most of the organizations realize that quality is vital for products development that ensures ongoing success. Quality becomes an omnipresent value and has a worldwide problem. With the aim of surviving and offering customers excellent

products, the production companies are obligated to validate that techniques are always observed and improve for the standard of the product. Quality control is the method that assesses results related to a criterion and grabs remedial action while result doesn't meet the criterion (Stevenson, 2018; Montgomery, 2019). When the output is acceptable, other action is unnecessary; corrective action needs to be for unacceptable results. Whenever a company fails, it should take quality management seriously, it consistently causes the products to undergo revision, scraped or customer refund.

Research papers see the rework as the method whereby an element is made to be conforming to the standard by achievement or the modification (Love et al., 2016). May also be noticed as the irrelevant struggle of remaking an operation or an action that was applied wrong (Love et al., 2019). Other research establishes rework like a deviation from quality point of view, in remaking words, that remake and quality relate mutually (Asadi et al., 2023). Where management and quality control was not implemented proper rework appears. Basically, rework can outcome from errors, negligence, damages, failures and modification of orders over the purchasing process (Love et al., 2020; Hwang et al., 2019). Some research papers classify poor quality in three kinds of rework causes (technological and quality elements and manpower) discovered the hardness statistical indicators. (Love et al., 2020; Evans & Lindsay, 2020; Siva et al., 2016; Hwang et al., 2019). There are always quality costs taking part in guaranteeing that products are in conformity with the requirements and there are charges for participating every time in a rework. Other papers tense the significance cost evaluation for the rework in the context of cost of conformance (Akhil & Jagathy Raj, 2024; Wawak et al., 2020; Forcada et al., 2017). While kept up that modify is the most donor the time and cost occupy in project execution procedure (Alaghbari et al., 2019; ElGohary & Aziz, 2017; Ayalp & Arslan, 2025).

Non-conformance costs bound pointed where revise is discovered at that moment rework is finalized and the activity restarted how was in original. The price monitoring time includes the transfer time, the time the review is detected, the time required to perform the redo, and the time required to be ready to maintain the base workload of the domain (Assaad et al., 2022). Past research demonstrated that non-conformity costs fluctuate 3-15% of agreement fees (Asadi et al., 2023; Safapour & Kermanshachi, 2019; Forcada et al., 2017). In industrial sector under review, the question was: What generates non-conforming products? How much does it cost monthly the modification of non-conforming products? Should we rework non-conforming elements or discard them? Which are the cost benefits of remaking instead of discarding? (Sharma & Laishram, 2023). Considering the corrections can be used by administration to appreciate how quality has been arranged and to find out issues into the manufacturing process.

Thoughtfully evaluated issues above of significant into the business, the research performs following objectives: Find the real sources of non-conforming elements inside of the business; Evaluate the expense of remake inside of the business; Discover the price for non-conforming products; Appraise charge advantage of remake instead of discarding inside the production sector. It is understood that accomplishing the

upper scope will allow administration to identify efficient avoidance plans that have potential to be put in place to enhance products accomplishment relating to quality, cost and time. The analysis of the price quantity can be applied in this research to achieve the higher goal.

1.1 Research Gap

Although extensive literature exists on product quality, rework costs, and quality management practices, there remains a significant research gap in several areas relevant to this study:

1. Limited research on rework strategies in cardboard-based manufacturing processes.
Most studies focus on sectors such as construction, metal fabrication, or mechanical industries.
2. Absence of standardized rework techniques for non-conforming cardboard elements.
Active research identifies different causes for the defects but doesn't provide specific, validated methods of rework suitable for cardboard element for their structural and mechanical properties.
3. Incomplete comparative analyses of scrap versus rework costs for cardboard elements.
While the literature recognizes both rework costs and quality costs, there are few evidence acknowledgments where rework can be more economically beneficial than scrapping.
4. Regardless of a growing focus on enduring production, few studies assess the environmental opportunities of repairing cardboard elements rather than scrapping them.
5. Lack of research on short-term operative cost adaptation triggered by marketplace conditions.

By handling these gaps, the present research affords into field by developing and rating efficient, economically and sustainable justified methods of rework for cardboard elements, thereby adding new knowledge to both quality management and sustainable manufacturing research.

1.2. Research Objectives

General Objective

To implement, develop and evaluate efficient rework methods for cardboard elements to minimize the waste for the material, minimize costs of the production, and improve the sustainability for manufacturing operations.

Research Objectives

The purpose of this paper is to show that rework is much more efficient than scraping in the cardboard area, being able to significantly reduce costs by up to a third. These reworks can be done even with components already available internally, with no need for new elements or a long time.

2. Materials and Methods

In processes of manufacturing, involving cardboard elements, a significant segment of material and commercial losses constantly rises from the discarding of elements that don't meet the initial quality needs. This research is based on identifying and carries out effective rework techniques that allow non-compliant cardboard elements to be fixed or repurposed rather than being discarded.

The company's multifunctional team identified that the costs related to cardboard scrap had reached very high amounts, and this was affecting the group's profit. After several internal meetings, it was discovered that it is difficult to avoid defective cardboard elements due to a high volume of products per day. For this reason, it was decided to carry out a more detailed weekly monitoring of cardboard scrap and to look for convenient rework methods to reduce costs.

After 2 months (February 2024 and March 2024) when the price for scrap on cardboard was high, between 250 and 300 euro per month, the following reworking processes were adopted to see the cost reduction in this field. As we can see the cost was reduced by 3.

Table 1. Table for cost reduced by 3 (internal data)

Area	February 2024	March 2024	April 2024	May 2024	June 2024
Cardboard (total price – euro)	252	306	101	71	95

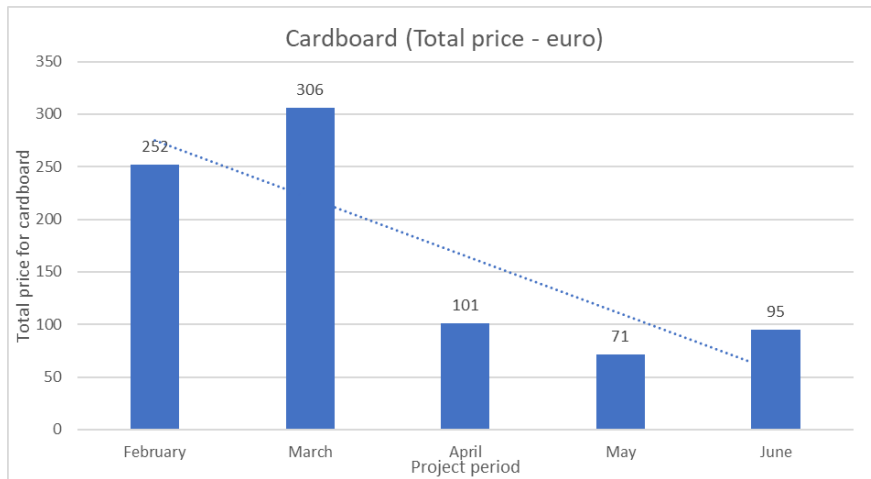


Figure 1. Graph for cost reduced by (internal data)

Analyzing the very high scrap costs, as illustrated in the table above, and since reworks can be done with elements that the company already owns, the following rework methods have been identified.

In the following table we can see how the cardboard components can be reworked instead of scrapped. For each case from the next table R&D team remade the test from the client to assure that will not impact the transportation, the storage or the movement of boxes/pallets inside the store.

Table 2. Table of ways for rework process (internal data)

No. Crt.	Cardboard type	Way of rework process
1	Pallet legs	Pallet legs are glued to the pallet using hot glue, placing lightly damaged ones in the middle, while those without cardboard covering are attached with the damaged side down to ensure proper adhesion
2	Pallets/plain sheets	For good pallets or plain sheets with damaged legs, the legs will be replaced with new ones, while damaged pallets or plain sheets with good legs will be scrapped
3	Edge corners	Corners that are deformed if straightened by hand will be used, those that are broken will be given to the person who cuts the small corners so they can be cut and used under the straps.
4	Manuals	Manuals of instructions with a dirty spot on the page (near the edge) will have a piece of white label placed to cover the dirt – then will be used
5	Trays	For trays that are slightly torn or dirty, shells or white labels will be applied as needed, while trays with minor edge damage that does not affect functionality will be used as they are.

6	Boxes	Boxes that are slightly torn, wrinkled, dented, stained, or mildly damaged—without affecting functionality—will be used as they are or covered with a small white label/ULL if needed. Boxes damaged on areas visible to the customer will be repaired with a label only if the defect is minor; otherwise, they will be scrapped. Boxes with internal fins or flaps that are incomplete but not visible after assembly will be cut straight and used. For any uncertain situation, team must be informed before rework to confirm if repair is allowed.
7	Boxes, multipacks, trays, lids	Boxes, multipacks, trays, lids that are dirty and can be cleaned with an eraser will be cleaned and used
8	Multipacks	If they are slightly torn, put some shells on the inside as long as it is not so visible on the outside.
9	Cover of the trays	Cover with small tear on the side, if it does not affect functionality, it will be used
10	Small brown boxes	Small brown boxes because they come with broken inside when closed, will be cut straight and used (last picture)
11	Packing	Packaging without complete printing will be given to the supplier/incoming scrap. Glued packaging - when detached, the cardboard breaks and will be sent to the supplier/incoming scrap
12	Inlay	Damaged inlay on the outer edge will be cut until the tear is no longer visible on both edges and will be used. They will be kept in the scrap area every week and on Friday by 3:00 PM we will notify production to take them for cutting

After all the reworks were applied, a month later questionnaires were sent to the clients in the portfolio, and the result was as desired: there were no complaints on this subject and the number of products purchased did not decrease. On the contrary, some retail stores didn't even notice the changes.

Table 3. Table of customer opinion survey (internal data)

Customer opinion survey			
Questions	Yes	No	Maybe
Have the changes been noticed?	8	20	0
Have these reworks affected sales?	0	28	0
Do we have complaints received from the store's customers?	0	28	0

3. Conclusion

The rework for cardboard elements has proven to be significantly more economically and sustainably efficient than scrapping, reducing monthly scrap costs by approximately three times, without affecting the quality perceived by customers or the performance of the products.

Monthly scrap cost before intervention: €250–300 / month (February–March 2024).

High production volume: defected cardboard elements cannot be eliminated, making the occurrence of non-compliant items inevitable.

The identified reworks use elements already existing in the company, without additional purchases. R&D tests have confirmed that the reworks do not affect transportation, storage, or handling.

In terms of external validation, after implementation, a survey was distributed to the clients and they reported no issues, and some retailers did not even notice the modifications.

The economic impact reports monthly scrap costs reduced by approximately 3 times after introducing the reworks for cardboard elements.

The rework was chosen because of the following reasons: it is the only solution with almost zero cost, using already existing materials, reduces scrap costs by ~66%, according to real data, does not affect the quality perceived by customers, validated through surveys, is sustainable, reducing cardboard waste and contributing to environmental goals, quick to implement, without production interruptions and it is repeatable and standardizable, being applicable in the long term.

Through data analysis, evaluation of alternatives, and validation of results, it is demonstrated that rework is the most efficient, economical, and sustainable strategy for managing non-conforming cardboard elements. Its implementation significantly reduces costs, maintains the quality perceived by customers, and contributes to the company's sustainability objectives. The results obtained justify making these methods a permanent standard practice in production.

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Is there a correlation between pollution, energy, and economic growth?

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Abstract

This paper examines the relationship between pollution, energy, and economic growth in Kosovo. This study considers data from the World Bank and Transparency International for the period 2000 to 2020 and conducts correlation and econometric regression models to establish the relationships among the variables used. We observe a significant positive correlation between pollution and economic growth but a negative correlation between energy consumption and economic growth. Additionally, our results imply that while higher energy consumption is linked to slower economic growth, higher pollution levels are linked to increased economic activity in Kosovo. These findings demonstrate the complex connection between regional economic development and environmental factors. The regression analysis's findings show that the outcome variable is significantly impacted by the variables *rec* and *gdpg*. Environmental quality was found to have a positive effect on GDP per capita. Corruption was found to have a positive effect on GDP per capita. Energy consumption was found to have a negative effect on GDP per capita. This suggests that while pollution may be beneficial for economic growth in the short run, it is not a sustainable long-term strategy, and steps must be taken to reduce energy consumption to promote sustainable economic growth. Implications for policymakers and economic researchers are discussed.

Keywords: Pollution, Energy, Economic Growth, Corruption

JEL Classification : Q2, Q4, Q5

1. Introduction

Research linking energy use, environmental pollution, economic growth, and corruption is relatively scarce, but a growing number of multi-country panel studies

directly address this nexus, often using the Environmental Kuznets Curve (EKC) as a framework. However, many studies in many regions and income groups identify strong statistical links between energy consumption, environmental pollution (often CO₂), and GDP. Most suggest an association between growth and higher energy use, but generally at the cost of environmental quality, although the magnitude and sign can differ by time, energy type, and country group. Many panel and country studies indicate that higher energy consumption improves economic growth but increases pollution such as CO₂ or other emissions (Ashraf, Sekar and Abraham, 2020; Khan and Farooq, 2019; (Zhao, Zhao and Zhang, 2019; Li and Hu, 2020). The relationship between rising energy consumption, economic expansion, and emissions of carbon dioxide (CO₂) has drawn more attention recently, and many scholars have examined it in depth (Saidi and Hammami, 2015; Radmehr, Henneberry and Shayanmehr, 2021b; Shahbaz *et al.*, 2013; Salari, Javid and Noghanibehambari, 2020). An intriguing area of study has emerged recently by fusing the issues of corruption, political stability, and environmental quality in one package (Khan and Farooq, 2019; Fredriksson and Neumayer, 2014; Ganda, 2020; Adams *et al.*, 2015). Corruption increases economic growth, environmental quality, and energy consumption in the Middle East and North Africa, and environmental degradation and political instability hamper economic growth (Sekrafi and Sghaier, 2016). In addition, compared to other more industrialized nations, CO₂ levels in the MENA region are rising fast. In MENA and BRICS, corruption not only adds directly to CO₂ emissions but also diminishes environmental quality indirectly by amplifying the pollution effects of economic growth and energy use (Wang *et al.*, 2018; Leitão, 2021). These changes may be a result of natural climatic fluctuation or human activity. According to various empirical investigations, the long-term and short-term effects of different indices are linked in different ways. Panel models for newly industrialized countries demonstrate that corruption, GDP, and fossil fuel use all increase ecological footprints, while renewables reduce it (Akalin, Erdogan and Sarkodie, 2021). Corruption can seem to drive down CO₂ in the long term in some samples from Africa and West Africa, but such findings are context-specific and may reflect weak enforcement, measurement, or structural factors (Abid, Kacem and Saadaoui, 2023; Chang and Hao, 2016). Conversely, the majority of current research concentrates on the relationship between pollution and economic development, as well as the relationship between energy and pollution. Only a handful of studies have examined these four relationships in the same context. In the case of the MENA region, this study is an effort to address that gap.

This research aims to investigate the effect of energy consumption, economic growth, corruption, and pollution on each other in Kosovo. Kosovo is a landlocked country in Southeast Europe that declared its independence from Serbia on 17 February 2008. Albania borders Kosovo to the southwest, the Republic of North Macedonia to the southeast, Montenegro to the west, and Serbia's uncontested

territory to the north and east. Its capital and largest city is Pristina. Kosovo has a population of 1.8 million people and an area of 10,887 km².

Kosovo is a member of the International Monetary Fund, the World Bank, and the regional cooperation organization CEFTA and has applied for Interpol membership and observer status in the Organization of the Islamic Cooperation. Since 1999, Kosovo has been under United Nations administration under UNMIK, within an internationally supervised interim self-government. On 17 February 2008, Kosovo unilaterally declared independence from Serbia. It has since gained diplomatic recognition as a sovereign state by 113 out of 193 United Nations member states. In October 2008, the International Court of Justice's (ICJ) Advisory Opinion on Kosovo's declaration of independence confirmed that Kosovo could lawfully declare independence.

Efforts have been made to improve the country's economic development and environmental sustainability, but these have been hindered by corruption, political instability, and weak rule of law. This study aims to analyze the effect of energy consumption, economic growth, pollution, and corruption on each other in Kosovo. The results will help policymakers to design appropriate policies to address environmental pollution, economic growth, and corruption.

2. Literature review

A significant body of literature has documented the relationship between energy consumption, economic growth, and environmental pollution. A seminal work in this literature is that of Grossman and Krueger (1994), who were the first to provide empirical evidence of the Environmental Kuznets Curve (EKC) (Grossman and Krueger, 1994). The paper from Galor and Moav (2002) develops an evolutionary theory of growth that accounts for the interaction between the evolution of mankind and economic growth since the emergence of the human species. The theory states that the struggle for survival that defined most of human history led to the evolutionary advantage of human traits that aided growth, which sparked the shift from stagnation to sustained economic growth. The EKC hypothesis posits that there is an inverted U-shaped relationship between economic growth and environmental pollution. In other words, as countries develop and their income levels increase, they initially experience an increase in environmental pollution due to the increased use of fossil fuels and other forms of energy. However, at a certain point, they reach a turning point after which environmental pollution begins to decrease as countries adopt more efficient technologies and better environmental practices.

A number of studies have been conducted to test the EKC hypothesis empirically, with mixed results. Some studies have found evidence in support of the EKC hypothesis (Grossman and Krueger, 1994; Bruvoll and Fæhn, 2006), while other studies

have found evidence that runs counter to the EKC hypothesis (Shafik, 1994; Paltsev *et al.*, 2005). Panayotou (2001) discusses the Environmental Kuznets Curve (EKC), which states that the relationship between economic growth and environmental degradation is not linear. Moreover, economic growth may lead to environmental damage, but when income levels rise, people demand better quality environments, and situations improve. The paper of Dinda (2004) reviews theoretical developments and empirical studies associated with EKC. There is controversy about the validity of EKC and the specific income level at which improvement begins (Dinda, 2004). The paper emphasizes the importance of understanding the causal links between economic growth and environmental quality, providing an extensive overview of the EKC literature and indicating directions for future research. The study finds that per capita emissions of all four pollutants exhibit inverted-U relationships with per capita GDP. The findings from Rajaguru and Khan (2021) indicate a decline in energy intensity, supporting sustainability amidst the energy-growth relationship in the studied countries. Volatility analysis reveals that energy consumption significantly decreases with rising income growth volatility, often mitigated by compensation measures such as subsidies to households and producers to stabilize energy consumption behaviors.

The EKC hypothesis has also been extended to include a number of other economic and environmental variables. For example, some studies have examined the relationship between energy consumption and economic growth (Dlamini *et al.*, 2016; Lee and Chang, 2007, while others have examined the relationship between economic growth and environmental pollution (Grossman and Krueger, 1994; Van Der Ploeg and Poelhekke, 2010). Cole, Rayner and Bates (1997) use a cross-country panel dataset to examine the relationship between per capita income and several environmental indicators. The study finds that there are only important EKCs for local air pollutants; indicators that have a more global impact tend to rise with income, or turning points occur at high income levels.

More recently, a growing body of literature has examined the relationship between energy consumption, economic growth, and corruption. For example, Arminen and Menegaki (2019) found that energy consumption is associated with higher levels of corruption in developing countries. Lee and Chang (2007) also found evidence that energy consumption is associated with higher levels of corruption. In addition to energy consumption, several other studies have examined the relationship between economic growth and corruption. For example, Mauro (1995) found that economic growth is associated with lower levels of corruption. Similarly, Arminen and Menegaki (2019) found that economic growth is associated with lower levels of corruption. Stern (1993) found total (gross) energy use alone does not show a causal effect on GDP, suggesting that the type and effective use of energy, not just quantity, are important for growth. Further, the results of the study show that economic growth

leads to changes in energy use, rather than the other way around, confirming a neoclassical view of the production process over a purely biophysical one. There is a bi-directional causal relationship between electricity consumption and economic growth in Poland, as found in the study by Kasperowicz (2014). The growth rate of electricity consumption increases economic growth, which means that economic growth in Poland is energy-dependent.

The literature on the relationship between energy consumption, pollution, economic growth, and corruption is somewhat limited. To the best of our knowledge, only one study has examined the relationship between these variables using structural equation modeling. In their study, He et al. (2010) used structural equation modeling to examine the relationships between energy consumption, carbon dioxide emissions, economic growth, and corruption in China. They found evidence that energy consumption is associated with higher levels of corruption.

Environmental quality has a significant impact on public health, human welfare, and economic activity (Shahbaz et al., 2013). Environmental pollution can lead to many diseases and premature death. Several studies have found a relationship between environmental pollution and human health (Shahbaz et al., 2013; (Zhaoyong, Mamat and Simayi, 2018). Environmental pollution can also decrease economic activity and productivity (Shahbaz et al., 2013). The relationship between economic growth and environmental quality may change as a coreaches a higher income level, leading to more efficient infrastructure and a cleaner environment.

Table 1. Examples of Direction of Effects

Setting group	/	Energy → Growth	Energy → Pollution	Growth → Pollution	→	Citations
8 developing neighbors		Yes, bidirectional with growth.	Yes, bidirectional with pollution.	Yes, bidirectional with pollution.		(Abdollahi, 2020)
44 global countries		High energy boosts GDP but raises CO ₂ .	Strong positive	Implied positive via EKC patterns		(Ashraf, Sekar and Abraham, 2020)
Pakistan, South Africa		Energy and GDP both raise CO ₂ .	Strong positive	Positive GDP–CO ₂ link		(Khan and Farooq, 2019; Menyah and Wolde-Rufael, 2010)
Nepal		Energy ↔ CO ₂ ; Growth → both	Policies can cut CO ₂ without hurting long-run growth.	Growth → energy, CO ₂	→	(Bastola and Sapkota, 2014)

Economic growth is associated with environmental pollution in both the short and long run. Numerous studies have established a correlation between economic growth and heightened environmental pollution (Grossman and Krueger, 1994; Dasgupta, 1996; Stern, 2000). Economic growth can also lead to environmental degradation

through natural resources and the production of waste (Dasgupta, 1996). In some studies, corruption is associated with environmental pollution (Fredriksson and Neumayer, 2014; Bhattacharya *et al.*, 2015; Wang, Yuan and Wang, 2019). Corruption can lead to environmental degradation by using natural resources and the production of waste (Bhattacharya *et al.*, 2015).

There is a large body of literature on the relationship between energy consumption and economic growth (Apergis and Payne, 2009; Imrohorglu, Merlo and Rupert, 1996). The vast majority of this literature has focused on developed countries. However, a few studies have investigated this relationship in developing countries (Shahbaz *et al.*, 2013; Solarin *et al.*, 2019). These studies yield mixed results. Some studies have found a positive relationship between energy consumption and economic growth (Shahbaz *et al.*, 2013), while others have found a negative relationship (Solarin *et al.*, 2019). Several studies have investigated the relationship between corruption and economic growth (Mauro, 1995; Ahmed *et al.*, 2014; Spyromitros and Panagiotidis, 2022). These studies yield mixed results. Some studies have found a positive relationship between corruption and economic growth (Mauro, 1995), while others have found a negative relationship (Ahmed *et al.*, 2014).

This study seeks to contribute to the literature by examining the relationships between Kosovo's energy consumption, pollution, economic growth, and corruption. In particular, we use regression models for time series analysis and correlation matrices to examine these relationships. The remainder of this paper is organized as follows. The following section reviews the literature on the relationships between energy consumption, pollution, economic growth, and corruption. In the following section, we describe our data and methodology. In the results section, we present our findings. Finally, we conclude with a discussion of our findings and their policy implications.

3. Methodology

This study uses data from 2000 to 2020 from the World Bank and Transparency International to investigate the relationships between energy consumption, economic growth, corruption, and pollution in Kosovo. A correlation and a regression method are used with time series data for Kosovo to estimate the results. The model was estimated using STATA 13 software. The model consists of four variables: Energy use (kg of oil equivalent per capita)—eus; renewable energy consumption (% of total final energy consumption)—rec; GDP growth (annual %) - GDP, corruption index (CI), and pollution from CO₂ emissions from electricity and heat production total (% of total fuel combustion) - CO₂EFEH.

The World Bank Database was used to obtain data on energy consumption, renewable energy, gross domestic product (GDP), and pollution. In contrast, the

Transparency International database was used to gather data for the corruption index for Kosovo. The data were collected for the period 2000-2020. Table 1 presents a detailed description of all the variables used in this study.

Table 2. Describing variables

Variable Code	Variable Name	Variable Description	Source
us	Energy use	Energy use refers to the use of primary energy before transformation into other end-use fuels, equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport.	World Bank - World Development Indicators https://databank.worldbank.org/source/world-development-indicators
reck	Renewable energy consumption	Renewable energy consumption is the share of renewable energy in total final energy use.	World Bank - World Development Indicators https://databank.worldbank.org/source/world-development-indicators
GDP	GDP growth	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus product taxes minus subsidies excluded from the product value. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	World Bank - World Development Indicators https://databank.worldbank.org/source/world-development-indicators
ci	Corruption index	The CPI ranks 180 countries and territories worldwide by their perceived levels of public sector corruption. The results range from 0 (highly corrupt) to 100 (very clean). Here we used the ranking of Kosovo among other countries.	Transparency International https://www.transparency.org/en/cpi/2021
co2efeh	Pollution from CO ₂ emissions from electricity and heat	CO ₂ emissions from electricity and heat production are the sum of three IEA categories of CO ₂ emissions: (1) Main Activity Producer Electricity and Heat, which contains the sum of emissions from main activity producer electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as	World Bank - World Development Indicators https://databank.worldbank.org/source/world-development-indicators

production totals	public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be publicly or privately owned. This category corresponds to the IPCC Source/Sink Category 1 A 1 a. For the CO ₂ emissions from fuel combustion (summary) file, emissions from the own on-site use of fuel in power plants (EPOWERPLT) are also included. (2) Unallocated auto producers, which contain the emissions from the generation of electricity and heat by auto producers. "Auto producers" are defined as undertakings that generate electricity and heat, wholly or partly for their own use as an activity that supports their primary activity. They may be privately or publicly owned. The 1996 IPCC Guidelines typically distribute these emissions among industry, transport, and "other" sectors. (3) Other energy industries contain emissions from fuel combusted in petroleum refineries, for the manufacture of solid fuels, coal mining, oil and gas extraction, and other energy-producing industries. This corresponds to the IPCC Source/Sink Categories 1A1b and 1A1c. According to the 1996 IPCC Guidelines, emissions from coke inputs to blast furnaces can either be counted here or in the Industrial Processes source/sink category. Within detailed sectoral calculations, certain non-energy processes can be distinguished. In the reduction of iron in a blast furnace through the combustion of coke, the primary purpose of the coke oxidation is to produce pig iron, and the emissions can be considered an industrial process. Care must be taken not to double-count these emissions in both energy and industrial processes. The IEA estimations include these emissions in this category.

Energy use is measured in kg of oil per capita, renewable energy consumption is presented as a percentage of final consumption, GDP growth is shown as annual percentage growth, the Corruption Index ranks Kosovo by year, and pollution is represented by the percentage of CO₂ emissions from total fuel combustion.

4. Econometric Results

The results of the correlation and regression analysis indicated that there is a positive relationship between environmental quality and economic growth.

Table 3. Correlation Matrix

Variables	GDP	eus	rec	co2efeh	ci
gdpg	1.000				
eus	0.589	1.000			
rec	-0.129	-0.814*	1.000		
co2efeh	0.309	-0.148	0.622*	1.000	
ci	0.002	0.535	-0.819*	0.466	1.000
*** p<0.01, ** p<0.05, * p<0.1					

The correlation coefficients indicate that GDP growth is positively correlated with CO₂ emissions and energy use, but negatively correlated with renewable energy use. Furthermore, there is a strong negative correlation between CO₂ emissions and renewable energy consumption. From Table 2, we found that environmental quality positively affected GDP per capita. The results also showed a positive relationship between corruption and economic growth. Corruption was found to harm renewable energy. The results also showed a negative relationship between pollution and energy use. Renewable energy consumption was found to harm corruption. Furthermore, energy use has a positive impact on GDP growth. The results indicate that countries with higher GDP growth tend to have higher CO₂ emissions and energy use, but lower renewable energy consumption. This underlines the importance of policies and initiatives to promote the transition to more sustainable and environmentally friendly energy sources.

In Table 3, we constructed the regression results of different models with time series data for Kosovo. Model 1 takes energy use as the dependent variable and pollution, renewable energy, GDP growth, and the corruption index as independent variables. Model 2 also takes energy use as the dependent variable, but unlike Model 1, it excludes the corruption index from its independent variables. In Model 3 the dependent variable is GDP growth, and only the corruption index is the independent variable. Lastly, Model 4 considers pollution as the dependent variable and GDP growth and energy use as independent variables.

Table 4. Regression Results

	Model 1	Model 2	Model 3	Model 4
Variables	eus	eus	gdpg	co2efeh
co2efeh	54.95*** (12.998)	40.895 (16.39)		
rec	-82.998*** (9.735)	-83.124 (38.318)		
gdpg		1.472 (14.002)		-.099 (.363)
ci			.001 (.118)	
eus				.012 (.008)
_cons	-1186.581 (887.972)	-87.497 (1398.704)	3.624 (12.203)	61.686*** (9.76)
Observations	14	6	11	6
R-squared	.871	.887	0	.478
Standard errors are in parentheses.				
*** p<.01, ** p<.05, * p<.1				

The regression results indicated a significant negative relationship between rec and gdpg, with a coefficient of -82.998. This means that as rec increases, gdpg decreases. The coefficient for CI is also positive, .001, suggesting a small positive association with the dependent variable. The overall model has a high R-squared value of .871, indicating that the independent variables explain a large proportion of the variance of the dependent variable. The results of Table 3 and Table 2 suggest that there is a relationship between energy, pollution, economic growth, and corruption. Environmental quality was found to have a positive effect on GDP per capita. Corruption was found to have a positive effect on GDP per capita. Energy consumption was found to have a negative effect on GDP per capita. These results suggest that environmental quality is important for economic growth and that corruption and energy consumption are detrimental to economic growth.

5. Findings and Conclusion

The regression analysis results indicated that there is a positive and significant relationship between energy consumption and pollution in Kosovo. This means that an increase in energy consumption will lead to an increase in pollution. The results also showed a positive and significant relationship between economic growth and pollution. This means that an increase in economic growth will lead to an increase in pollution. However, the results showed a negative and significant relationship between corruption and pollution. This means that an increase in corruption will lead to a decrease in pollution. These results are in line with other studies' findings (Abdollahi, 2020; Ashraf, Sekar and Abraham, 2020; Khan and Farooq, 2019).

The study results showed that energy consumption has a positive and significant effect on economic growth (Arminen and Menegaki, 2019). This means that increasing energy consumption will lead to higher economic growth. However, the effect is not strong enough to be considered causal. The results also indicated that economic growth has a positive and significant effect on corruption. This means that increasing economic growth will lead to higher levels of corruption. Again, the effect is not strong enough to be considered causal.

Finally, the outcome of this study showed that energy consumption has a positive effect and economic growth harms pollution. This means that increasing economic growth will lead to higher pollution levels, but increasing energy consumption will reduce pollution. This must mean that an increase of energy will most likely go to renewable energy consumption and thus reduce the pollution.

6. Policy implications

The findings of this study have important policy implications for Kosovo. The results showed that energy consumption and economic growth are major drivers of pollution in Kosovo. Therefore, policies that aim to reduce pollution should reduce energy consumption and promote sustainable economic growth. In addition, the findings showed that corruption is a major obstacle to reducing pollution in Kosovo. Therefore, policies that aim to reduce pollution should also focus on reducing corruption.

The findings of this study have important policy implications for Kosovo. Firstly, the results suggest that increasing energy consumption will lead to higher pollution levels. This means that policies to reduce environmental pollution should focus on reducing energy consumption. Secondly, the results suggest that increasing economic growth will lead to higher levels of corruption. This means that policies to reduce corruption should focus on slowing down economic growth. Finally, the findings indicate that reducing pollution levels requires a decrease in both energy consumption and

economic growth. This means that Kosovo needs to discover a way to reduce energy consumption and economic growth without compromising its development goals.

Conflict of Interest Statement: The authors declare that there is no conflict of interest regarding the publication of this paper.

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PART V: INTERNATIONAL ECONOMICS, TRADE, FINANCE, AND INFRASTRUCTURE

Global economic development is increasingly shaped by international trade agreements, strategic infrastructure investments, changing financial behaviour, digitalization, and new forms of geopolitical competition. These forces affect the movement of goods and capital, the financial security of households, the resilience of institutions, and the economic relationships between countries and regions.

The papers in this section examine several dimensions of the contemporary international economic and financial environment. They analyse China's infrastructure and trade strategy in Latin America, including the Chancay Port and the proposed Central Bi-Oceanic Railway Corridor, as well as the trade effects of the ASEAN-India Free Trade Agreement. The section also explores present bias and household saving behaviour in North Macedonia and develops a framework for digital financial resilience, prudential supervision, cyber-risk governance, and institutional accountability.

Together, these contributions illustrate the close relationship between global infrastructure, international trade, financial decision-making, and institutional resilience. They demonstrate that economic integration creates significant development opportunities while also introducing new strategic, regulatory, financial, and technological risks. The section highlights the need for informed policy choices and robust governance mechanisms at the household, organizational, national, and international levels.

YU, C. W. / *China's Gateway to Latin America: Chancay Port Multipurpose Terminal and Central Bi-Ocean Railway Corridor*

China's Gateway to Latin America: Chancay Port Multipurpose Terminal and Central Bi-Ocean Railway Corridor

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Abstract

China is making its gateway to Latin America and developing new trade routes through Chancay Port Multipurpose Terminal and Central Bi-Oceanic Railway Corridor. The sea-land transportation and trade route development are part of China's Belt and Road Initiative (BRI) – Silk Road Economic Belt and the 21st Century Maritime Silk Road. The United States views the mega port with growing alarm and concerns. Among the concerns are China's influence over critical infrastructure in Central and South America, including the ports at either end of the Panama Canal, and now China's ownership of the mega port at Chancay, Peru. The future Central Bi-Oceanic Railway Corridor is a planned project of cross-border railway between Peru and Brazil, which will make China the top trading partner of most countries in Central and South America. The author analyzes the opportunities, challenges and implications of China's new strategy, new port and new corridor in Latin America. China's strategy and the Belt and Road Initiative have an important impact on the landscape of infrastructure, transportation, trade, and other areas in Latin America, known as "Washington's backyard". The paper contributes to the studies of maritime and rail development and economic development as well as global transportation and supply chains.

Keywords: Chancay Port Multipurpose Terminal, Central Bi-Ocean Railway Corridor (CBRC), Belt and Road Initiative (BRI), Maritime Silk Road, Silk Road Economic Belt

JEL Classification : F15, F52, L91, L92, O19

1. Introduction

China's role in Latin America and the Caribbean has grown rapidly since the turn of the century promising economic opportunity but also raising concerns over Beijing Influence. China's state-owned firms are major investors in the region's energy, agriculture, infrastructure, transportation, mining and natural resources. Now the country has surpassed the United States as the South America largest trading partner.

China has also expanded its business, cultural and diplomatic presence throughout the region. Former U.S. President Joe Biden saw China as a “strategic competitor” in the region. The re-elected President Donald Trump is taking a more confrontational approach to China in the Western Hemisphere (Roy, 2025).

Recently, China celebrated the opening of a new mega port in Peru as part of its global Belt and Road Initiative (BRI) and as a gateway to Latin America. China is developing new trade routes to Latin America through Chancay Port Multipurpose Terminal and Central Bi-Oceanic Railway Corridor (CBRC). The Chancay Port, built with 3.5 billion USD of Chinese investment, is now the largest deepwater facility on South America's Pacific coast. It can handle ultra-large container ships and reduce shipping time to Asia by up to 20 days. The Chancay Multipurpose Port Terminal is a private port and logistics complex being developed and managed primarily by COSCO Shipping Ports in the small city of Chancay, Peru. Inaugurated in 2024 and slated for completion in 2032, the Chancay port promises to become a significant hub connecting Asian and South American markets (Choy, 2025). Brazil ships billions to China, but it's about to send them faster. The long-dreamed Bi-Oceanic rail, now tethered to China's Chancay deepwater port, is gaining steam—cutting 10,000 km off maritime routes, rerouting trade away from the Panama Canal, and redefining South America's logistics map (Rail Targets, 225).

The Brazil-Peru Transcontinental Railway is a planned freight line that will transverse South America, stretching for about 5,000 kilometers to connect the hinterland of Brazil to the Pacific Ocean on the Peruvian coast (Dourado, 2023). After the inauguration of Chancay Port on Peru, Brazil recognized significant opportunities to strengthen connectivity with China, thus the Brazil government has recently expressed great interest in reviving the cross-continental railway project. At the China-CELAC (China-Community of Latin American and Caribbean States) Forum in Beijing in May 2025, the transcontinental railway project was identified as a strategic area of cooperation in documents produced by the meetings. The trilateral agreement between Peru, Brazil and China is expected to deliver the project within six years at an estimated cost of 10 billion USD. Brazil and Peru share an old dream of joining their Atlantic and Pacific coasts, and China can turn the dream into a reality (Dialogue Earth, 2025).

2. Belt and Road Initiative and Latin America

The Belt and Road Initiative (BRI) is a central piece of Chinese international diplomacy and foreign economic development policy. It was launched in 2013 by President Xi Jinping with proposals to develop a new Silk Road – “Silk Road Economic Belt” and “21st Century Maritime Silk Road”. Latin America was not considered part of the BRI when it was first established. The Chinese government policy paper on Latin America, issued in 2016, did not refer to it. Subsequently, China invited Latin American countries to participate in the BRI at the China-Community of Latin America and Caribbean States (CELAC) Ministerial Forum in Santiago in January 2018 (Jenkins, 2021).

During the CELAC summit in Cuba in early 2014, LAC leaders expressed support for a cooperative mechanism at the first meeting leaders of China and Latin America and the Caribbean. In the Brazilian capital, Brasilia, the leaders announced the establishment of the China-CELAC Forum, an institutional framework to advance the vision of building a China-LAC community with a shared future. Ten years later, this mechanism has matured into a key platform for South-South collaboration that has drawn China and Latin American and Caribbean nations into a closer partnership across political, economic, cultural, and other domains. The forum's fourth ministerial meeting was held in Beijing on May 13, 2025. Chinese President Xi addressed the opening ceremony and unveiled new initiatives and measures to promote closer ties (Xinhua, 2025). The Chinese president introduced action plans to build a "community with a shared future" as highlighted by his commitment to provide 66-billion-yuan credit line to support the region's development, import more products and channel further investments. Nearly 200 BRI megaprojects with \$100 billion were implemented over the last decade in Latin America; bilateral trade in 2024 leapt 6% to \$518 billion. By 2023, China's investments had also exceeded \$600 billion. One recent example of the China-LAC cooperation is development of Chancay Port in Peru (Azam, 2025).

Chancay Port is expected to capitalize on new transport infrastructure projects that are under discussion, many of them funded by Chinese investments, such as the planned Brazil-Peru Transcontinental Railway – a 3,000-kilometer route that would connect Puerto Santos in Brazil to Puerto de Ilo in Peru (Choy, 2025). China's growing influence in the ports, railways and roads of South and Latin America, known as "Washington's backyard", is China's first and most important goal. It is to create more markets for its products and companies, given that Latin America represents a huge consumer market with a population of more than 700 million for China. In addition, China seeks to obtain natural resources at the best possible price and with a steady flow of goods from South America ports. China also seeks to expand the scope of its Belt and Road Initiative to include Latin American countries that occupy a pivotal position in international shipping traffic. China has succeeded in convincing more than 21 countries in South America to join the Belt and Road Initiative (Helmy, 2025).

3. Chancay Multipurpose Port Terminal Impact

The Chancay Multipurpose Port Terminal is under construction at the southern edge of the small city of Chancay, about 70 kilometers north of Lima, Peru's capital. Chancay's economy has historically been based on agriculture, fishing, and tourism. The city has access to an expanded road network that links its port to key distribution hubs, including Lima, and mining and agricultural regions in Central Peru. The Chancay Port aims to reduce congestion and logistics costs at Peru's main port, the Lima-Callao hub, while establishing itself as a critical gateway to Asia and a global commercial hub for cargo redistribution.

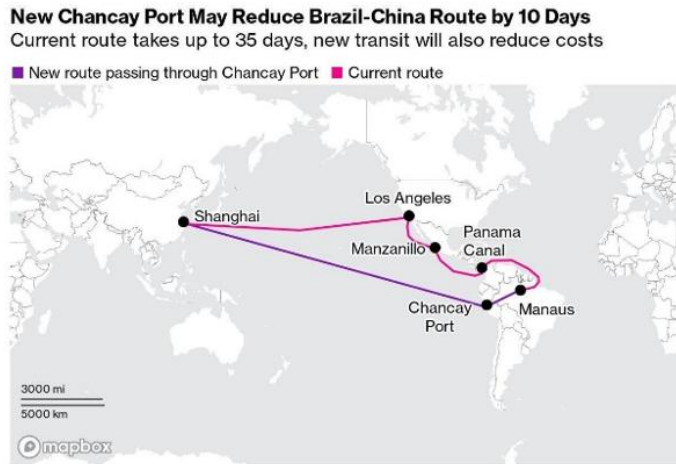


Figure 1. Shipping Route from Shanghai to Latin America through Chancay (Reddit)

The idea of the Chancay port dates to 2008, when a former Peruvian admiral began acquiring land and securing government permits. In 2011, he partnered with the Volcan Comania Minera to establish Termiales Portuarios Chancay. Volcan is a Peruvian mining company that controls 12 mines and 13 hydroelectric plants, but, since 2017, Swiss multinational Glencore has owned 55 per cent of its shares. Initial work on the project—then much smaller in scope—began in 2016. After the admiral's death in 2016, Volcan retained sole ownership. In January 2019, COSCO announced a partnership with Volcan during the World Economic Forum in Davos, committing to a 3 billion USD investment in the port. By May 2019, COSCO had acquired a 60 per cent majority stake in the project for 225 million USD, with Volcan retaining 40 per cent. The deal coincided with the signing of the Belt and Road Initiative Memorandum of Understanding between Peru and China (Choy, 2025).

When at full capacity, Chancay, as a 15-berth deepwater port, will be able to receive and accommodate simultaneous loading and unloading of multiple, of the biggest container ships, of 18,000 to 21,000 TEU in size and in the future, 24,000 TEU ships. Capabilities to handle roll-on-roll off ships, break-bulk cargoes, or handle petroleum and other liquid bulk cargoes, including liquid natural gas (LNG) could eventually be added as well. Chancay will also be geographically closer to major Chinese ports than other options on the Pacific coast of the Americas. Its location and geographic characteristics thus make it ideal to serve as a hub port for COSCO's operations on the eastern coast of the Pacific Ocean. Using the new classes of very large container ships, rather than small ones, will reduce the per container cost for trans-Pacific transit. At the same time, the more direct route will reduce fuel, crew, and other costs associated with the steaming days (Ellis, 2024).

The Chancay Multipurpose Port Terminal promises to generate between 8,000 and 15,000 direct and indirect jobs, though some sources claim that the project could

create up to 50,000 jobs. The Ministry of Production estimates that when the port and logistics is fully operational (after 2032), it will contribute an annual income of 450 billion USD—1.8 per cent of Peru's gross domestic product (GDP). According to the Central Reserve Bank of Peru's estimate, the port will contribute 0.9 per cent of Peruvian GDP in 2025. Despite the prospects of future port benefits and income, many groups in the community have protested the construction of the port since the beginning. Of significant concern for people and wildlife are the increased noise and pollution due to the port operations, including the emission of toxic PM10 and PM2.5 particulate matter from increased large-vehicle traffic. The effects of construction on the seascape and marine resources are also of concern. The environmental issues described particularly affect the neighboring Santa Rosa Wetland, a conservation area and resting site for migratory birds very close to the port site (Choy, 2025).

4. Central Bi-Oceanic Railway Corridor and Impact

The Bi-Oceanic Corridor, a transport route originally proposed by Brazil in 2014, has undergone several updates to reflect evolving trade needs and regional infrastructure developments. The corridor would connect Brazil to the Pacific Ocean, create a shortcut for exports to and from countries in South America. The idea of the Bi-Oceanic Corridor has become more viable since the construction of the Pacific Highway, which links Brazil with Peru. While some sections of the highway still require updates, it is now possible to travel by car, truck, or bus from Brazil through Peru to major destinations like Lima and Chancay. This infrastructure, combined with the proposed rail connections, is expected to transform trade logistics in the region (Travel and Tour World, 2025).



Figure 2. Brazil-Peru Bi-Oceanic Corridor (Andres Alegria/Mongabay)

China's leadership appears to be preparing for a future in which the U.S. could restrict its access to the Panama Canal. Beijing is actively looking for an alternative to the waterway and has apparently found one: the Central Bi-Oceanic Railway Corridor (CBRC). The 2024 opening of the Chancay mega port in Peru marked a notable step forward for this project. During President Xi's address to the 2025 China-CELAC Forum, he remarked that "the inauguration of Chancay Port in Peru has established a new land-and-sea connectivity link between Asia and Latin America." Since the CBRC is planned to run through Peru, the port's launch significantly enhances its logistical and strategic feasibility. If built, the corridor would offer China a viable alternative to the Panama Canal and a direct route to the Pacific, sidestepping potential restrictions (Illueca, 2025).

China would see a reduction in transportation costs for agricultural and mineral products imported from Latin American countries. Among the commodities exported along the route before shipped to China would be soybeans from Para in Brazil's central-western interior as well phosphate rock, a raw material used by the carbon-intensive fertilizer industry. The Bayovar mine in the Sechura Desert in Peru has one of the largest deposits of phosphate rock in South America with a capacity of 3.9 million tons per year. The mine supplies markets in Brazil, North America and Asia. The Central Bi-Oceanic Railway Corridor would have high socio-environmental costs. The indigenous communities living along the proposed route claim there are more than 600 indigenous communities of different language groups that stand to be affected by the railway project including around 15 living in voluntary isolation. Many inhabit the Isconahua reserve near the Peru-Brazil border, an area already threatened by illegal logging (Diaogue Earth, 2025).

It is very critical for China to get involved with construction of Chancay Port and Central Bi-Oceanic Railway Corridor between Peru and Brazil. Without the Peru-Brazil Bi-Oceanic Railway Corridor, Chancay Port could only serve as a transshipment hub but would not be a destination to unload goods from Chinese ships and reload them on railcars to Brazil or vice versa. Chancay Port and Central Bi-Oceanic Railway Corridor are key elements of China's Belt and Road Initiative, a global strategy to build ports, railroads, and other economic infrastructure in Latin America (LaFranchi and Eulich, 2025).

5. Implication and Conclusion

Chancay Port plays an important role in enhancing transport and infrastructure between Peru, Brazil, and China. With the proposed Central Bi-Oceanic Railway Corridor and expansion of key ports and railways, this initiative could redefine trade flows in China and Latin America. Both projects have significant implications and would not only impact on the logistics industry but could also affect the tourism sector. As transport links between Brazil and Peru are strengthened, there could be increased opportunities for cross-border tourism, especially in areas like the Amazon and the Andes, where visitors may be drawn to explore both the natural landscapes and new cultural exchanges. In a striking move to deepen its Latin American ties, China

has unveiled visa-free access for citizens of five key countries – Brazil, Argentina, Chile, Peru and Uruguay. This pilot policy will run from June 1 to May 31, 2026, and is aimed at supercharging business, tourism and diplomatic connections (Ammachchi, 2025).

As China has the exclusive rights to use the Chancay Port and hub in such a system, it can pose a problem to the interests of others drawn to trade and investment with the region. The United States sees China investing and operating in the region for unfair economic gain and using Chancay Port as its potential to serve as a beachhead for military activities. Chancay could be President Trump's next target in his bid to secure the hemisphere and confront China's rising economic and political influence. He has already floated the idea of slapping special tariffs on goods arriving at Chancay.

Since 2000, when the U.S. and the European Union were Latin America's principal trading partners, China increased trade with the region fortyfold to become its dominant trade partner. With multilateralism off the agenda, the countries of Latin America are going to pursue their interests with a variety of partners, especially since the region's historical partner is squarely focused on its own interests (LaFranchi and Eulich, 2025). Due to the sheer scale of its Peru's investment in Chancay Port, China would cement its position as a leading producer, transporter and refiner of critical materials. The Central Bi-Oceanic Railway Corridor would be instrumental in achieving the goal while enhancing regional economic integration and solidifying China's logistical presence in South America.

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The Role of Multilateral Trade of ASEAN-India Free Trade Agreement (AIFTA): Evidence of Trade Diversion

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Abstract

This study aimed to examine the impacts of ASEAN-India Free Trade Agreement by using RCA, IIT index, and Gravity Model to analyze affecting factors of international trade of 21 groups before (2001-2010) and after (2011-2022) agreement. To find the trends of exporting advantages products to global market in each category, as well as analyzing what economic factors influence the export value products under the agreement. The results showed that only 8 categories (or 38 %) of total products indicate comparative advantage products with a moderate advantage level before agreement. However, a hundred percent of total products with 19 categories was found a high level of competitiveness after agreement. The main influencing factors on exports base on Gravity Model are GDP and population, except international distances and FDI in this case. The agreement created trade diversion from non-group countries with freely imported and production efficiency higher than trade creation.

Keywords: Trade Diversion, AIFTA, RCA, Inter-industry Trade, Gravity Model

JEL Classification Numbers: F13, F14, F15

1. Introduction

The expansion of free trade agreement is a major trend in the modern global economy, especially in Asia, where countries are focusing on building economic cooperation and opening new markets to increase competitiveness and create new trade opportunities, lead to increased productivity, resources reallocation and growth

(World Trade Organization, 2022). Regional integration established production networks, free access to regional markets, reduce tariff and non-tariff barriers, increase intra-regional trade and foreign direct investment, these lead to growth of country productivity (Islam et al., 2016) and poverty reduction with trade facilitation (Jouanjean et al., 2016).

Among regional integration, 'multilateral trade' played an important role gain more trade creation or trade diversion of country. One major collaboration is free trade agreement between ASEAN and India (AIFTA). The Treaty was signed in 2009 and implementation in 2010 with removing tariff barriers and promoting the free flow of goods and services between the two regions, with aimed to help strengthen the competitiveness of ASEAN member on the India market (ASEAN Secretariat, 2020). Under regional cooperation it would be more effectively access to the ASEAN market gain more benefit with the least economically linked to the globe, and provide significantly trade and investment growth. In consequence, India also can gain more opportunities with pool resources, labor and production potential in Asian regions to offer policy and recommendations to government.

This study will focus, especially on India because of the huge population (1.4 thousand million) as the new ASEAN market with a large market size in the future. At the same time this population can be a large labor force with more than 67 percent working age. Thus, India will become a large consumer market and high potential labor force (Galan, S., 2025). India also has continuous increased economic growth rate more than 6 percent per year, and become the third largest economy by 2027 (Sophonpanich, 2024; KResearch, 2024), Reserve Bank of India, 2025). Together with the both policies: 'India's look east and ASEAN's look west' imply the same line to expand economy and strategic links between the regions. This trade agreement will gain more stronger trade, investment, and supply chain for country.

Many previous studies investigate pattern of trade and impact of the intra- and inter-regional trade cooperation by using quantitative methodologies to evaluate both established and emerging trade pattern, with a particular emphasis on the detailed level of product stratification. The empirical studies base on multilateral trade in this issue have been study such as the evidence to examine competitiveness through trade pattern at the specific product level across regional such as from APEC countries by Chemsripong, et.al., (2009), AEC countries by Chemsripong, (2012), South Asia by Islam, et.al., (2016), low-income country by McCaig, and Pavcnik, (2018), and Central and South Asia by Wani, et.al, (2024), ASEAN-China FTA by Tongzon, (2005). Moreover, the empirical study to explained complementarity, intensity and similarity on trade across countries such as Japan and the United States by Balassa and Noland, (1989), India and Brazil by Wani and Dhami, (2014), Afghanistan and Pakistan by Naseri and Wani, (2020), Indo-Russia by Wani et al., (2020). To analyzed on export diversification in Africa (Vogel, 2022) and Sikdar, C. and Nag, B. (2011), applied the indices to measure the dynamics trade competitiveness of ASEAN-India under FTA Negotiations.

However, many study investigate pattern of trade and impact of the intra- and inter-regional trade cooperation applying quantitative methodologies by using each IIT and RCA index. A Few studies use both indexes to evaluate both established and emerging trade pattern, with a particular emphasis on the detailed level of product stratification. Therefore, this study aims to answer two research questions: 1) what is the comparative advantage of ASEAN under the AIFTA agreement? 2) what are the influencing economic factors of AIFTA exports to India? Two indexes: Revealed Comparative Advantage (RCA) and Intra-Industry Trade (IIT) will be applied to assess the benefits and drawbacks of trade within and between ASEAN-India FTA. Then, the objectives of this study are: 1) to analyze the changes in the comparative advantage index (RCA) of ASEAN countries in 21 categories of goods before and after AIFTA. 2) to analyze the trend of inter-industry trade between ASEAN and India during 2001–2022.

The rest of the study is divided into five sections. Section two, highlights the backgrounds and current regional trade patterns in AIFTA, while section three discusses relevant strands of literature, primarily focusing on the theoretical framework of trade indices and the methodological foundations. Section four is devoted to understanding the methodology, focusing on the trade indices, while section five presents the analysis and discussions of the findings. Finally, section six concludes the study with policy recommendations, as well as the study's limitations and future scope.

2. Literature Review

2.1. Revealed Comparative Advantage (RCA) index

Under Ricardo's theoretical foundation, the nation comparative advantage depended on productivity and product differentiation more than the others, due to regional specialization as endogenous and exogenous factors, including technology and human capital. The Revealed Comparative Advantage (RCA) index first applied by Balassa (1965) to measure international comparative advantage trade with comparing the countries' exports proportion to the world of that products. Scholars such as Vollrath (1991) used RCA to measure trade intensity, Yeats (1985) analyzed RCA index on industry sector, and Lafay, (1987) apply RCA on regional specialization between Colombia and pacific Alliance, etc. Moreover, Balassa, (1989) extend comparative advantage with trade policy and economic development by introduce the RCA index formular as following:

$$RCA_{k,i} = (X_{ki} / \sum X_{ij} / X_{kw} / \sum X_{wj}) \quad (1)$$

It stipulates that $RCA_{k,i}$ is the comparative advantage index of product k, country i, X_{ki} is the export value of goods k, country i, $\sum X_{ij}$ is the total export value of country i, X_{kw} is the export value of goods k, in the world's (w), $\sum X_{wj}$ is the total export value of the world's goods k (w). To explain the level of comparative advantage via RCA index, Balassa (1989) has also divided into two major levels:

- Comparative advantage level ($RCA \geq 1$) indicated that the products have a higher exports proportion than the world proportion of the same product. This reflects good competitiveness in that product and the country does not have a competitive advantage.
- Comparative disadvantage level ($RCA \leq 1$) explained that the product has a lower export proportion than the world proportion of that product market. This may reflect low competitiveness or inability to compete in the global market.

The RCA index as mention above, widely used in empirical study to examine the comparative advantage of trade pattern under regional integration and prospective of both across region and countries, across countries such as Japan and the United States by Balassa and Noland, (1989), India and Brazil by Wani and Dhami, (2014), Afghanistan and Pakistan by Naseri and Wani, (2020), Indo-Russia trade by Wani et al., (2020), etc. across regional in Central and South Asia by Wani, et.al, (2024), low-income country by McCaig, and Pavcnik, (2018), ASEAN-China FTA by Tongzong (2005), Africa by Vogel, (2022), across industry e.g. apparel sector in China by Das, et.al, (2024), agri-food sectors in Hungarian by Fertő, and Hubbard, (2003), etc. Other factors e.g. exchange rate by Goldberg (2010), labor reallocation by Menezes-Filho and Muendler (2011), labor allocation by McCaig and Pavcnik (2018), trade policies, tariffs, non-tariff barriers, and export subsidies among certain goods., etc. applied to explained international specialization measurement by Laursen, K. (2015), trade complementarity, diversification and similarity by Wani, N. and Rasa, M. (2025). Few studies applied only RCA to measure the dynamics trade competitiveness of ASEAN-India under FTA Negotiations by Sikdar, C. and Nag, B. (2011), etc.

However, this study will not apply other factors that affect competitiveness, such as tariffs, nontariff measures and subsidies, etc. Also, this study will applied the RCA index followed the study of Hinloopen and Marrewijk (2001,2005) that extended the level of RCA index of Balassa into more specifically on empirical distribution by product competitiveness level which divided into 4 tiers as follow:

- Level Tier A ($0 < RCA < 1$) refers to comparative disadvantage, i.e., a group of products with an RCA index value of less than 1. These products do not have a comparative advantage in exports.
- Level Tier B ($1 < RCA < 2$) refers to weak comparative advantage index value more than 1 commodity groups with index value. These products are starting to become competitive.
- Level Tier C ($2 < RCA < 4$) refers to moderate comparative advantage. RCA index values have a range from 2 to 4. These goods have a comparative advantage.
- Level Tier D ($RCA > 4$) means high comparative advantage level. The available products are highly competitive and have strong export potential.

2.2. Intra-industry Trade (IIT) index

Intra-industry Trade (IIT) is an index to measure the trade exchanges within the same industry of goods at the same time. According to the conventional theory of comparative advantage is unable to explain why country trade exchange impact within the same industry of goods at the same time. Trade within the same industry led to lower domestic prices and elimination of less local competitive companies explained the impact of trade liberalization on economies of scale, product differentiation, imperfect markets and rising customer demands. Intra-industry Trade has original applied in 1971 and Grubel and Lloyd (1975) applied the Intra-industry Trade (IIT) index known as 'G-L Index', and expressed as one of the most popular indices to measure the trade level within an industry. The G-L Index presented the quantitative evaluation of international trade flows within distinct product categories across national borders. In other words, 'G-L index' is "two-way trade" between businesses that create unique products inside the same industry. Therefore, IIT will gains from specialization trade by focusing on national competitiveness rather than manufacture corporate levels (Krugman,1981).

Previous empirical study such as Chemsripong, et.al., (2009) applied the IIT indices between Thailand and Other APEC. Also, the study of Chemsripong, (2012) applied to the integration among ASEAN Economic Community (AEC). The IIT indices applied to explained the determinant of IIT and global value chains (Hamilton and Kniest (1991), also under liberalization Marginal IIT can applied to measure industrial trade pattern (Brühlhart (1994), Thom and McDowell, (1999) and Vona, 1991), sectoral trade flows between New Zealand and Asia (Bano, 2018). Also, Baccini et al., (2018) extend the IIT indices on global value chains, and preferential tariff liberalization by using Portuguese data to explain comparative advantage.

Later trade flow under regional free trade agreement have pay more attention from the researcher. The empirical studied on the effects of Preferential Trade Agreements (PTA) or free trade agreement (FTA) (via tariffs, trade cooperation) namely Manger, (2015) to explained trading within an industry can lessen product rivalry and the sense of threat that imports provide to domestic businesses. The impact of trade agreements explained that the less IIT and no-exporting industry indicate the less competitiveness advantage. Therefore, the production factors and other factors e.g. institutions, and information (Milner (1997) will be interested to expanding the market, and offer a greater selection of manufacturing goods more competitive, driving less competitive firms from the market (Crespo and Fontoura, 2004).

Many scholars applied the IIT index to extend the reflection of exchanges within the same industry such as in Indian manufactured goods by Agarwal and Betai, (2021), global value chains, and preferential tariff liberalization by Baccini et al., (2018), IIT transition trends and determinants by Kandogan, (2003), patterns and IIT determinants in Asia by Sawyer, et al., (2010), IIT in intermediate products, pollution and internationally increasing returns by Benarroch and Weder, (2006) and IIT impact and domestic political coalitions by Madeira, (2016). However, few study applied on both IIT and RCA indexes within specific industry such as in gem and jewelry industry

by Chemsripong, et.al, (2025) to measure the changes in the structure of sectoral trade flows between regional integration.

Therefore, this study applied the IIT Index to measure trade within the industry of four products groups: 1) agricultural products, 2) agro-industrial products, 3) industrial products, and 4) mineral and fuel products and calculated with the IIT index formula for industry as following:

$$IIT_i = 1 - (X_i - M_i) / (X_i + M_i) \times 100 \quad (2)$$

It stipulates that IIT_i is the index value of goods in group i (between 0 and 100), X_i is the export value of goods in group i , M_i is the import value of goods in group i , (close to 100 means), that intra-industrial trade is highly concentrated. IIT value near 0 means that trade between industries is prominent.

2.3. The Gravity Model

The Gravity Model based on Newton's law in physics. The Gravity Model has been used in the context of international trade, that *"the gravitational force between two objects is directly proportional to mass product and inversely proportional to the square of distance"*. Later, Tinbergen (1962) apply the Gravity Model to explain international trade patterns with two main variables affecting the trade volume between two countries:

- Economy size or economics factor represented by Gross Domestic Product (GDP) of each country, which reflection large productivity and consumption. The larger economies indicate more likely to trade with other countries.
- Distance factor means not only geographical distance, but also other trade barriers such as import duties, language, cultural and trade regulation barriers. The greater distance indicated decreasing trade volume between two countries.

As mention above, the gravity model is widely explained the impact on international trade by consider two objected. The gravity model equation have been applied based on the main factors that determine the trade volume between two countries are revenue of each partner country and international distance is follow:

$$T_{ij} = G M_i / M_j D_{ij} \quad (3)$$

It specifies that T_{ij} is international trade volume i and j , M_i and M_j is a positive economic factor such as GDP, D_{ij} is a negative economic factor such as: international distance i and j . G is the constant, i is the country of origin, j is the country of destination. The higher income of each country come from higher trade volume. GDP makes the export value, import value and total trade value change in the same direction. Empirical study such as Wangcharoenlap and Woravisutsarakul, (2011) study the role of economic integration on Thailand's trade and applied GDP (Gross Domestic Product), population, distance, and foreign direct investment in the model. Bharti and Nisa (2021) applied GDP, distance both geographical and non-geographical factor, membership of country integration of India such as AIFTA and BIMSTEC). Therefore,

this study will apply GDP, population, international distance, and foreign director investment (FDI).

3. Research methodology

To evaluates the trading opportunities for regional economic integration in AIFTA over a specified duration. This study applied two-indices, RCA and IIT, to help understanding the potential of trade pattern value and trade potential of concerned countries.

The RCA index used to measure advantage by comparison the proportion of country's exports and the world market by using trade data from international trade center to reveal these discrepancies. The comparative advantage determines the pattern on international trade calculated as follows (Balassa,1989),

$$RCA_{k,i} = \left(\frac{X_{ki} / \sum_i X_i}{X_{kw} / \sum_w X_w} \right). \quad (4)$$

The global export of goods k, is denote by X_{kw} , and export of goods k from the nation is denote by X_i . This study was conducted to determine the comparative advantage of ASEAN under the AIFTA agreement. Using the comparative advantage index (RCA) on 21 categories according to HS code. In this study, the RCA index was applied into 2 periods: 1) during 2001 and 2010, before AIFTA and 2) during 2011 and 2022, after joining AIFTA.

The IIT index use to measure the exchange of similar or related items within the same industry between nations at the same time by Grubel and Lloyd, (1975) measure international trade in differentiated products will apply in this study and applied to measure the changes in the structure of sectoral trade flows between India and the ASEAN countries f or four groups of goods, namely agricultural products, agro-industrial products, industrial products, and mineral and fuel products. The formula for calculating GL index for a single industry are:

$$IIT_i = 1 - \frac{|X_i - M_i|}{X_i + M_i} \times 100 \quad (5)$$

It stipulates that IIT_i is the value of intra-industry trade of good i, X_i is the export value of product group i, M_i is the import value of products group i. The IIT between two nations is calculated by dividing the value of a product's exports from a reporter country i by its imports from a partner country k. The value close to 100 means that IIT is highly concentrated which trading partner countries both export and import the same type of goods in similar proportions. The value close to zero, means that trade between industries is prominent. The increasing IIT values align with the convergence of trading partners' industrial structures, indicating the importance of trade in a country's overall trade.

The study was conducted to identify the trend of inter-industry trade and the intra-industry trade (IIT) index under the context of AIFTA. It is divided into 214 main industry group, according to the classification of the department of internal trade, ministry of commerce including agricultural products, agro-industrial products,

industrial products, and mineral and fuel products. Based on the RCA values, regional value chain analysis is used to identify possible cross border industrial fragmentation.

The gravity model measure main variables affecting the trade volume between the two Countries base on Tinbergen (1962) 's Gravity model equation as follow:

$$T_{ij} = G \frac{M_i}{M_j} D_{ij} \quad (6)$$

It stipulates that: T_{ij} is international trade volume, country i and j, M_i and M_j is a positive economic factor from country i and j, D_{ij} is international distance from country i and j. G is the constant, i is the origin country, j is the destination country. This study applied Gross Domestic Product, population, distance, and foreign direct investment as the economics factors into the gravity model as follow: $Export_{ij} = GDP_i, POP_i, Distance_{ij}, FDI_i$

4. Analysis and discussions

The RCA indices resulted that before joining the agreement (from 2000-2022) only 38.10 percent of total ASEAN products (8 from 21categories) indicating moderate advantage level of comparative advantage. Animal or vegetable fats and oils (3.71) showed the highest RCAvalue, follow by finished goods (1.57), machinery, mechanical, electrical equipment (1.55) and wood and wooden products (1.42), respectively. Only thirteen categories have comparative advantages including flavored foods, beverage, liquor, tobacco (0.97), plant products (0.9) and miscellaneous products (0.79), respectively. However, after joining the agreement, hundred percent of the total products (21categories) indicated high competitiveness level. Highest level in animal or vegetable fats and oils (47.12), wood and wooden products (19.61) and finished goods (17.98), respectively. The moderate advantage level were fine art and antiques (2.53). The weak advantage level were weapons and ammunition, and no comparative disadvantage level of goods detailed in table 1 as follow:

Table 1. The RCA index of AIFTA countries between 2001 to 2022 (source: authors' compilation based on the data from UNCOMTRADE)

Section (Description)	Before join AIFTA (2001-2010)	After join AIFTA (2011-2022)	Difference	Meaning
I Live animals/ animal products	1.36 (B)	17.35 (D)	15.99	H-inc.
II Vegetable products	0.90 (A)	11.61 (D)	10.71	H-inc.
III Animal or vegetable fats and oils	3.71 (C)	47.72 (D)	44.01	H-inc.
IV Prepared foodstuffs/ beverages	0.97 (A)	12.84 (D)	11.87	H-inc.
V Mineral products	1.11 (B)	11.42 (D)	10.31	H-inc.
VI Products of the chemical	0.58 (A)	8.47 (D)	7.89	H-inc.
VII Plastics/ rubber and articles thereof	1.23 (B)	15.35 (D)	14.12	H-inc.
VIII Raw hides and skins/ leather	0.53 (A)	6.59 (D)	6.06	H-inc.
IX Wood and articles of wood	1.42 (B)	19.61 (D)	18.19	H-inc.

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X	Wood pulp or other fibrous material	0.66 (A)	8.33 (D)	7.67	H-inc.
XI	Textiles and textile articles	1.36 (B)	17.65 (D)	16.29	H-inc.
XII	Footwear/ headgear/ umbrellas	1.57 (B)	17.98 (D)	16.41	H-inc.
XIII	Articles of stone/ plaster/ cement	0.64 (A)	7.85 (D)	7.21	H-inc.
XIV	Pearls/ precious or semi-precious stones	0.56 (A)	10.40 (D)	9.84	H-inc.
XV	Base metals and articles of base metal	0.33 (A)	5.42 (D)	5.09	H-inc.
XVI	Machinery and electrical equipment	1.55 (B)	17.72 (D)	16.17	H-inc.
XVII	Vehicles/ aircraft/ vessels	0.30 (A)	5.26 (D)	4.96	H-inc.
XVIII	Optical/ photographic	0.50 (A)	5.25 (D)	4.75	H-inc.
XIX	Arms and ammunition	0.08 (A)	1.42 (B)	1.34	L-inc.
XX	Miscellaneous manufactured articles	0.79 (A)	10.41 (D)	9.62	H-inc.
XXI	Works of art	0.16 (A)	2.53 (C)	2.37	L-inc.

Notes: year before join AIFTA = 2001-2009; year after join AIFTA = 2010-2022

IIT index result according to industry level, this study will focus on all ASEAN member during 2001–2022, (except Myanmar and Laos during 2010-2022 due to lack of international trade data with India). *Before join AIFTA*, the IIT level of Thailand results the low level, account for 37- 49. However, after join AIFTA, the IIT level results increased two times to the highest level in every sector (average 60-75). However, the IIT level in industry sector still had a high IIT level in Agro-industrial followed by mineral and fuel. See detailed in Table 2 and Figure 1 below.

Table 2. IIT results of ASEAN member before and after join AIFTA (source: authors' compilation based on the data from UNCOMTRADE)

	AIFTA	Agricultural	Agro-industrial	Industrial	Mineral and Fuel
Thailand	Before	36.84	43.51	49.27	46.14
	After	62.39	75.79	38.28	68.92
India	Before	75.91	25.15	86.97	19.48
	After	58.43	13.15	90.75	13.94
Brunei	Before	0.07	0.00	20.97	0.52
	After	1.53	0.00	27.93	1.61
Vietnam	Before	67.75	1.70	26.43	68.74
	After	60.08	38.32	88.15	78.46
Philippine	Before	2.35	19.44	68.85	31.22
	After	32.67	63.31	56.72	31.50
Malaysia	Before	69.78	24.47	69.88	10.05
	After	49.80	15.63	70.85	73.48

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Singapore	Before	57.52	87.91	40.52	60.29
	After	73.66	84.99	38.80	32.43
Cambodia	Before	0.29	82.27	6.00	0.00
	After	7.41	27.70	17.88	16.58
Laos	Before	0.00	0.00	1.18	0.00
	After	12.47	11.68	20.11	5.13

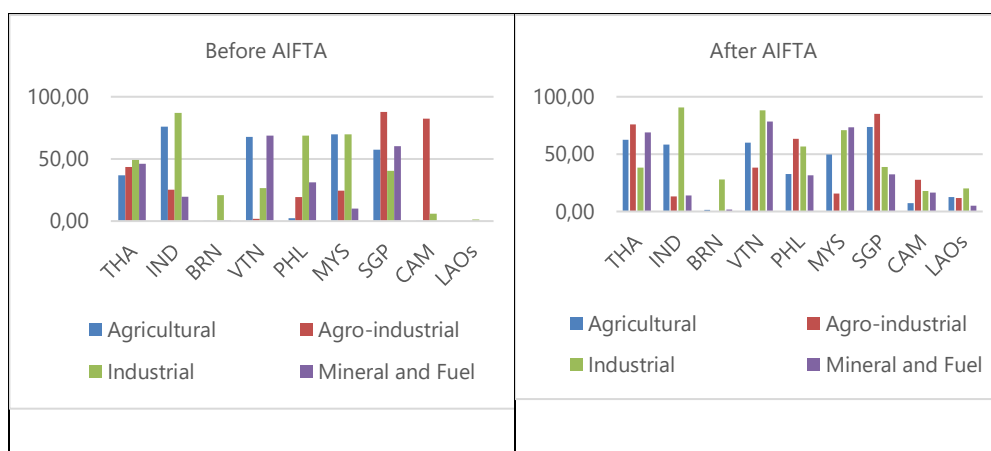


Figure 1. IIT results of ASEAN member before and after join AIFTA (source: authors' compilation based on the data from UNCOMTRADE)

Trends of inter-industry trade under free trade agreement (AIFTA) during 2001–2022 show that the IIT index of *agricultural products* have been consistently high level before join AIFTA products group were regularly exported and imported in similar proportion especially, *India* showed the highest level at 75.9, followed by Malaysia (69.7) and Vietnam (67.7). For the *post-AIFTA period*, IIT index remained high in Singapore (73.6) followed by Thailand (62.3) and Vietnam (60.1). *Agro-industrial products* during period 2001–2010, trade with the same group reflects with the similarity trade between ASEAN.

The top three of highest IIT countries were Singapore (87.9) followed by Cambodia (82.2) and Thailand (43.5). The IIT rose up in following year after joining AIFTA, Singapore (84.9), Thailand (75.7), and the Philippine (63.3), respectively. A moderate IIT to high level of *industrial products* can be seen with *India* (86.9), Malaysia (69.8), and Philippine (68.8) before join AIFTA (in 2009–2010). After join agreement, *India* (90.7), Vietnam (88.1) and Malaysia (70.8) respectively still have the high IIT level (2011–2022) to indicate industrial products pattern of trade, both intra-industry trade and inter-industry trade. This depended on the technology level, production process, and

complexity industrial goods, both similarities and differences between ASEAN and India. Mineral and fuel goods showed the highest IIT level with Vietnam (68.7), Singapore (60.2) and Thailand (46.1) during 2006-2010, this reflects intensive change of energy products between ASEAN and those country. After 2011, the high IIT level with Vietnam (78.4), Malaysia (73.4), and Thailand (68.9) represents inter-industry trade structure characterized. However, there is an increase in IIT in some year, such as coal exporting form one country while another country exports oil. Detailed in Figure 2.

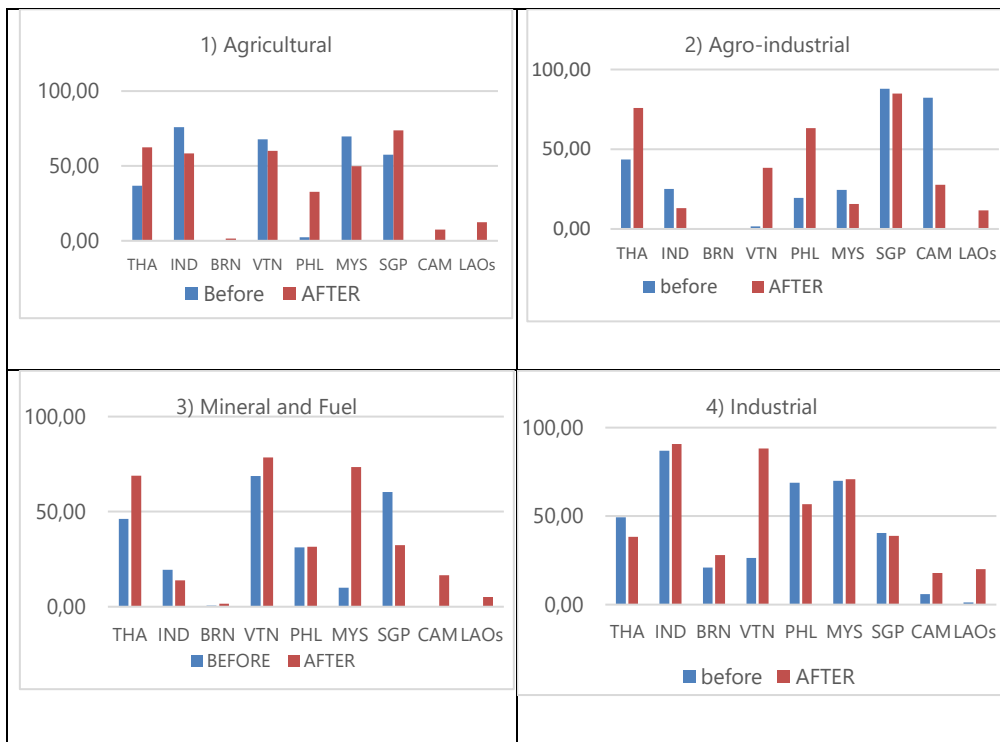


Figure 2. IIT before and after join AFTA, separate by sectoral sectors (source: authors' compilation based on the data from UNCOMTRADE)

The countries characteristic measure with the IIT index between Thailand and ASEAN member in each country found that before joined agreement the top three of IIT level resulted industrial, mineral and fuel, and agro-industrial, respectively. The highest IIT level, before join AFTA, were industrial (India/Philippine/Malaysia/Brunei) followed by agricultural (India/ Vietnam/ Malaysia /Brunei), and mineral and fuel (Vietnam/Philippine), agro-industrial (Singapore/Brunei/ Cambodia). *After joined agreement*, IIT level were agro-industrial, mineral, and agricultural. IIT level were industrial (India/Vietnam/Philippine/Malaysia/Cambodia Singapore/ Brunei), agricultural (India/Singapore/Brunei/Laos), mineral (Vietnam/Malaysia), agro-industrial (Philippine/Singapore/Brunei/Laos). See IIT level in Figure 3.

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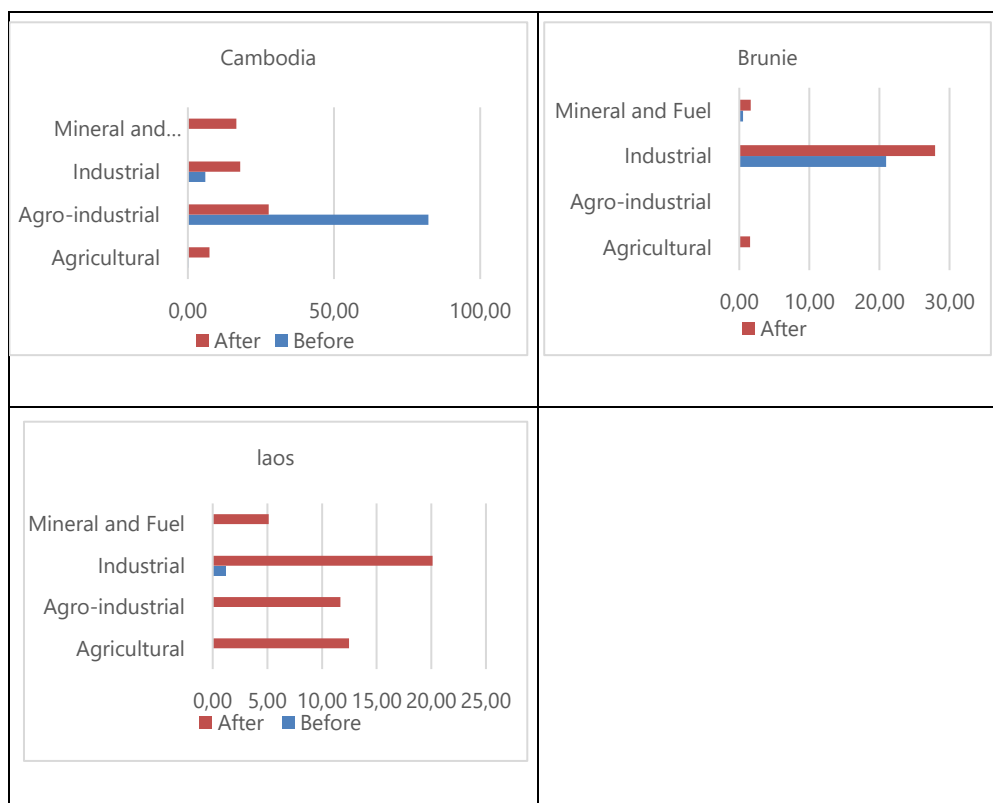


Figure 3. IIT before and after join AIFTA, separate by countries (source: authors' compilation based on the data from UNCOMTRADE)

The factors affected the ASEAN trade export value to India by applied the Gravity Model with independent variable, namely Gross Domestic Product, population, distance, and foreign direct investment. The results showed that all factors variation affecting the export value by the model with consistency level (adjusted R^2) in the range of 0.84–0.95 through the study period and compare into three difference phases as:

The estimation results show that the **GDP** of the exporting country has a positive influence with statistically significant in every year. The results indicate that GDP increased 1 percent effect the exports value by 1.58 percent, 1.61 percent and 1.48 percent in 2006, 2011 and 2022, respectively. Lead the economy to increased production and export potential. The result is consistent with Tinbergen's (1962) for an international economic policy, Islam, et.al., (2016) regional integration affected efficiency and productivity growth with empirical evidence from South Asia, the gains from trade from IIT specialization (Krugman, 1981), institutions growth effects from economy size of an exporting country an important factor with a positive impact on the value of trade (Nawaz, 2015). This consisted with a study of Khati and Kim (2023)

that the impact of India's free trade agreement with ASEAN on its goods exports: A gravity model analysis. The GDP of ASEAN countries have a positive effect on the value of trade with India.

The population of exporting countries had negative coefficients in select years, (2006, 2011, and 2022) with statistically significant at 95 percent confidence. It means that the increasing population by 1 percent will decrease export value by 0.34, 0.40 and 0.44 percent, respectively. The results shows that the population of exporting countries increases higher the domestic consumption demand. The population of exporters and trading partners play different role in the value of exports consistent with the study of McCaig, and Pavcnik (2018), export markets and labor allocation in a low-income country. Menezes-Filho, and Muendler, (2011), labor reallocation in response to trade reform. This outcome is the opposite from Khunthongnoi, (2007) trade competitiveness of ASEAN countries that the population of trading partners had a positive effect on trade flows.

The international distances remain a major obstacle, according to gravity model. The negative impact of international distance on exports value account as 10 percent statistically significant level by 1.94, 1.40 in 2006 and 2011 respectively, except in 2022 with not statistically significant, consistent with the study of Anderson, and Wincoop, (2003); Gravity with Gravitas: A Solution to the Border Puzzle. Dembatapitiya, and Weerahewa, (2015), "Effects of regional trading agreements on South Asian trade: a gravity model analysis. Although the results are clear and vary from time to time when distance increased by 1 percent in 2011, the exports value decreased by 1.40 percent, with statistically significant. This effect is consistent with Tinbergen (1962) that distance reflects transport cost and natural barrier, consistent with Anderson and Wincoop (2003), that negative distance is correlated with trade value due to higher transport costs.

The foreign direct investment (FDI) factor has a slightly positive effect on export in 2006 (0.20) and in 2011 (0.09) with no statistically significant, excluded from the equation in 2022, because of multi-collinearity problem, while FDI does not play a significant role in explaining the value of exports in this case. However, FDI variable is in line with the results of Bharti and Nisa (2021) that FDI in some case did not directly increase the value of exports, but mainly focused on investment for domestic consumption. Consider Table 2 as follows:

Table 2. Comparison of factors affecting the export value of ASEAN's trade to India (source: authors' compilation based on the data from UNCOMTRADE)

	2006	2011	2022
$\ln \text{Export}_{ij}$	- 5.49 (0.55)	- 6.98 (-1.77)	- 1.66 (-0.38)
$\ln \text{GDP}_i$	+1.58 (0.04)**	+1.61 (6.02)***	+ 1.48 (7.28)***
$\ln \text{POP}_i$	- 0.34	- 0.40	- 0.44

	(0.24)	(-2.93)**	(-2.93)**
In Distance _{ij}	- 1.94	- 1.40	- 1.30
	(0.20)	(-2.20)*	(-1.08)
In FDI _i	+0.20	+ 0.09	-
	(0.51)	(0.56)	
R ²	0.9334	0.9768	0.9469
Adjusted R ²	0.8446	0.9582	0.9204
Prob > F	0.0413	0.0003	0.0003

Note: The values in parentheses are t-statistic values.

***, **, * are statistically significantly level at 0.01, 0.05, 0.1, respectively

1) 2006: $\ln \text{Export}_{ij} = - 5.49 + 1.58 \ln \text{GDP}_i - 0.34 \ln \text{POP}_i - 1.94 \ln \text{Distance}_{ij} + 0.20 \ln \text{FDI}_i$
 (0.55) **(0.04)**** (0.24) (0.20) (0.51)

(R² = 0.9334 Adjusted R₂ = 0.8446 Prob > F = 0.0413)

2) 2011: $\ln \text{Export}_{ij} = - 6.98 + 1.61 \ln \text{GDP}_i - 0.40 \ln \text{POP}_i - 1.40 \ln \text{Distance}_{ij} + 0.09 \ln \text{FDI}_i$
 (-1.77) **(6.02)***** **(-2.88)**** **(-2.20)*** (0.56)

(R² = 0.9768 Adjusted R₂ = 0.9582 Prob > F = 0.0003)

3) 2022: $\ln \text{Export}_{ij} = - 1.66 + 1.48 \ln \text{GDP}_i - 0.44 \ln \text{POP}_i - 1.30 \ln \text{Distance}_{ij}$
 (-0.38) **(7.28)***** **(-2.93)**** (-1.08)

(R² = 0.9469 Adjusted R₂ = 0.9204 Prob > F = 0.0003)

For the economic integration has significantly influenced global economic growth, with free trade agreement and effective in AIFTA. The ASEAN expansion with India has been successful from various economic integration. ASEAN experienced significant growth in bilateral and multilateral trade during the 1980s, as well as greater integration with other Asian nations. Apart from integration other factors for example reducing trade barriers, promoting cross-border investments and fostering cooperation in areas such as development infrastructure and technology transfer to enhance their economic growth and increase their global competitiveness. Moreover, the integration efforts play more attention leading to greater economic stability, job creation and overall prosperity for the regions.

5. Conclusion and recommendations

This study has examined the impact of multilateral trade of AIFTA by using RCA and IIT indexes, to explore the trade comparative advantage opportunities. The results reveal that intra- and inter-regional trade in AIFTA is estimated to be twice of the current value, based on the assumption that nations can export to regional trading counterparts without trade barriers and government policy. The comparative advantages expressed the more benefits particularly from export product

diversification, value-added export goods, less trade expenses (non-tariff, trade barriers, licenses, permits and certifications, regional trade facilitation exchange regulations and price competition). In the case of AIFTA with India gain the most profit from trade both across country and industry. It should recommend that government and all stakeholder will pay attention to multilateral trade with other regional trade to gain more opportunity of competitive advantage of the country and step up the level of development growth of the country.

6. Limitations and future scope of the study

Based on economic analysis, the current study examined opportunities and barriers for intra and inter-regional trade in AIFTA through an analysis of comparative advantage via RCA and IIT indexes. Only the ASEAN and India are considered in the research. It is recommended that to improve the quality of the analysis in future research, the methods used in the study also recommends the usage of competitiveness, complementarities, regional value chain analyses and stakeholder ranking analyses for better gauging the trade latency within and between the regions.

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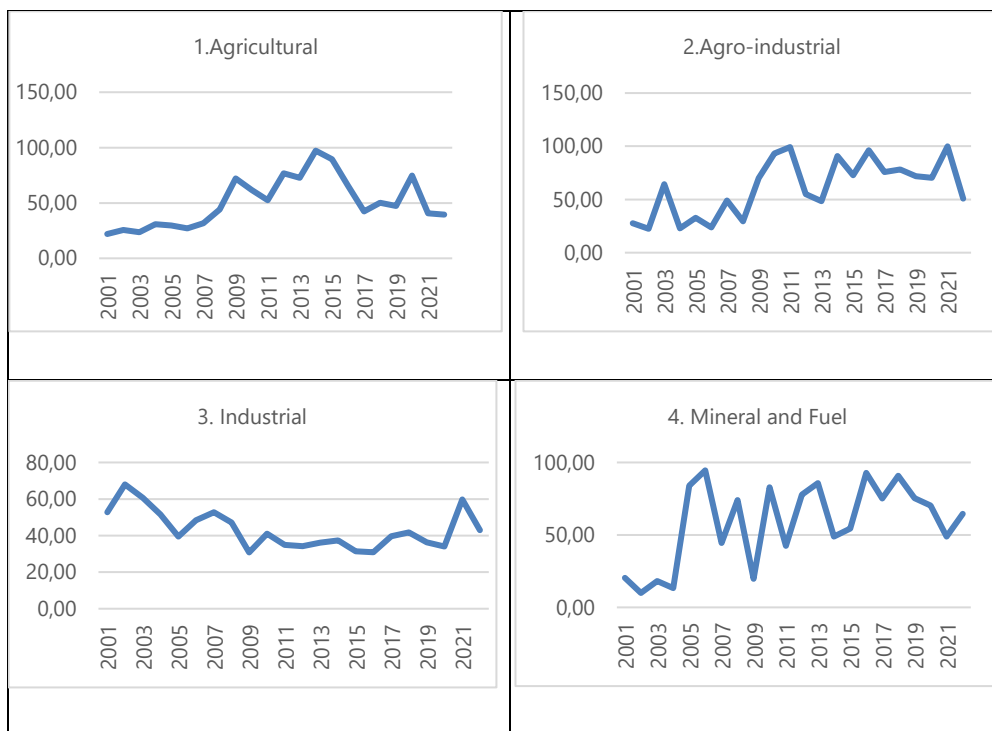
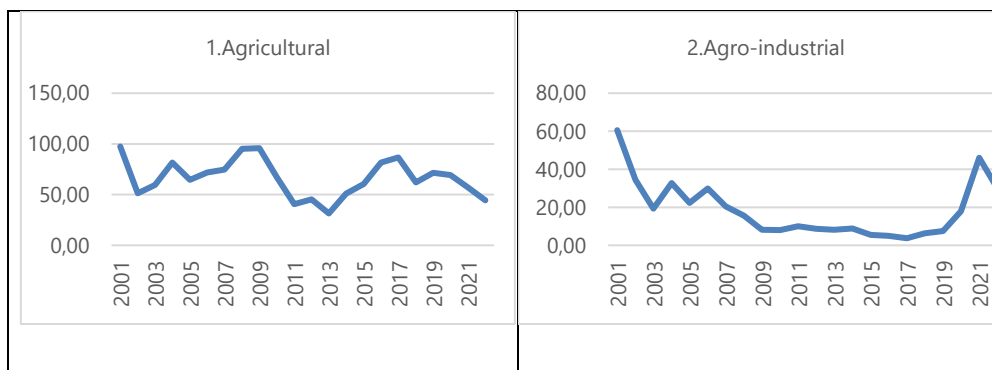
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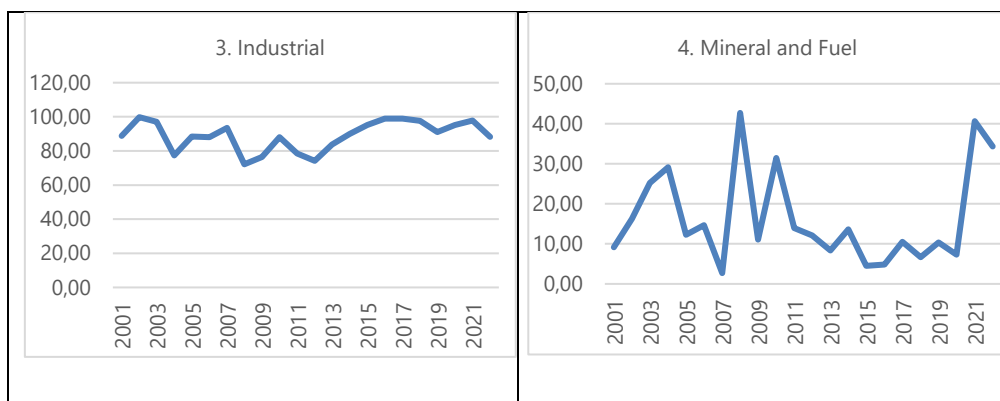
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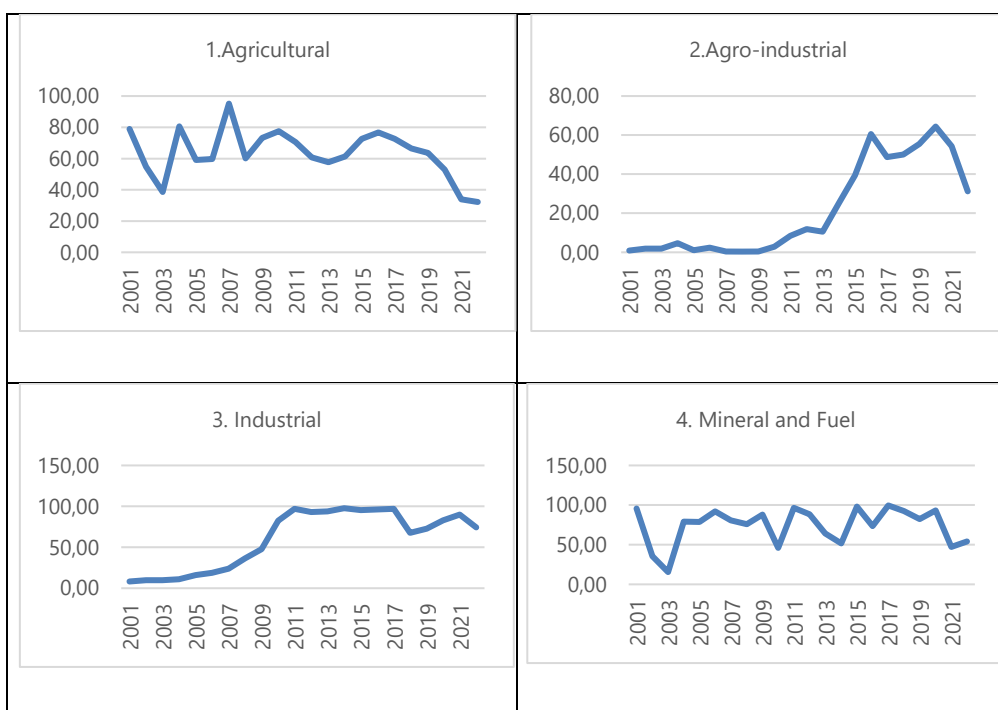
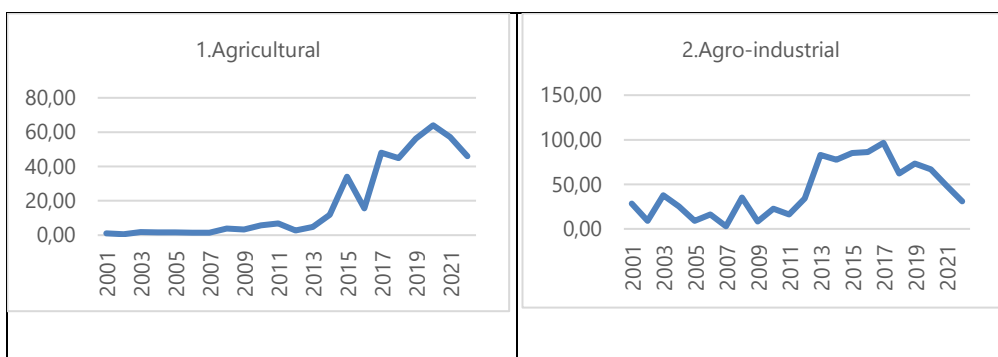
Appendix A*IIT index of ASEAN Countries**A.1. Thailand**A2 Indonesia*

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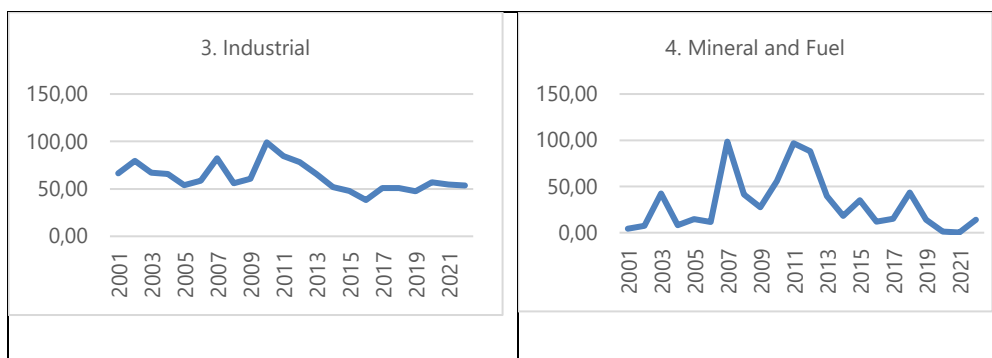


A3 Brunei

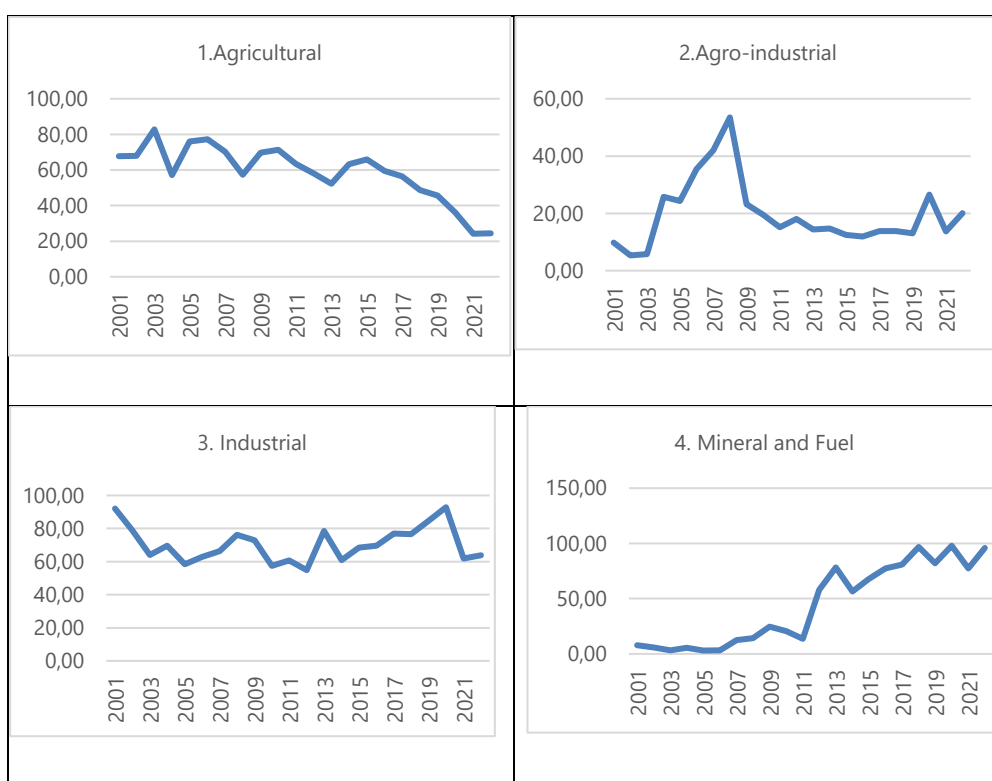


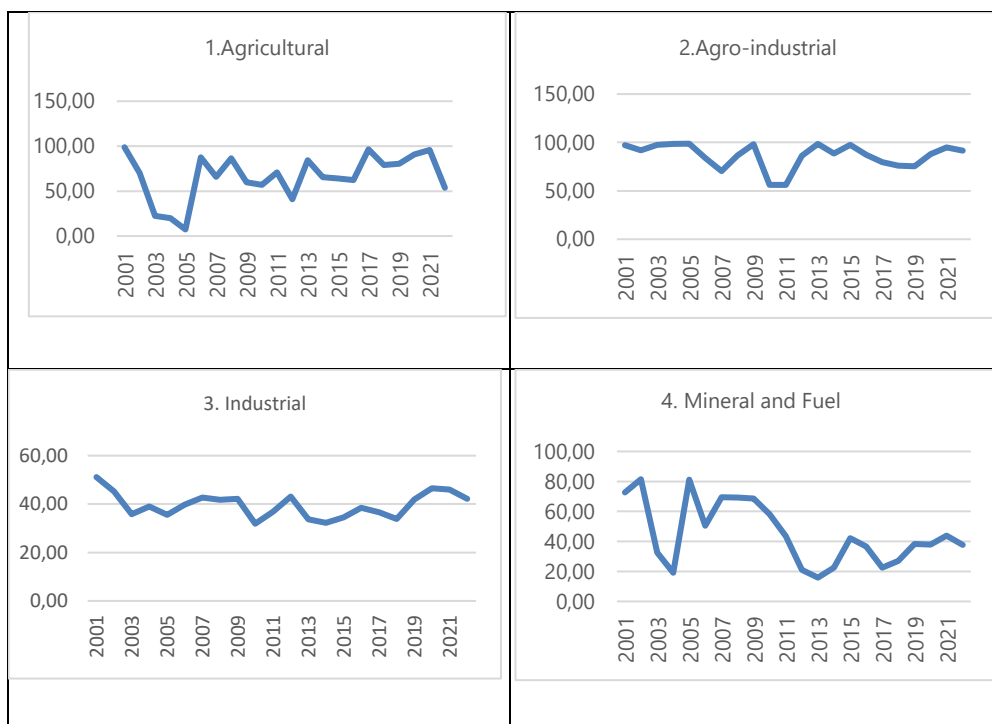
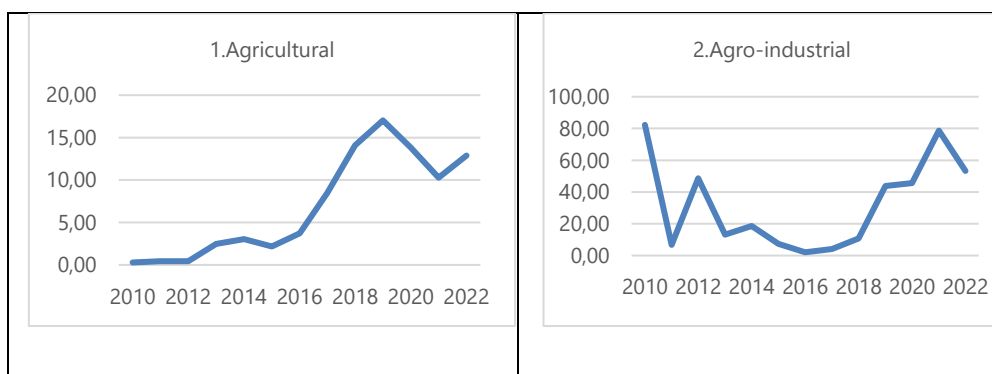
A4 Vietnam**A5 Phillippines**

CHEMSRIPONG, S. & CHANTHASING, B. / *The Role of Multilateral Trade of ASEAN-India Free Trade Agreement (AIFTA): Evidence of Trade Diversion*



A6 Malaysia



A7 Singapore**A8 Cambodia**

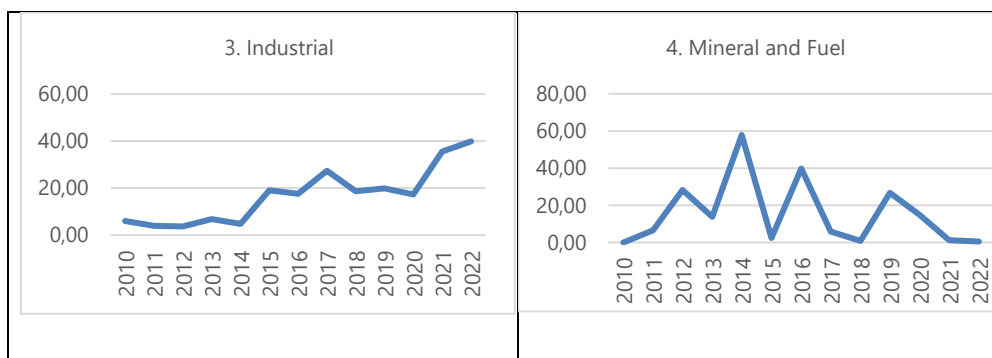
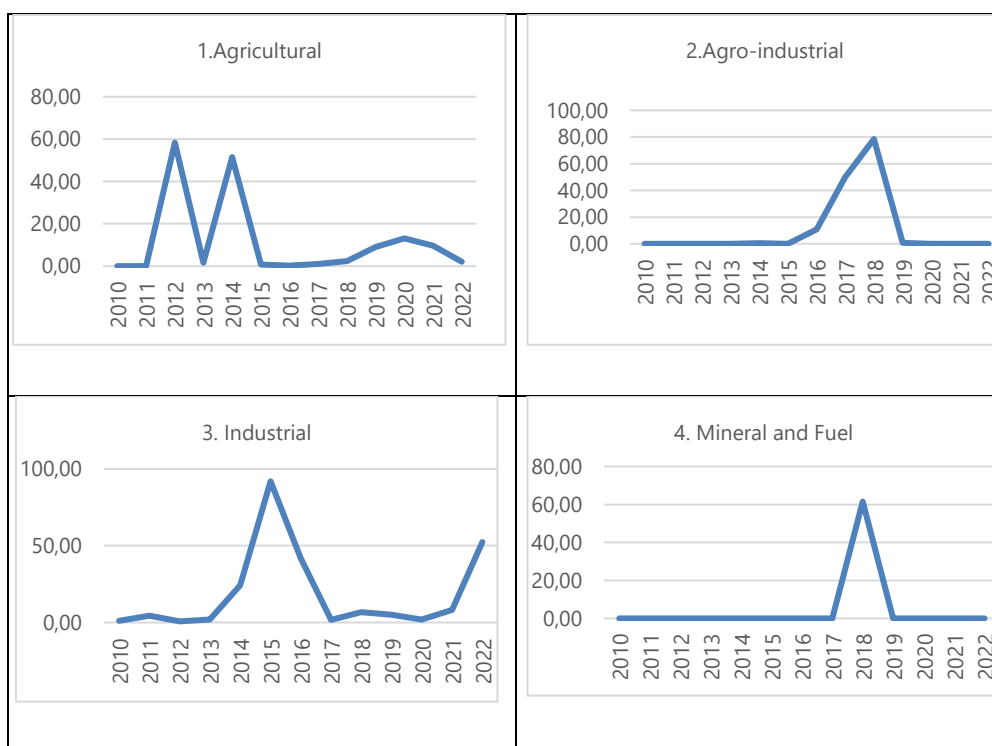
CHEMSRIPONG, S. & CHANTHASING, B. / *The Role of Multilateral Trade of ASEAN-India Free Trade Agreement (AIFTA): Evidence of Trade Diversion***A9. Lao**

Table A1: IIT values by 21 product categories in the ASEAN-India Free Trade Agreement (AIFTA)

A1. Thailand

Year	Agricultural	Agro-industrial	Industrial	Mineral and Fuel
2001	21.97	27.58	52.85	20.27
2002	25.55	22.43	67.99	9.96
2003	23.49	64.25	60.63	18.17
2004	30.87	22.77	51.46	13.36
2005	29.62	32.73	39.51	84.04
2006	27.18	23.72	48.47	94.53
2007	31.71	48.96	52.81	44.45
2008	44.22	29.42	47.15	74.02
2009	72.00	69.92	30.79	19.79
2010	61.78	93.27	41.07	82.78
Average before AIFTA	36.84	43.51	49.27	46.14
2011	52.42	99.29	34.94	42.48
2012	76.74	55.14	34.27	77.76
2013	72.85	48.39	36.10	85.69
2014	97.20	90.74	37.36	48.77
2015	89.49	72.82	31.40	54.36
2016	65.45	96.20	30.86	92.86
2017	42.46	75.78	39.58	75.24
2018	50.05	78.32	41.75	90.75
2019	47.35	71.80	36.33	75.44
2020	74.62	70.23	34.00	70.19
2021	40.61	99.92	59.79	48.87
2022	39.44	50.85	42.93	64.58
Average after AIFTA	62.39	75.79	38.28	68.92

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Table B1. IIT values by 21 product categories in the ASEAN-India Free Trade Agreement (AIFTA) (source: researcher)

Year	Agriculture	Agricultural Industry	Industrial Products	Mineral and Fuel Products
2001	98.07	66.65	84.94	18.91
2002	96.91	47.11	85.77	18.44
2003	98.88	33.58	81.90	21.84
2004	98.52	40.81	81.08	29.08
2005	98.30	53.67	82.65	39.93
2006	98.35	71.99	81.98	89.45
2007	99.10	78.17	75.97	98.36
2008	99.91	76.90	88.74	97.66
2009	98.64	40.88	96.47	80.44
2010	99.34	34.78	88.07	84.43
<i>Average before AIFTA</i>	98.62	54.45	84.76	57.85
2011	95.10	32.24	93.47	86.57
2012	93.67	26.24	84.62	87.25
2013	90.71	30.55	90.86	81.53
2014	92.11	22.52	81.96	91.96
2015	94.11	24.48	76.92	82.16
2016	93.38	31.10	79.50	75.53
2017	91.66	23.50	81.83	73.37
2018	93.25	28.01	67.12	82.26
2019	95.99	23.63	73.72	72.40
2020	96.65	31.85	80.75	62.56
2021	95.38	33.99	72.03	67.91
2022	96.91	32.83	62.07	98.03
<i>Average after AIFTA</i>	94.08	28.41	78.74	80.13

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Table B2: RCA Before and After join AIFTA (source: calculate by researcher)

Section	RCA	THA	IND	BRU	VTN	PHL	MLS	SGP	CAM
I	Before	2.74 (C)	1151.71 (D)	1.99 (B)	595.26 (D)	53.29 (D)	28.73 (D)	15.51 (D)	12.80 (A)
	After	1.01 (B)	1226.11 (D)	5.90 (D)	1758.8 (D)	46.10 (D)	32.18 (D)	9.55 (D)	1.68 (B)
II	Before	0.84 (A)	6.75 (D)	0.00 (A)	4.37 (D)	0.80 (A)	0.22 (A)	0.10 (A)	0.17 (A)
	After	3.22 (C)	8.19 (D)	0.01 (A)	1.60 (B)	1.08 (B)	0.14 (A)	0.06 (A)	1.27 (B)
III	Before	0.62 (A)	158.32 (D)	0.00 (A)	0.61 (A)	3.61 (C)	10.63 (D)	0.38 (A)	0.13 (A)
	After	0.05 (A)	255.53 (D)	0.01 (A)	0.46 (A)	3.77 (C)	12.42 (D)	0.15 (A)	0.40 (A)
IV	Before	5.27 (D)	8.87 (D)	0.00 (A)	0.82 (A)	0.79 (A)	0.48 (A)	0.46 (A)	0.10 (A)
	After	1.32 (B)	14.13 (D)	0.03 (A)	0.84 (A)	1.11 (B)	0.84 (A)	0.76 (A)	0.34 (A)
V	Before	0.09 (A)	22.80 (D)	6.87 (D)	1.01 (B)	0.20 (A)	1.32 (B)	0.86 (A)	0.02 (A)
	After	5.40 (D)	21.75 (D)	6.15 (D)	0.04 (A)	0.30 (A)	1.32 (B)	0.91 (A)	0.00 (A)
VI	Before	0.86 (A)	4.89 (D)	0.02 (A)	0.59 (A)	0.16 (A)	0.58 (A)	0.97 (A)	0.00 (A)
	After	3.12 (C)	8.10 (D)	0.67 (A)	1.11 (B)	0.26 (A)	0.57 (A)	1.07 (B)	0.04 (A)
VII	Before	7.20 (D)	14.54 (D)	0.01 (A)	0.40 (A)	0.28 (A)	1.08 (B)	0.77 (A)	0.34 (A)
	After	1.31 (B)	15.25 (D)	0.02 (A)	0.01 (A)	0.46 (A)	1.58 (B)	0.93 (A)	0.75 (A)
VIII	Before	0.89 (A)	5.15 (D)	0.01 (A)	3.86 (C)	0.65 (A)	0.13 (A)	0.22 (A)	0.06 (A)
	After	0.63 (A)	7.05 (D)	0.02 (A)	4.64 (D)	1.30 (B)	0.09 (A)	0.54 (A)	8.48 (D)
IX	Before	1.42 (B)	38.44 (D)	0.01 (A)	1.69 (B)	1.54 (B)	2.70 (C)	0.09 (A)	0.50 (A)
	After	2.04 (C)	35.14 (D)	0.03 (A)	2.53 (C)	4.06 (D)	2.36 (C)	0.03 (A)	1.31 (B)
X	Before	0.53 (A)	20.67 (D)	0.01 (A)	0.99 (A)	0.22 (A)	0.34 (A)	0.37 (A)	11.48 (A)
	After	2.16 (C)	29.83 (D)	0.02 (A)	3.07 (C)	0.31 (A)	0.43 (A)	0.64 (A)	2.19 (C)
XI	Before	3.98 (C)	19.60 (D)	0.56 (A)	4.49 (D)	1.13 (B)	0.40 (A)	0.24 (A)	14.03 (A)

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	After	2.09	19.10	0.02	2.28	0.54	0.33	0.13	14.29
		(C)	(D)	(A)	(C)	(A)	(A)	(A)	(A)
XII	Before	6.42	1.73	0.00	13.23	0.23	0.15	0.11	2.94
		(D)	(B)	(A)	(D)	(A)	(A)	(A)	(C)
	After	0.50	1.19	0.00	8.54	0.25	0.11	0.16	8.39
		(A)	(B)	(A)	(D)	(A)	(A)	(A)	(A)
XIII	Before	2.74	8.36	0.02	2.95	0.55	0.59	0.19	0.01
		(C)	(D)	(A)	(C)	(A)	(A)	(A)	(A)
	After	1.85	5.57	0.03	3.01	0.33	0.84	0.15	0.04
		(B)	(D)	(A)	(C)	(A)	(A)	(A)	(A)
XIV	Before	0.24	3.12	0.00	0.16	0.27	1.93	0.68	0.27
		(A)	(C)	(A)	(A)	(A)	(B)	(A)	(A)
	After	1.80	9.14	0.02	0.06	0.40	0.33	0.91	0.62
		(B)	(D)	(A)	(A)	(A)	(A)	(A)	(A)
XV	Before	1.85	7.83	0.07	1.04	0.40	0.58	0.39	0.03
		(B)	(D)	(A)	(B)	(A)	(A)	(A)	(A)
	After	2.22	13.11	0.10	1.73	0.65	0.78	0.35	0.11
		(C)	(D)	(A)	(B)	(A)	(A)	(A)	(A)
XVI	Before	2.12	4.76	0.04	0.22	2.44	1.74	2.11	0.02
		(C)	(D)	(A)	(A)	(C)	(B)	(C)	(A)
	After	0.87	4.10	0.06	0.09	2.27	1.65	1.86	0.17
		(A)	(D)	(A)	(A)	(C)	(B)	(B)	(A)
XVII	Before	1.40	1.86	0.12	0.07	0.39	0.14	0.23	0.10
		(B)	(B)	(A)	(A)	(A)	(A)	(A)	(A)
	After	0.03	4.65	0.06	0.11	0.45	0.17	0.29	0.36
		(A)	(D)	(A)	(A)	(A)	(A)	(A)	(A)
XVIII	Before	0.36	2.41	0.07	0.29	0.69	0.70	0.90	0.02
		(A)	(C)	(A)	(A)	(A)	(A)	(A)	(A)
	After	1.49	2.42	0.16	0.82	1.05	1.04	1.41	0.03
		(B)	(C)	(A)	(A)	(B)	(B)	(B)	(A)
XIX	Before	0.25	0.27	0.07	2.01	0.32	0.04	0.04	0.04
		(A)	(A)	(A)	(C)	(A)	(A)	(A)	(A)
	After	0.16	0.13	0.35	6.15	0.88	0.02	0.01	0.13
		(A)	(A)	(A)	(D)	(A)	(A)	(A)	(A)
XX	Before	2.62	12.13	0.01	0.91	0.54	0.79	0.19	0.10
		(C)	(D)	(A)	(A)	(A)	(A)	(A)	(A)
	After	0.86	8.66	0.01	0.04	0.51	0.75	0.15	0.82
		(A)	(D)	(A)	(A)	(A)	(A)	(A)	(A)
XXI	Before	0.73	0.54	0.46	0.09	0.04	0.02	0.27	2.36
		(A)	(A)	(A)	(A)	(A)	(A)	(A)	(C)
	After	0.21	0.41	0.77	0.15	0.07	0.01	0.54	0.60
		(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)

Note: (Blanket) = RCA level

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Table B3: Section (Description) (source: Researcher)

No.	Section	No.	Section
I	Live animals/ animal products	XII	Footwear/ headgear/ umbrellas
II	Vegetable products	XIII	Articles of stone/ plaster/ cement
III	Animal or vegetable fats and oils	XIV	Pearls, precious or semi-precious stones
IV	Prepared foodstuffs/ beverages	XV	Base metals and articles of base metal
V	Mineral products	XVI	Machinery and electrical equipment
VI	Products of the chemical	XVII	Vehicles/ aircraft/ vessels
VII	Plastics/ rubber and articles thereof	XVIII	Optical/ photographic
VIII	Raw hides and skins/ leather	XIX	Arms and ammunition
IX	Wood and articles of wood	XX	Miscellaneous manufactured articles
X	Wood pulp or other fibrous material	XXI	Works of art
XI	Textiles and textile articles		

ADEMI K., EMINI DEARI E., DEARI ZEQRIRI H. & ELEZI SH. / *Present Bias and Household Saving Behavior: Empirical Evidence from North Macedonia*

Present Bias and Household Saving Behavior: Empirical Evidence from North Macedonia

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Abstract

This research investigates the impact of present bias which is the impulse of humans buying things in the present rather than saving for later, on the saving habits of households in North Macedonia. We have used both, primary and secondary data from National Bank of North Macedonia to evaluate the relation between personal transfers and deposits of households to find the culprit of present bias in this country. Present bias is positively and significantly associated with liquidity preference (H1: $p = 0.264$, $p = 0.007$), and target saving co-exists with liquidity preference as the dominant behavioral saving profile (H2: $p = 0.326$, $p = 0.001$). The proposed positive association between present bias and target saving is not supported (H3: $p = 0.129$, $p = 0.189$), suggesting that goal-directed saving in this context is a culturally embedded practice rather than a conscious response to recognized self-control failure. A stable long-run cointegrating relationship between personal transfers and household deposits is confirmed (H4), with a one percent permanent increase in remittances associated with a 9.08 percent increase in household deposits, though the speed of adjustment is slow (1.25% per month). The results provide policy hints for the National Bank of the Republic of North Macedonia (NBRM) concerning the design of "getting more" financial products to encourage long-term fiscal resilience.

Key words: Household saving behavior, Remittances, VECM, Cointegration, Behavioral economics

JEL Codes: D14, D91, E21, F24, C32

1. Introduction

Household savings are an important indicator of financial security, economic well-being, and long-term investment opportunities, contributing to economic sustainability.

The behavior of individuals toward consumption and saving has been widely studied, suggesting that savings contribute to financial stability at both the national and household levels, enabling families to cope with unexpected expenses and invest in a better economic future (Subov et al., 2024; Abbas, 2026).

As a result, the factors that influence saving behavior have received increasing attention in the literature.

Traditional economic theories explain saving decisions through rational models in which individuals allocate resources efficiently between present and future consumption Modigliani and Fisher, (1930); Brumberg (1954) ; Friedman, (1957).

In recent years, empirical studies have expanded this field by emphasizing that, in addition to economic factors, saving behavior is also influenced by psychological factors.

In behavioral finance and self-control theory, present bias is a central concept (Thaler & Shefrin, 1981), referring to the tendency to place greater importance on immediate benefits than on future rewards (Xiao & Porto, 2019). A recent systematic review of studies published between 2020 and 2025 on present bias and saving behavior found that present bias consistently contributes to impulsive spending and lower levels of saving (Aquino et al., 2026).

Although interest in the concept of present bias and household saving is growing, previous studies have mainly focused on the negative relationship between this bias and household saving. Limited attention has been paid to the possibility that present-biased individuals may continue to save when they are clearly motivated by specific future goals.

This perspective suggests that present-biased households may not avoid saving altogether but may accumulate savings when they have well-defined goals for the future, such as purchasing a house, financing education, weddings, or other significant expenditures, while maintaining a preference for liquidity.

Considering the existing gap in the literature regarding present-biased behavior, this study aims to investigate the relationships among present bias, liquidity preference, and target saving behavior in North Macedonia. By focusing on a developing and transition economy, the study also contributes to the literature by

providing evidence on the cultural and contextual dimensions of present-biased behavior.

Moreover, household saving behavior is often influenced by additional sources of income. Given the substantial role of migration in North Macedonia, this study further investigates the long-run relationship between remittances and household deposits to assess the extent to which remittances contribute to household savings.

The rest of the paper continues with the second section which includes a review of the relevant literature in the field and develops the research hypotheses. The third section of the paper presents the methodology and research data. Section four presents the empirical findings, while section five discusses the results and implications. The last section includes the limitations of the study and recommendations for future studies.

2. Literature Review and Hypothesis Development

Household saving behavior has traditionally been explained through rational economic models that assume individuals optimize consumption and saving decisions over time. Among these theories, the Life-Cycle Hypothesis (LCH) proposed by Modigliani and Brumberg (1954) posits that individuals save during their working years to smooth consumption over their lifetimes and maintain it after retirement.

Another important theoretical framework is the Permanent Income Hypothesis (PIH), which argues that saving decisions are primarily based on expected long-term income rather than current income fluctuations (Friedman, 1957). Similarly, Intertemporal Choice Theory suggests that individuals allocate resources between present and future consumption to maximize lifetime utility (Fisher, 1930).

Unlike traditional economic theories, behavioral finance emphasizes the role of psychological factors in financial decision-making. One of the most influential concepts in this field is present bias, which refers to the tendency of individuals to place disproportionate weight on immediate benefits relative to future outcomes. As a result, individuals may prioritize current consumption at the expense of future financial well-being.

Recent empirical evidence supports the assumption that financial decisions are influenced by psychological tendencies and short-term considerations. Previous studies have shown that present-biased individuals are more likely to engage in current consumption and are less likely to save for the future (Xiao, 2019; Goda et al., 2019; Prasad, 2025).

An important contribution to the literature on present bias is provided by O'Donoghue and Rabin (2015), who distinguish between naïve and sophisticated individuals. Naïve individuals believe that they will exercise greater self-control in the future and therefore postpone beneficial financial actions, such as saving. In contrast,

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sophisticated individuals recognize their limitations in self-control and adopt commitment mechanisms to support long-term financial objectives.

Recent empirical studies suggest that asset liquidity plays an important role in the financial behavior of present-biased individuals. Tang, Pu, and Chen (2024) argue that illiquid assets can function as commitment devices by limiting immediate access to funds and reducing impulsive consumption. Their findings indicate that the relationship between present consumption preferences and asset liquidity significantly influences long-term saving decisions and wealth accumulation.

Drawing on prior theoretical and empirical evidence, the following hypothesis is proposed:

H1: Present bias is positively associated with liquidity preference among households.

While present bias is often associated with lower saving rates, recent evidence suggests that present-biased individuals are not necessarily unwilling to save. Beshears et al. (2022) argue that present-biased individuals may continue to accumulate savings when supported by commitment mechanisms and clearly defined future objectives. Rather than maximizing wealth accumulation continuously, households may save for specific goals such as housing purchases, education expenses, weddings, or other culturally significant expenditures.

The above studies suggest that present bias and saving behavior are not necessarily contradictory. Rather than completely avoiding saving, individuals exhibiting present-biased preferences may accumulate funds for specific future objectives. Such behavior indicates that saving decisions may be goal-oriented, reflecting a target saving approach rather than continuous wealth accumulation.

Therefore, the following hypothesis is proposed:

H2: Target saving behavior is positively associated with liquidity preference among households.

Although prior studies have extensively examined the relationship between present bias and saving behavior, limited empirical evidence exists regarding the association between present bias and target saving behavior. Previous research has primarily focused on the tendency of present-biased individuals to prioritize current consumption over future savings. However, recent findings suggest that present-biased individuals may still accumulate savings for specific future objectives when supported by commitment mechanisms and goal-oriented financial planning. Therefore, this study extends the existing literature by examining the relationship between present bias and target saving behavior among households.

H3: Present bias is positively associated with target saving behavior among households.

While the preceding hypotheses focus on the behavioral determinants of household saving decisions, household savings are also influenced by external sources

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of income. In many developing and transition economies, remittances represent an important financial resource that affects consumption, saving, and asset accumulation decisions. Consequently, understanding household saving behavior requires not only an examination of behavioral factors such as present bias and target saving motives but also an assessment of the role of remittance inflows in shaping household financial outcomes.

Remittances constitute an important source of household income in many developing and transition economies. Previous studies have shown that remittance inflows contribute to household savings, asset accumulation, and financial development. Aggarwal, Demirgüç-Kunt, and Martínez Pería (2011) report a positive relationship between remittances and bank deposits, while more recent evidence suggests that remittance inflows are associated with higher levels of household savings and deposits in the long run. Furthermore, remittances may encourage households to utilize formal financial institutions and increase the use of deposit accounts.

These findings suggest that remittance inflows can play a significant role in supporting household deposit growth. Therefore, the following hypothesis is proposed:

H4: Remittance inflows positively influence household deposits in the long run.

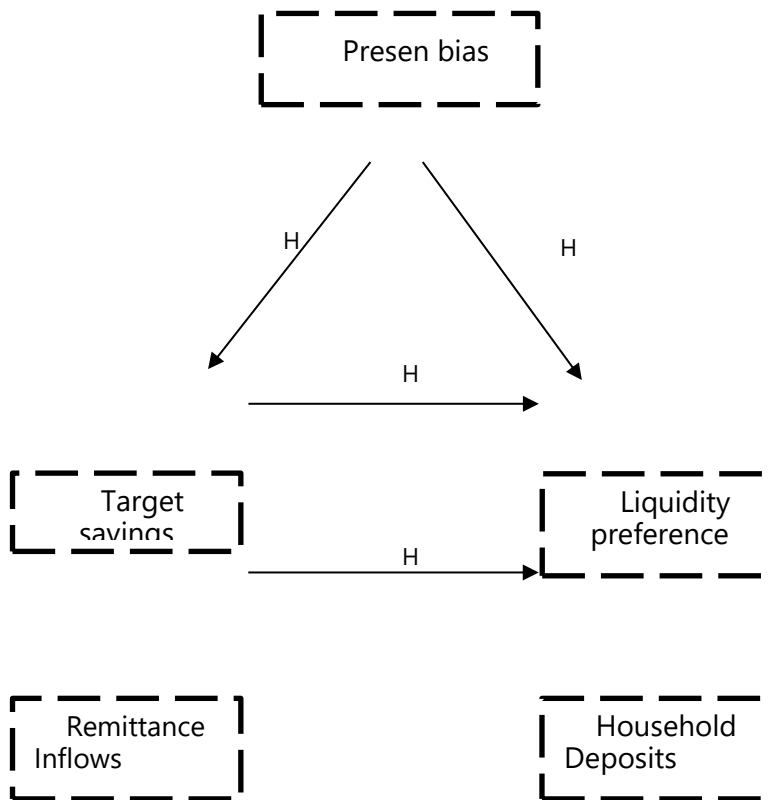


Figure 1. Conceptual Framework of Present Bias, Target Saving, Liquidity Preference and Household Deposits (source: Developed by the authors based on O'Donoghue and Rabin (2015), Beshears et al. (2022), Tang et al. (2024), and the remittance literature)

3. Methodology and data sample

We have worked with both, primary and secondary data to prove our main hypothesis. Our primary sample concerning the secondary data which are sourced from National Bank of North Macedonia is consisting of 276 observations monthly data, the period is from January 2003 until December 2025. Main focus in the first sample are two time series, the household deposits in millions of denars of people from North Macedonia and personal transfers in million denars for the same period mentioned. These series are seasonally adjusted before performing cointegration test and VECM. The analysis of the first sample is done with EViews.

Our second sample is consisting of 105 observations from a questionnaire conducted during May and early June via Google forms. The second sample has primary data and main sections in this sample are the Present bias section with 5 items, Target saving with 4 items and Liquidity preference with 6 items. The data of the

second sample are analyzed and visually presented using Python libraries such as NumPy and Pandas.

We have used VECM for our first sample with secondary data to explain the long-term relationship between personal transfers and household deposits of the people in North Macedonia. The lag structure is determined not by chance but by checking the lag length criteria and the VECM is done using 5-time lags. We have stabilized the series of personal transfers seasonally and then both the personal transfer series and household deposits series are put in their log form to count for their percentage change hence the elasticity. Johansen cointegration test firstly is used to check for the common unit root because visibly the series of household deposits and those of the personal transfer were non-stationary series as we will check on later in the following section.

In the second sample with our primary data normality of the three composite indices was assessed using the Shapiro-Wilk test. Since both the Present Bias and Target Saving indices violated normality assumptions ($p < 0.05$), all subsequent group comparisons and bivariate analyses employed non-parametric methods: Spearman rank-order correlation for bivariate associations, Kruskal-Wallis H test for multi-group comparisons, and Mann-Whitney U test for two-group comparisons. Chi-Square analysis was used to test the association between remittance receipt and saving regularity. Internal consistency of each scale was assessed using Cronbach's Alpha (α).

4. Data analysis and results

4.1. Household deposits and personal transfers analysis and results

Our data analysis starts with our first sample with two monthly time series, households deposits of people in North Macedonia and personal transfers. Households' deposits in million denars in Figure 1 show linear (deterministic) increasing trend and no seasonality. By the end of 2025 the value of the households' deposits reached more than 444758 million denars which is roughly 7.23 billion euros or over 45% of the GDP of North Macedonia in 2025. After the 2022 the trend of the series is steeper than it was before, emphasizing the quick rise in the value of the total household deposits in North Macedonia.

Personal transfers *Figure 1* in millions of denars units also show increasing trend, after the decline in the 2020 during the pandemic it followed higher increase the following years up to 2025 with a value of approximately 25 million euros in September 2025. The series shows seasonality and that is why it was seasonally adjusted before putting it to log transformation for the cointegration analysis.

Table 1. Johansen Cointegration test, Variables: lnHD (Household Deposits) and lnPT (Personal Transfers), 2003M06–2025M09

Panel A: Unrestricted Cointegration Rank Test (Trace)

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Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Value	Critical	Prob.
None *	0.0911	29.480**	15.495		0.0002
At most 1 *	0.0148	3.985*	3.841		0.046†

Trace test indicates 2 cointegrating equations at the 5% level. † 'At most 1' is marginally significant ($p = 0.046$); the second eigenvalue (0.0148) is small relative to the first (0.0911).

Panel B: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5% Value	Critical	Prob.
None *	0.0911	25.495**	14.265		0.0006
At most 1 *	0.0148	3.985*	3.841		0.046†

Maximum Eigenvalue test indicates 2 cointegrating equations at the 5% level.

Panel C: Normalized Cointegrating Vector (rank = 1)

Variable	lnHD	lnPT
Coefficient	1.0000	-9.0807**
Standard error	—	(1.2240)
Implied t-statistic	—	[-7.419]

lnHD normalized to 1. Cointegrating vector: $\ln HD - 9.081 \cdot \ln PT = \text{constant}$. Standard errors in parentheses; implied t-statistics in brackets.

Panel D: Adjustment Coefficients (α)

Equation	Coefficient	Std. Error	t-Statistic	Sig.
D(lnHD)	-0.01255	(0.00289)	[-4.342]	***
D(lnPT)	0.00653	(0.00340)	[1.921]	†

Notes: lnHD = log of seasonally adjusted household deposits; lnPT = log of seasonally adjusted personal transfers. Sample: 2003M06–2025M09 (268 monthly observations). VAR lag order: 6 (selected by LR, FPE, and AIC); VECM estimated with 5 lags in first differences. Trend assumption: linear deterministic trend. Critical values from MacKinnon, Haug, and Michelis (1999). A cointegrating rank of 1 is imposed in the VECM on the grounds that: (i) the second eigenvalue (0.0148) is an order of magnitude smaller than the first (0.0911); (ii) the 'At most 1' null is only marginally rejected ($p = 0.046$); and (iii) rank = 2 in a bivariate system implies both variables are stationary, which is inconsistent with unit root test results.

Significance: ** $p < 0.01$ * $p < 0.05$ † $p < 0.10$ (marginal) *** α coefficient $p < 0.01$.

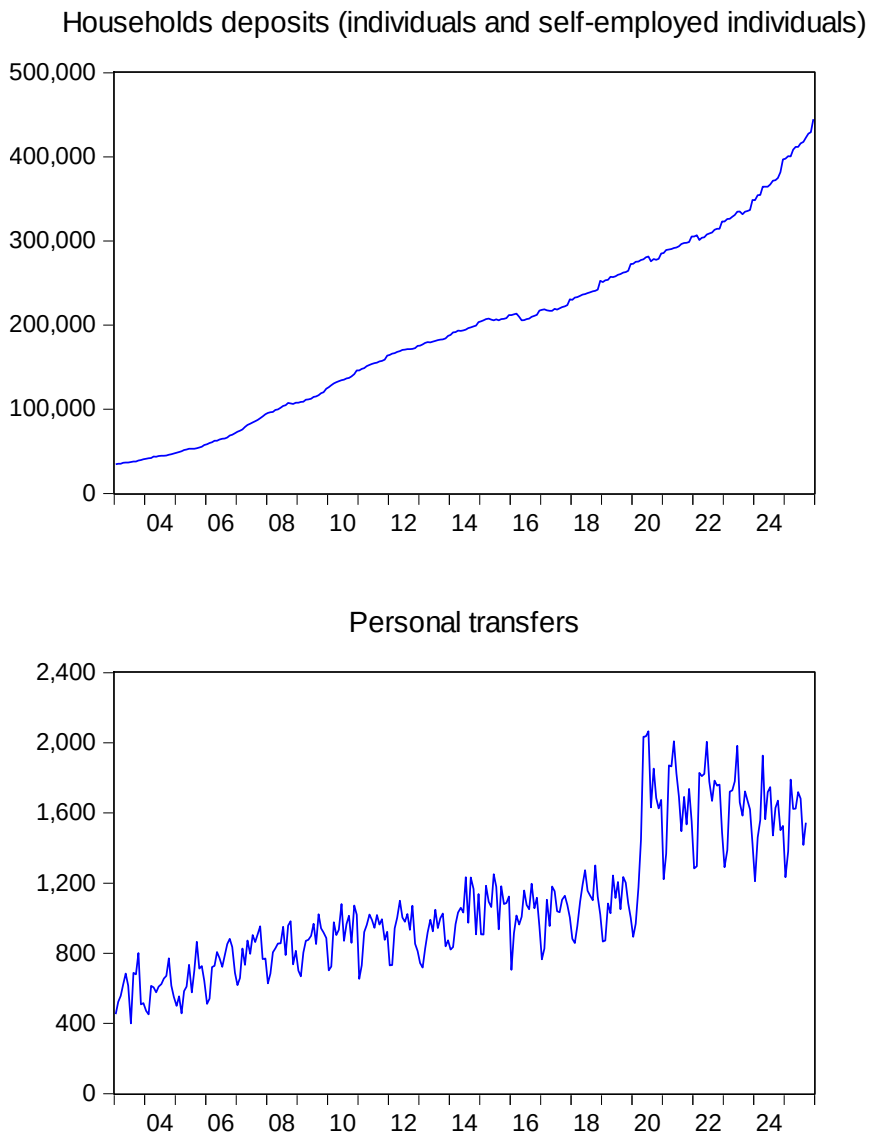


Figure 2. Personal Transfers and Household Deposits in North Macedonia, 2003M01–2025M09. Notes: Panel (a) up shows total household and individual deposits held by private individuals and self-employed individuals (in millions of denars). Panel (b) down shows monthly personal transfers received from abroad (in millions of denars, unadjusted) (source: National Bank of the Republic of North Macedonia (NBRM)).

The Johansen cointegration tests (Table 1) confirm the existence of one stable long-run relationship between log household deposits ($\ln HD$) and log personal transfers ($\ln PT$) over the sample period 2003M06–2025M09. Both the Trace statistic (29.48, $p =$

0.0002) and the Maximum Eigenvalue statistic (25.49, $p = 0.0006$) reject the null hypothesis of no cointegration. Although both tests formally indicate two cointegrating equations at the 5% level, the second eigenvalue (0.0148) is an order of magnitude smaller than the first (0.0911), and the associated p-value is only marginally significant ($p = 0.046$). Following the Schwarz criterion and consistent with the theoretical prior that a bivariate system of two non-stationary variables admits at most one economically meaningful long-run attractor, we have proceeded with a cointegrating rank of one for our VECM estimation (Johansen, 1995).

Table 2 VECM estimation, , Variables: lnHD (Household Deposits) and lnPT (Personal Transfers), 2003M06–2025M09

Variable	$\Delta \ln HD$	$\Delta \ln PT$
Panel A: Long-Run Cointegrating Equation		
lnHD(–1)	1.0000	—
lnPT(–1)	–9.0807*** (1.2240) [–7.4187]	—
Constant	5.5644	—
Panel B: Short-Run Error Correction Equations		
CointEq1	–0.0125*** (0.00289) [–4.3474]	0.0065* (0.00340) [1.9172]
$\Delta \ln HD(–1)$	–0.1468** (0.06192) [–2.3710]	–0.0395 (0.07305) [–0.5407]
$\Delta \ln HD(–2)$	0.1118* (0.05913) [1.8908]	0.0076 (0.06975) [0.1095]
$\Delta \ln HD(–3)$	0.1227** (0.05940) [2.0661]	0.1604** (0.07007) [2.2885]
$\Delta \ln HD(–4)$	–0.0254 (0.05963) [–0.4266]	0.0592 (0.07034) [0.8414]

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Variable	$\Delta \ln HD$	$\Delta \ln PT$
$\Delta \ln HD(-5)$	0.0330 (0.05858) [0.5631]	0.1859*** (0.06910) [2.6900]
$\Delta \ln PT(-1)$	-0.0556 (0.05536) [-1.0049]	-0.6679*** (0.06530) [-10.2271]
$\Delta \ln PT(-2)$	-0.1677*** (0.06512) [-2.5760]	-0.4439*** (0.07681) [-5.7790]
$\Delta \ln PT(-3)$	-0.2695*** (0.06800) [-3.9635]	-0.2602*** (0.08022) [-3.2438]
$\Delta \ln PT(-4)$	-0.3867*** (0.06504) [-5.9447]	-0.1824** (0.07672) [-2.3776]
$\Delta \ln PT(-5)$	-0.1442*** (0.05454) [-2.6438]	-0.1163* (0.06433) [-1.8080]
Constant	0.0088*** (0.00141) [6.2272]	-0.0022 (0.00166) [-1.2986]
Panel C: Model Diagnostics		
Observations	267	267
R ²	0.2267	0.3819
Adjusted R ²	0.1934	0.3553
S.E. of equation	0.01150	0.01356
F-statistic	6.797***	14.324***
Log likelihood	819.646	775.549
Akaike AIC	-6.0498	-5.7195
Schwarz SC	-5.8886	-5.5582

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Variable	$\Delta \ln HD$	$\Delta \ln PT$
Sum of squared residuals	0.03370	0.04689

System: Log likelihood = 1598.064 | AIC = -11.7758 | SC = -11.4264 | Det. residual covariance (dof adj.) = 2.38×10^{-8}

Notes: $\ln HD$ = log of seasonally adjusted household deposits; $\ln PT$ = log of seasonally adjusted personal transfers; Δ denotes first difference; parentheses contain standard errors; square brackets contain t-statistics. The cointegrating vector is normalised on $\ln HD$. Sample: 2003M07–2025M09 (267 monthly observations). Lag order: 5, selected by AIC. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$.

The normalized cointegrating vector in Table 2, with $\ln HD$ set to one, gives a coefficient on $\ln PT$ with a value of **-9.081** (standard error = 1.224, implied t-statistic = -7.419), significant at the 1% level. This implies that a one percent increase in real personal transfers is associated with a 9.08 percent increase in household deposits in the long run, consistent with a substantial marginal propensity to save out of remittance income at the aggregate level. The magnitude of this coefficient reflects both the cumulative nature of the deposit stock and the sustained, multi-year increase in remittance flows documented over the sample period.

The adjustment coefficients (α) from the VECM indicate a significant but slow return to equilibrium following a deviation. The error correction term in the household deposits equation carries a coefficient of **-0.01255** (SE = 0.00289, $t = -4.34$, $p < 0.01$), confirming that deposits bear the primary burden of adjustment. Approximately **1.25% of any disequilibrium** is corrected each month, implying a half-life of roughly 55 months and full adjustment over a horizon of approximately six to seven years. This is a characteristically slow speed of adjustment and is consistent with the hypothesis that behavioural inertia — specifically, the present bias documented in the primary survey — retards the transmission from remittance inflows to durable saving behaviour. As a conclusion from all of this we can conclude that the H4 hypothesis is fully supported

4.2. Survey analysis and results

Our survey is divided in three composite indices, Present Bias (PB), Target Saving (TS) and Liquidity Preference (LP). Reliability assessment valuated with Cronbach's α shows that each of the indices has low value, Present Bias has 0.535, Target Saving 0.578 and the highest alpha has the Liquidity Preference with a value of 0.651. as mentioned before our sample is fairly small with 105 respondents and these values could be due to the sample size.

The demographic profile of the survey we have done is detailed in *Figure 3*. Most of our respondents are middle-aged (36 to 51 years) with 51% followed by the youngest group 18 to 25 years with 26%, only 4 respondents were older than 51 years.

71% of the respondents were females compared to less than 30% males. Most of the respondents are employed with 70% and only 9% are unemployed. The mode of monthly income interval is from 6000 to 1000 euros, counting for 35% of the total 105 respondents.

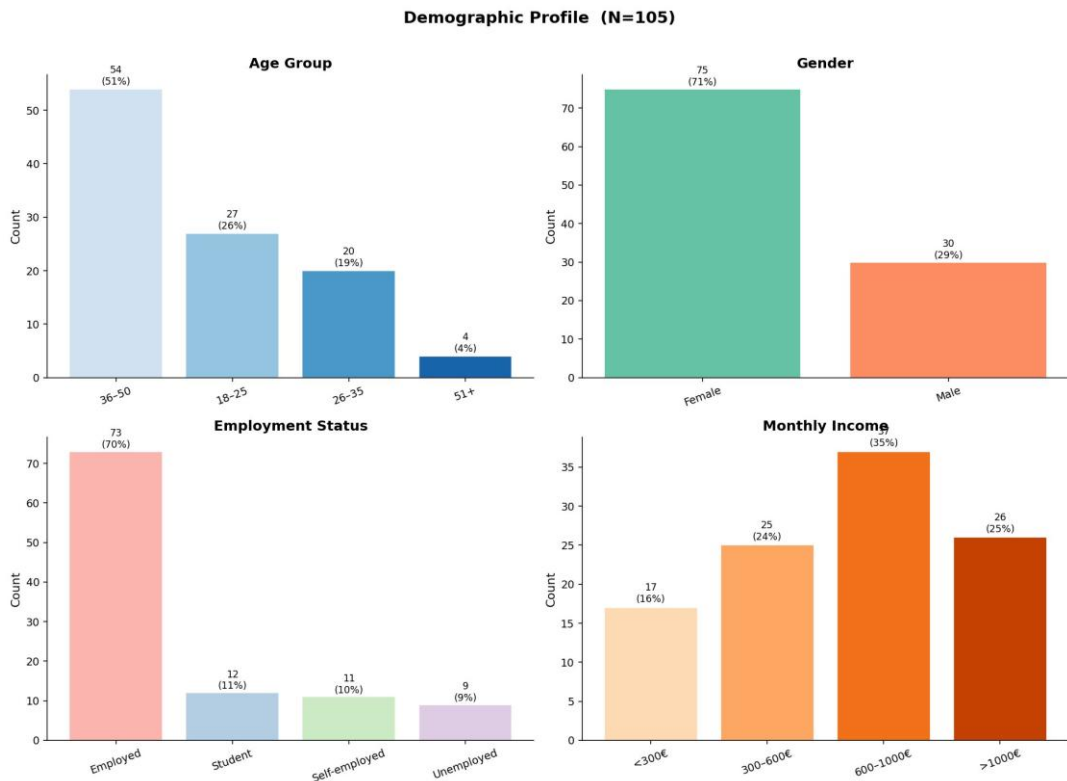


Figure 3 Demographic Profile of Survey Respondents (N = 105). Notes: Bars show absolute counts with percentages in parentheses. Age groups, gender, employment status, and monthly net income (expressed in EUR) are reported. Sample collected May–June 2026 via Google Forms.

Figure 4 shows the saving behaviour frequency of our respondents. 72.4% save regularly which is major advantage for our study because present bias is more prominent and understandable when people save money. 50.5% of our respondents save their money in cash and 40% in bank, leaving 6.7% and 2.9% respectively for investments and no savings. 36.8-2% of the respondents use rarely their saved money for daily spending, 38.1% use it sometimes and only 8.6% doesn't use it ever. The distribution of income saved reveals a bimodal pattern: 41.0% of respondents save only 1–10% of monthly income, while 28.6% save more than 20%. This bimodality is theoretically significant: it is consistent with the Target Saving hypothesis, whereby a subset of households saves intensively toward specific high-value goals (real estate, weddings, family ceremonies) rather than maintaining moderate, steady saving rates.

The 3.8% who save 0% of income (n=4) represent a financially vulnerable group exhibiting the most acute present bias.

In Figure 5 is shown that majority of the respondents over 84% do not receive remittances and only 15% do. 7 of those 16 who receive remittances receive them each month, 8 rarely and only 1 periodically. 13 respondents who receive remittances use them for consume, 2 for savings and only 1 for large expenses.



Figure 4 Saving Behaviour of Respondents (N = 105). Notes: Pie charts display the percentage distribution of self-reported responses. 'Saves Regularly?' refers to Q5; '% of Income Saved' to Q7; 'Where Savings Are Kept' to Q8; 'Uses Savings for Daily Spending' to Q9. Remittance recipients and non-recipients are pooled.

The Present Bias composite score (mean=2.554, SD=0.758) falls below the neutral midpoint of 3.0, indicating that respondents, on average, do not report extreme levels of present bias on the self-assessment instrument. This finding is consistent with the

cognitive psychology literature on bias blind spots: individuals are systematically less aware of their own biases than of others', meaning self-reported present bias reliably underestimates its true behavioural manifestation. The distributional evidence — 50.5% cash savings rates, high rates of dipping into savings for everyday spending — suggests that present bias operates substantially below the threshold of conscious awareness in this population.

The Shapiro-Wilk test rejects normality for this index ($SW=0.9737$, $p=0.035$), confirming that parametric tests are inappropriate. The interquartile range ($Q25=1.8$, $Q75=3.0$) indicates substantial individual heterogeneity: a meaningful minority of respondents score in the moderate-to-high range (>3.0), and it is this sub-group that is of primary policy concern.

The Target Saving index (mean=3.614, $SD=0.866$) is above the neutral midpoint, indicating that goal-directed saving behaviour is the dominant saving orientation in this sample. The relatively high median (4.000) and the upper quartile value (4.250) confirm that strong endorsement of Target Saving is widespread. The non-normal distribution ($SW=0.9064$, $p<0.001$) is consistent with a heavily left-skewed distribution visible in Figure 5: most respondents score in the upper range (3.0–5.0), with a smaller cluster of low-scorers pulling the mean downward.

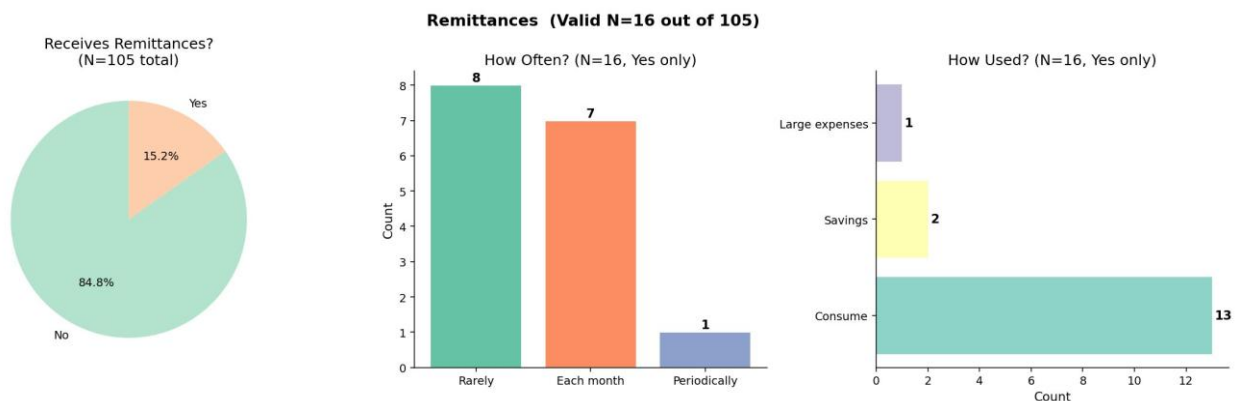


Figure 5. Remittance Receipt, Frequency, and Usage (Valid N = 16). Notes: Left panel: all 105 respondents (Q10). Centre and right panels show only the 16 respondents who answered 'Yes' to Q10. The 89 'No' respondents had their conditional answers recoded as missing values prior to analysis (skip-logic correction). Bars show absolute counts.

The high Target Saving scores, combined with the high Liquidity Preference scores discussed below, constitute the central behavioural pattern identified in this research: North Macedonian households save toward specific goals but insist on keeping those

savings in liquid, immediately accessible form — a pattern the abstract terms 'Target Saving with High Liquidity.'

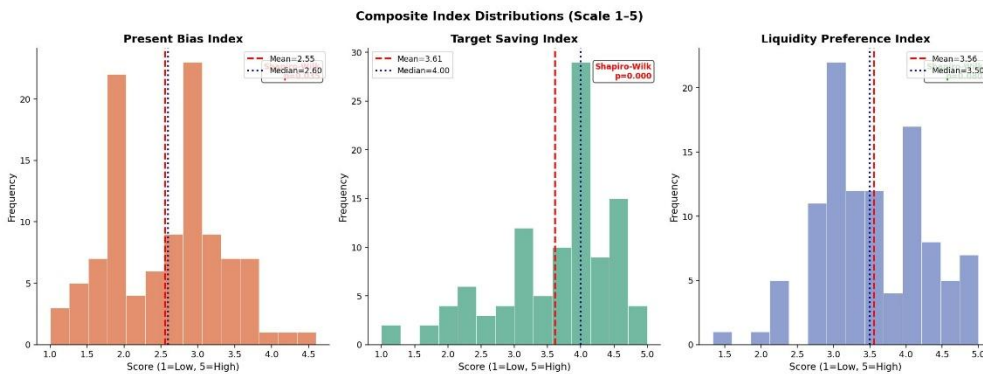


Figure 6. Frequency Distributions of Composite Behavioural Indices (N = 105). Notes: Each index is the unweighted mean of its constituent Likert items (scale 1–5). Dashed red line = mean; dotted navy line = median. Shapiro–Wilk p-value printed in each panel: red = non-normal ($p < 0.05$), green = normal. PB = Present Bias (5 items, PB5 reverse-scored); TS = Target Saving (4 items); LQ = Liquidity Preference (6 items).

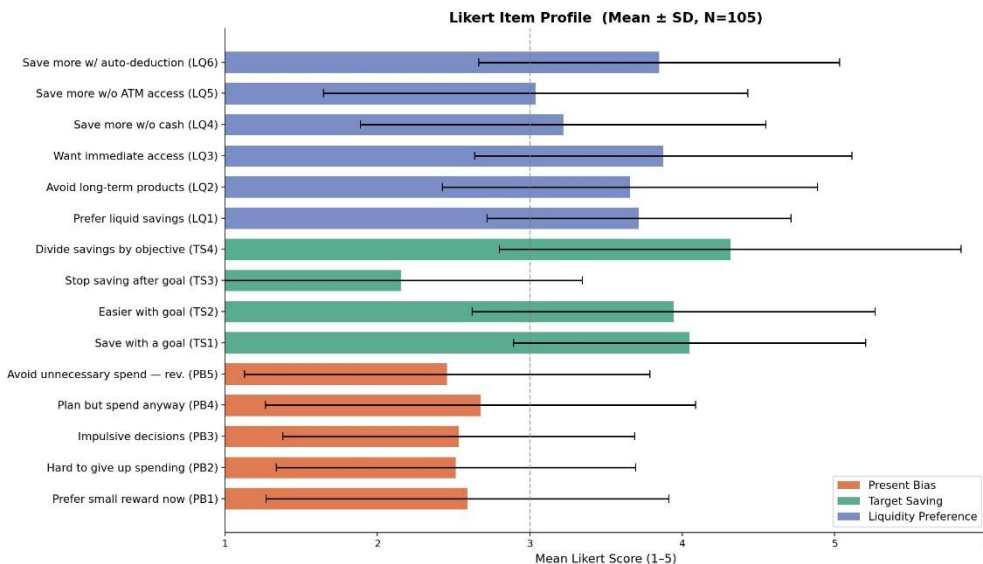


Figure 7. Likert Item Profile — Mean Scores with Standard Deviation Error Bars (N = 105). Notes: Horizontal bars show mean item score on a 1–5 scale. Error bars represent ± 1 SD. Dashed vertical line marks the neutral midpoint (3.0). Items are grouped by construct: Present Bias (PB1–PB5, orange); Target Saving (TS1–TS4, green); Liquidity Preference (LQ1–LQ6, blue-purple). PB5 is reported after reverse-scoring.

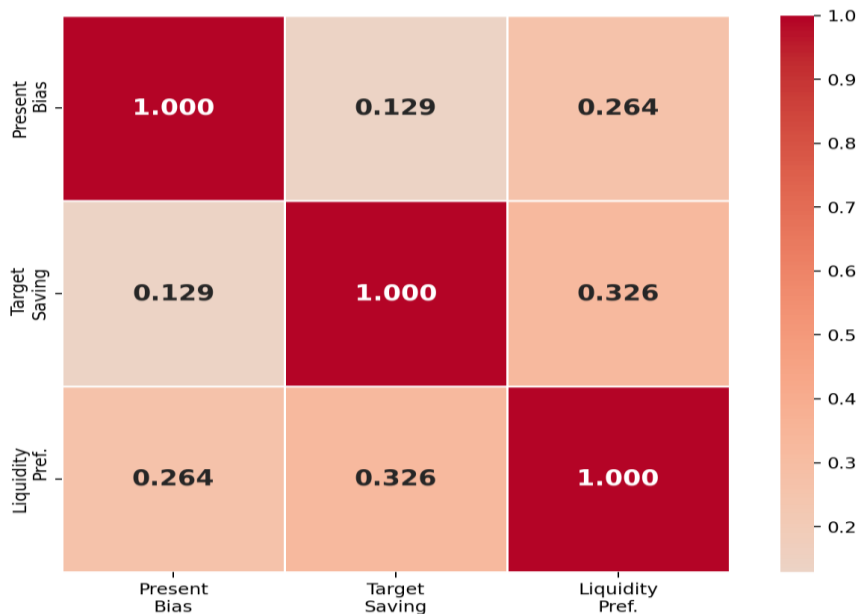


Figure 8. Spearman Rank-Order Correlation Matrix and Scatter Plot (N = 105). Notes: Cell colour intensity reflects strength (deep red = strong positive).

The Liquidity Preference index (mean=3.559, SD=0.746) is the only index whose distribution does not significantly deviate from normality (SW=0.9782, $p=0.081$). This suggests that the preference for liquid savings is a relatively uniform trait across the sample, rather than being concentrated among a specific sub-group. The mean of 3.559 indicates moderate-to-strong endorsement of liquidity preferences on average, consistent with the observed 50.5% cash savings rate.

Figure 7 shows the mean score by construct and the Likert Item profile. Mean score of all of the items of Present Bias falls below 3.0 scale and this emphasizes that the respondents mostly fail to channel the saving intentions into saving behaviour. The PB4 ('Even when I plan to save, I end up spending') has a highest scoring of 2.676 compared to the other items but within a sample whose self-reported present bias is below-neutral, is consistent with the behavioural evidence from the saving section (over 55% use savings for everyday spending at least sometimes).

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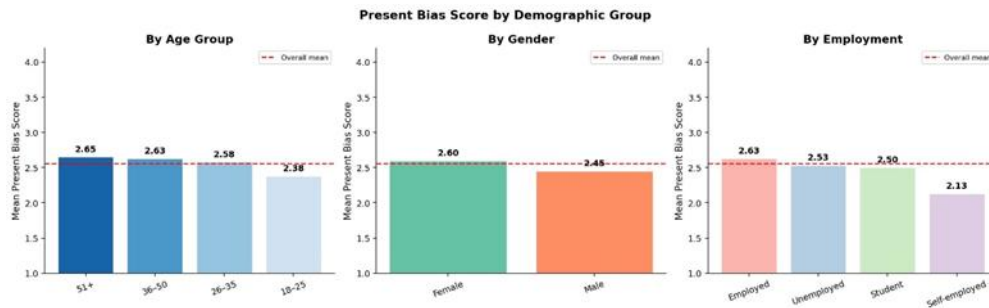


Figure 9. Mean Present Bias Score by Age, Gender, and Employment Status (N = 105). Notes: Bar heights represent group means of the Present Bias composite index. Dashed red horizontal line = overall sample mean (2.554). None of the group differences are statistically significant (Kruskal–Wallis: age $H = 2.616$, $p = 0.455$; gender $H = 0.910$, $p = 0.340$; employment $H = 4.503$, $p = 0.212$). Values displayed above bars.

The Target Saving profile item shows a coherent and meaningful pattern. Beside the TS 3 item with a low score other three items show scores well above 3. What this tells us? This confirms that goal-directed saving is the primary mechanism through which North Macedonian households show self-control over present bias. TS4 has the highest score in the whole dataset (mean=4.314), which means that the respondents can reallocate their savings toward different objectives.

Liquidity preference items have a score mean from 3 to almost 4. this profile shows a quite behavioral paradox. The paradox comes from the mean score of LQ3 (3.876) and LQ6 (3.848) implying wanting immediate access to funds while simultaneously recognising that removing access would increase saving rates. This means that people want to spend money and have money and are fully aware that they can not make the right decision unless something intervenes to make them save more.

Correlation analysis from *Figure 8* shows that there is a statistically significant positive correlation between Present Bias and Liquidity Preference and Target Saving and Liquidity Preference, on the other hand there is not a statistically significant correlation between Present Bias and Target Saving. Present Bias and Liquidity Preference ($p=0.264$, $p=0.007$) confirms the theoretical expectation that individuals who exhibit higher present bias are more likely to prefer keeping their savings in immediately accessible, liquid forms. The strongest and most statistically significant correlation in the dataset is between Target Saving and Liquidity Preference ($p=0.326$, $p=0.001$). This finding is the empirical cornerstone of the research's behavioural hypothesis: North Macedonian households simultaneously endorse goal-directed saving strategies and prefer keeping those savings in liquid, accessible forms. The H2 hypothesis is supported.

The absence of a significant correlation between Present Bias and Target Saving ($p=0.129$, $p=0.189$) indicates that goal-oriented saving behaviour does not function

as a simple compensatory response to present bias in this sample. The third hypothesis is not supported with these results.

Group comparisons in *Figure 9* show that mean present bias score by age, gender and employment status. The Kruskal-Wallis tests reveal no statistically significant differences in Present Bias scores across age groups ($H=2.616$, $p=0.455$), gender ($H=0.910$, $p=0.340$), employment status ($H=4.503$, $p=0.212$), or income brackets ($H=1.766$, $p=0.622$).

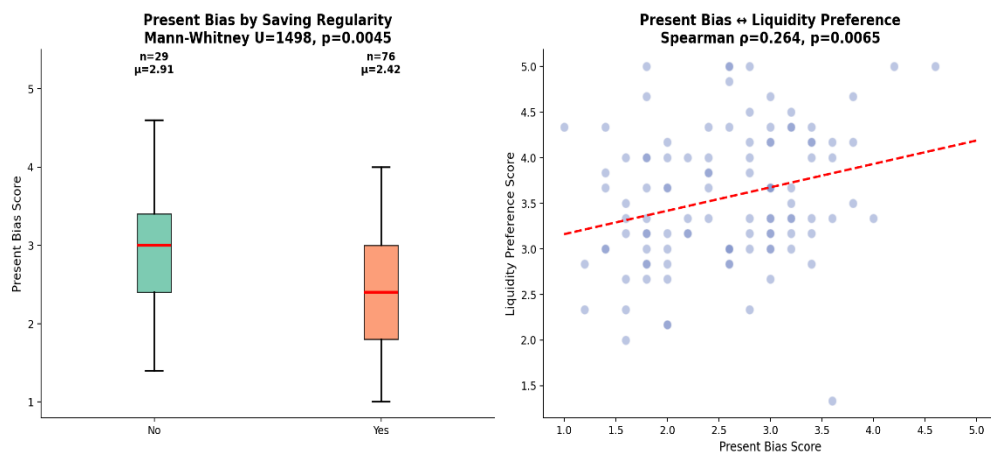


Figure 10. Present Bias by Saving Regularity (left) and Present Bias vs. Liquidity Preference (right)

Non regular savers (mean 2.910, median 3.000) as we can see in *Figure 10*, show higher mean scores compared to regular savers (mean=2.418, median=2.400). We performed the Mann-Whitney U test ($U=706.5$, $p=0.0045$) and Kruskal-Wallis H test ($H=8.096$, $p=0.004$) and the results confirm that there is a significant difference at the 1% alpha level. On the other hand, the positive and significant correlation between Present Bias and Liquidity Preference (Spearman $\rho = 0.264$, $p = 0.007$) suggests that individuals with stronger tendencies toward immediate buying systematically prefer more accessible, liquid savings forms, consistent with the hypothesis that present bias and cash-holding behaviour are mutually reinforcing. With this result our first H1 hypothesis is proved.

5. Conclusions, discussions and limitations of the research

Present bias in North Macedonia is hardly ever discussed when mentioning the low deposits rate. In our research we have analysed the relationship between present bias, target saving, liquidity preference and remittance drive of household deposits in North

Macedonia. Using both non parametric methods for the survey and a VECM from 268 monthly observations this study gives micro-level behavioural evidence and macro-level econometric results to understand better the present bias role in shaping the household saving outcomes. From the four hypotheses that we decided to put based on the literature review and our personal understanding in this matter, three hypotheses are statistically significantly supported. In addition, the analysis identified a key finding beyond the formal hypotheses: present bias is a significant predictor of saving irregularity (Mann-Whitney U = 706.5, $p = 0.004$), independent of age, gender, employment status, and income level. Beyond the four formal hypotheses, the analysis reveals that present bias is the only variable in the survey that significantly differentiates regular savers from non-regular savers. Non-regular savers show significantly higher Present Bias scores (mean = 2.910, median = 3.000) compared to regular savers (mean = 2.418, median = 2.400), with this difference confirmed at the 1% significance level by both the Mann-Whitney U test (U = 706.5, $p = 0.004$) and the Kruskal-Wallis H test ($H = 8.096$, $p = 0.004$). Critically, age, gender, employment status, and income level produce no statistically significant group differences in Present Bias scores (all $p > 0.21$), concluding that saving irregularity in this population is a behavioural rather than socioeconomic phenomenon. The results from this research could give to the National Bank of North Macedonia (NBRM) some recommendations to improve several issues. In order to make people save more the NBRM can invest on making automatic saving products because most of the respondents were aware that they could save more if there were ways to automatically take away their money. Another recommendation is to make saving accounts for special purposes because Target Saving item in this research had a mean score of 4.314. The cash problem which is very concerning with 50.5% of the savings rate being in cash. On the other hand, most of the remittances were also spent for consume rather than investing. This should prompt NBRM to make programmes for educating the individuals on how to invest and how to reduce the cash dependency.

Several limitations should be noted mainly with the survey data. The sample is small with only 105 respondents who are mostly female (over 70%). The low levels of Cronbach's Alpha are not satisfactory and we failed to support the H3 hypothesis for present bias. The VECM evidence confirms that personal transfers and household deposits share a stable long-run equilibrium (H4 supported) but that the path to that equilibrium is slow, asymmetric, and characterised by an initial consumption response to remittance shocks — the macroeconomic fingerprint of present-biased behaviour at the aggregate level.

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DRYHA, Z., LEVCHENKO, O. & KOCHUBEI, L. / *Digital Financial Resilience: Prudential Supervision, Cyber Risk Governance, and Accountability*

Digital Financial Resilience: Prudential Supervision, Cyber Risk Governance, and Accountability

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Abstract

Financial institutions are increasingly judged not only by the strength of their balance sheets, but also by their ability to keep digital services working when technology fails. A bank, payment institution, leasing company, insurer, or fintech platform may remain solvent and still be unable to serve customers if authentication, cloud hosting, data warehouses, or reporting systems are disrupted. This article develops a supervisory-oriented framework for digital financial resilience in emerging and crisis-exposed markets, with Ukraine used as a reference context for financial resilience under uncertainty. The argument is that cyber and ICT risk should be assessed as part of prudential governance, not as a separate technical issue. The article offers four applied instruments. The Digital Financial Resilience Governance Model links supervisory expectations, institutional governance, cyber-operational capability, and accountability. The Supervisory Digital Resilience Scorecard converts that model into assessment dimensions that can be used by supervisors, internal auditors, and boards. The Cyber-Operational Stress Testing Methodology adapts stress testing to scenarios such as cloud outage, ransomware, data loss, payment disruption, and failure of supervisory reporting. The Accountability-by-Design Framework assigns responsibility across boards, senior management, control functions, ICT providers, supervisors, and public authorities before a disruption occurs. The article contributes to management and financial regulation by showing how digital innovation can be made more resilient without reducing supervisory discipline or legal accountability.

Key words: digital financial resilience, prudential supervision, cyber risk governance, operational resilience, accountability

1. Introduction

A financial institution can be solvent in the morning and practically unavailable by noon. A failed authentication service may block customers from accounts; a cloud outage may interrupt payment collection; a corrupted reporting database may prevent the submission of prudential information; and a ransomware attack may force a manager to choose between restoring services and preserving evidence. These are not hypothetical problems for a distant future. They are ordinary consequences of the way modern finance is built: digital channels, outsourced ICT services, automated controls, data hubs, remote identification, and interconnected providers now support daily financial activity.

This change is beneficial, but it is not neutral. Digitalization has made financial services faster and more accessible, including for small firms and consumers outside large cities. It has also moved a part of financial stability from balance sheets to operational capacity. Capital and liquidity still matter, but they do not guarantee that a leasing company can collect payments, that a bank can authenticate clients, or that a payment institution can communicate with customers during a cyber incident. The resilience problem therefore sits between prudential supervision, management, cybersecurity, law, and public administration.

The Ukrainian context illustrates why this issue deserves more practical treatment. The National Bank of Ukraine has framed its current strategy around resistance to aggression, reconstruction, financial resilience, and the need for flexible contingency planning under high uncertainty (National Bank of Ukraine, 2025). The NBU Cybersecurity Center also performs a coordinating role for cyber protection in both the banking and non-bank financial sectors (National Bank of Ukraine Cybersecurity Center, n.d.). This does not make the article a country case study. Rather, Ukraine is used as a relevant reference point for emerging and crisis-exposed economies where digital financial services, supervisory modernization, war-related risks, and EU-alignment pressures coexist.

International standards have moved in the same direction. The Basel Committee links operational resilience to critical operations, governance, business continuity, third-party dependency, incident management, and resilient ICT (Basel Committee on Banking Supervision, 2021). DORA creates a detailed European framework for ICT risk management, incident reporting, resilience testing, information sharing, and oversight of critical ICT third-party providers (European Parliament and Council, 2022). NIST CSF 2.0 places governance at the center of cybersecurity risk management, including roles,

policies, oversight, risk strategy, and supply chain risk (Pascoe, Quinn and Scarfone, 2024).

The remaining gap is practical. In many institutions, cyber risk is discussed by technical specialists, outsourcing is handled by procurement and lawyers, continuity is owned by operational units, and supervisory communication belongs to compliance. When disruption occurs, this division of work can slow escalation and obscure responsibility. The aim of this paper is to develop an integrated framework for digital financial resilience that combines prudential supervision, cyber risk governance, cyber-operational stress testing, and accountability-by-design mechanisms. The framework is intended for supervisors, boards, internal auditors, compliance officers, lawyers, and managers who need a shared language for assessing whether a financial institution can operate through digital disruption.

2. Theoretical and regulatory background

2.1. Digital resilience as a financial governance category

Digital financial resilience is broader than cybersecurity. Cybersecurity protects systems, networks, and data; business continuity restores operations; operational resilience focuses on the delivery of critical operations during disruption. Digital financial resilience combines these ideas in a financial-sector setting. It asks whether an institution can preserve critical services, regulatory reporting, data integrity, and customer communication when cyber or ICT risk materializes.

This distinction is important because financial institutions can be damaged by disruptions that do not initially look financial. A cloud failure may stop customer access even if the institution has sufficient capital. A data integrity issue may corrupt risk reports even if the underlying portfolio is sound. A failure of an outsourced digital platform may produce consumer harm and legal exposure even where the institution itself did not write the software. Digital resilience therefore belongs in the institution's risk appetite, governance structure, outsourcing policy, internal control system, and supervisory review.

The macro-financial dimension has also become clearer. The IMF treats cyber risk as a financial stability issue because a major incident can affect confidence, market functioning, and the provision of critical services (International Monetary Fund, 2024). For financial market infrastructures, CPMI-IOSCO emphasizes the need for cyber resilience arrangements that support the continuity of critical operations and the broader stability of the financial system (CPMI-IOSCO, 2016). These perspectives support the idea that digital failures should be considered in prudential and public governance, not only in information security departments.

2.2. Regulatory benchmarks for supervision and management

The Basel Committee's operational resilience principles provide a prudential starting point. They require banks to identify critical operations, manage operational risk, plan for disruption, handle outsourcing, and learn from incidents (Basel Committee on Banking Supervision, 2021). Its earlier review of cyber-resilience practices also shows that supervisors commonly focus on strategy, governance, risk management, testing, culture, information sharing, and response capability (Basel Committee on Banking Supervision, 2018).

DORA is the most detailed binding example of the regulatory direction. It requires financial entities to maintain ICT risk management frameworks, report major ICT-related incidents, conduct resilience testing, manage third-party ICT risk, and remain responsible for obligations even when ICT services are outsourced (European Parliament and Council, 2022). The EBA guidelines on ICT and security risk management and on outsourcing arrangements follow the same logic: digital risk must be governed, documented, tested, and linked to responsibility (European Banking Authority, 2019a; European Banking Authority, 2019b).

For cybersecurity governance, NIST CSF 2.0 is useful because it does not reduce cyber risk to controls. It frames cybersecurity through organizational outcomes, including governance, risk strategy, roles, policy, oversight, and supply chain risk management (Pascoe, Quinn and Scarfone, 2024). This vocabulary is compatible with prudential supervision because it translates technical risk into governable categories.

2.3. Third-party dependency and incident response

Third-party ICT dependency is one of the most difficult elements of digital financial resilience. Financial institutions increasingly use cloud services, SaaS platforms, cybersecurity vendors, payment processors, fintech partners, and data providers. Such arrangements can reduce cost and improve service quality, but they may also create concentration risk and practical dependence on actors that are outside the institution's direct hierarchy.

The FSB toolkit on third-party risk management emphasizes the need to identify critical services, manage risks through the service lifecycle, and monitor systemic dependencies (Financial Stability Board, 2023). Its effective practices for cyber incident response and recovery also show that preparation, communication, coordination, and learning are as important as technical containment (Financial Stability Board, 2020). For supervisors, the key point is straightforward: outsourcing can transfer service provision, but it cannot transfer the regulated institution's responsibility for governance, reporting, and customer protection.

2.4. Accountability in digital finance

Accountability in digital finance is not only liability after a failure. It is the ability to explain who owned the risk, who approved the control, who detected the incident, who escalated it, who informed the supervisor, who communicated with customers, and who verified remediation. Without this chain, even a technically competent response may appear weak from a supervisory or legal perspective.

This article therefore treats accountability as a design requirement. The institution should allocate responsibility before disruption, preserve evidence during disruption, and review consequences after disruption. The approach is particularly relevant for emerging markets because rapid digitalization can outpace enforcement practice, supervisory technology, and internal audit maturity.

3. Research design and methodology

3.1. Research design

The article uses a qualitative, conceptual, and applied methodological design. It does not estimate the probability of cyber losses and does not claim to provide a universal quantitative model. That choice is deliberate. Without confidential incident data, provider-level information, and institution-specific recovery records, probability estimates would create precision without reliability. The practical task is different: to design a framework that supervisors and institutions can calibrate with their own evidence.

The object of the research is digital resilience in the financial sector. The subject is the set of supervisory, managerial, cyber-operational, legal, and accountability mechanisms through which financial institutions can keep critical services available during ICT-related disruption. The design draws on four professional perspectives: prudential supervision, bank audit and internal control, IT-law and contractual governance, and public administration of financial stability.

3.2. Source base and methods

The source base includes international supervisory documents, cybersecurity governance frameworks, outsourcing and third-party risk guidance, and public-sector materials relevant to Ukraine's financial resilience context. The main benchmarks are the Basel Committee, DORA, EBA guidelines, FSB tools, CPMI-IOSCO guidance, NIST CSF 2.0, IMF financial stability analysis, and NBU materials on financial-sector resilience and cyber coordination (Basel Committee on Banking Supervision, 2018; Basel Committee on Banking Supervision, 2021; CPMI-IOSCO, 2016; European Banking

Authority, 2019a; European Banking Authority, 2019b; European Parliament and Council, 2022; Financial Stability Board, 2020; Financial Stability Board, 2023; International Monetary Fund, 2024; National Bank of Ukraine, 2025; National Bank of Ukraine Cybersecurity Center, n.d.; Pascoe, Quinn and Scarfone, 2024).

Conceptual synthesis is used to define digital financial resilience as a governance category. Comparative regulatory analysis is used to extract supervisory expectations from international benchmarks. System-structural analysis is used to build the governance model. Scenario-based modelling is used to design cyber-operational stress tests. Accountability mapping is used to assign responsibility across internal functions, ICT providers, supervisors, and public authorities. The methodological structure is summarized in Table 1.

Table 1. Methodological structure of the research (source: developed by the authors)

Methodological element	Purpose in the article	Output
Conceptual synthesis	Defines digital resilience as a prudential, managerial, legal, and public governance category	Digital Financial Resilience Governance Model
Comparative regulatory analysis	Translates supervisory and cybersecurity benchmarks into assessable dimensions	Supervisory Digital Resilience Scorecard
Scenario-based modelling	Tests how critical functions behave under severe but plausible ICT disruption	Cyber-Operational Stress Testing Methodology
Accountability mapping	Links processes, risk owners, evidence, escalation, and consequences	Accountability-by-Design Framework

4. Digital Financial Resilience Governance Model

The Digital Financial Resilience Governance Model is the conceptual core of the article. It is meant to be simple enough for supervisory use and broad enough to reflect the way digital financial services actually operate. The model starts from a practical observation: a cyber incident becomes a supervisory problem when it affects a critical financial function, a regulated obligation, or the trust of customers and counterparties.

The model is built on three propositions. First, critical digital functions are part of the prudential risk profile. A financially sound institution may still be fragile if a single provider, data repository, or authentication tool can interrupt its service. Second, resilience depends on governance quality. Policies and firewalls do not compensate for unclear escalation, weak board attention, or missing audit evidence. Third,

accountability must follow the whole digital value chain, including cloud providers, software vendors, data processors, cybersecurity contractors, fintech partners, and internal decision-makers.

Five design principles guide the model. Proportionality means that expectations must reflect size, complexity, systemic relevance, and ICT dependency. Criticality means that stronger controls are required for functions whose failure would harm customers, reporting, payments, or financial stability. Traceability means that every important digital process should have a risk owner, a control owner, and an evidence trail. Continuity means that governance arrangements must be tested under disruption, not merely described in policy documents. Supervisory usability means that the model should produce evidence that an inspector, auditor, or board committee can actually review.

4.1. Layers of the model

The model has four layers: supervisory, institutional governance, cyber-operational, and accountability. The layers are not a hierarchy of departments. They are a way to show how decisions, systems, controls, reporting duties, and consequences interact. In practice, a weakness in one layer often exposes weakness in another. For example, a strong technical recovery plan may fail if the provider contract has no incident-notification clause or if senior management receives information too late.

Table 2. Layers of the Digital Financial Resilience Governance Model (source: developed by the authors)

Layer	Governance question	Evidence expected by supervisor
Supervisory layer	Can the authority assess the institution's digital resilience and require timely remediation?	Incident notifications, inspection findings, remediation plans, resilience test results
Institutional governance layer	Does the board and management govern digital risk as an enterprise risk?	Board minutes, risk appetite statements, management reports, internal audit findings
Cyber-operational layer	Can the institution maintain or restore critical digital functions?	ICT inventories, dependency maps, incident logs, backup and recovery tests
Accountability layer	Is responsibility traceable before, during, and after disruption?	RACI-style matrices, audit trails, contracts, escalation records, customer notices

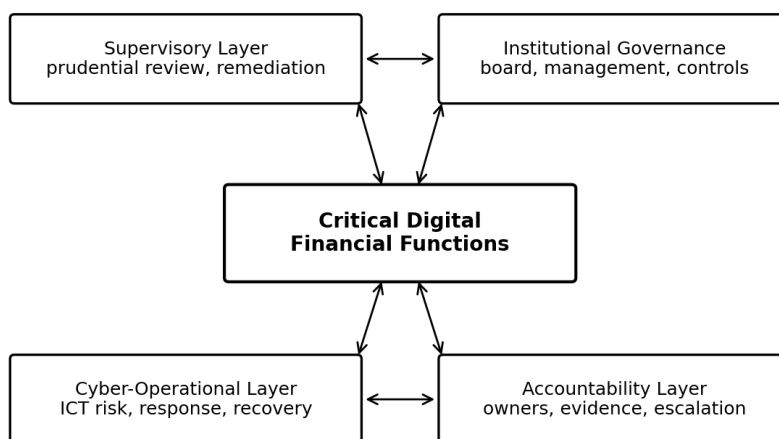


Figure 1. Digital Financial Resilience Governance Model (source: developed by the authors)

4.2. Critical functions and governance roles

Critical digital financial functions sit at the center of the model. These may include payments, customer authentication, loan or leasing servicing, digital onboarding, AML/KYC screening, data storage, internal risk systems, customer communication, and supervisory reporting. Criticality should be determined by business and supervisory impact, not by the technical importance of a system alone.

The board should approve the resilience strategy, risk appetite, and treatment of major ICT dependencies. Senior management should ensure implementation and coordinate business units, risk management, compliance, cybersecurity, legal, business continuity, and internal audit. Internal audit should provide independent assurance on whether controls work and whether remediation is completed. Legal and compliance functions should make sure that outsourcing contracts, incident reporting, customer communication, data protection, and evidence retention are not treated as afterthoughts.

4.3. Supervisory application

For supervisors, the model supports risk-based review. It helps structure off-site monitoring, on-site inspections, thematic reviews, and post-incident remediation. Smaller institutions may use a simplified version focused on critical functions, basic recovery, provider risk, and escalation. Larger or systemically important institutions may require more demanding stress tests, third-party concentration analysis, independent assurance, and board-level reporting.

5. Supervisory Digital Resilience Scorecard

The Supervisory Digital Resilience Scorecard turns the governance model into an assessment tool. Its immediate value is not the production of a single score; it is the discipline of asking the same supervisory questions across institutions and requiring evidence rather than assurances. The scorecard can be used by supervisors during off-site monitoring, by internal auditors during thematic reviews, and by boards to see whether management reports are specific enough.

The scorecard is designed to remain proportional. It should not force a small non-bank lender to run the same testing program as a systemically important bank. Still, proportionality cannot mean absence of control. Every institution should know which digital functions are critical, which providers support them, how incidents are escalated, and what evidence demonstrates recovery capacity.

5.1. Assessment dimensions and evidence

The scorecard uses ten dimensions. They combine governance, ICT risk, continuity, third-party dependency, reporting reliability, consumer communication, and supervisory cooperation. Table 3 presents the assessment structure.

Table 3. Supervisory Digital Resilience Scorecard: dimensions and evidence (source: developed by the authors)

Dimension	Core supervisory question	Examples of evidence
ICT risk management	Are ICT risks identified, assessed, controlled, and reported?	ICT policies, risk registers, vulnerability results, control tests
Incident detection and response	Can incidents be detected, classified, escalated, and contained?	Incident logs, playbooks, escalation timelines, post-incident reviews
Continuity and recovery	Can critical services continue or recover within tolerable limits?	BCP/DR tests, RTO/RPO results, backup records, workaround evidence
Critical digital functions	Has the institution identified functions whose failure would matter?	Function register, impact analysis, dependency map, service owners
Third-party ICT dependency	Are providers, cloud services, and outsourcing risks governed?	Outsourcing register, contracts, SLA reports, exit plans, provider risk assessments
Data integrity and reporting	Are internal and supervisory reports reliable during disruption?	Reconciliation controls, reporting logs, data lineage, correction records

Internal control and audit	Are resilience controls independently tested and remediated?	Internal audit reports, issue trackers, compliance reviews
Board and management oversight	Is digital risk visible at the right level?	Board packs, management reports, risk appetite statements
Consumer communication	Can customers be informed accurately during disruption?	Notification templates, call-center scripts, complaint data
Supervisory cooperation	Are major incidents reported transparently and on time?	Regulatory notices, correspondence, remediation updates

5.2. Scoring logic and override rule

A five-level maturity scale can be used for each dimension. The scale should be applied with professional judgment. A high aggregate score should not hide a critical weakness in one dimension. If a payment institution scores well on policies and reporting but depends on one untested cloud region for its core platform, the supervisor should be able to override the average and require targeted remediation.

The aggregate score may be calculated as follows: $DFR_i = \text{sum}(wkS_{ik}) / \text{sum}(wk)$, where DFR_i is the digital financial resilience score of institution i , S_{ik} is the score for dimension k , and wk is the supervisory weight assigned to that dimension. Equal weights may be used for a first assessment. Higher weights may be assigned to payment continuity, data integrity, or third-party dependency when these are critical for the institution's business model.

Table 4. Maturity scale for scorecard interpretation (source: developed by the authors)

Score	Maturity level	Practical meaning
1	Initial	Controls are informal, fragmented, or not evidenced; immediate remediation is needed.
2	Basic	Policies exist, but implementation, testing, or ownership is weak.
3	Established	Roles and controls are documented and partly tested; ordinary supervisory follow-up is appropriate.
4	Integrated	Resilience is embedded in governance, audit, continuity, and provider management.
5	Adaptive	Controls are tested, improved, evidenced, and linked to board accountability.

5.3. Use in audit and remediation

The scorecard should end with an action plan, not with a rating. Each weak dimension should be linked to a responsible owner, deadline, evidence requirement,

and supervisory follow-up. For example, a weak third-party score should trigger review of contracts, provider concentration, audit rights, exit plans, and provider incident communication. A weak board-oversight score should trigger changes in management information and board review of major ICT risk.

6. Cyber-Operational Stress Testing Methodology

Traditional stress tests usually ask whether a financial institution can survive a macroeconomic or market shock. Cyber-operational stress testing asks a different question: can the institution keep essential digital services available, or restore them in time, when technology fails under pressure? This question matters because a financial institution may have adequate capital and still fail customers if its digital channels, payment systems, reporting data, or outsourced platform are unavailable.

The proposed methodology is not a penetration test. A penetration test looks for exploitable technical vulnerabilities. A cyber-operational stress test looks at the combined performance of systems, people, providers, communication, legal duties, supervisory reporting, and recovery decisions. It is therefore closer to a crisis-management exercise with prudential consequences.

6.1. Testing stages

The methodology follows six stages: identification of critical functions, dependency mapping, scenario construction, impact assessment, recovery testing, and remediation with accountability review. The order matters. Testing a scenario before the institution knows its critical functions and provider dependencies usually produces a theatrical exercise rather than useful evidence.

Table 5. Stages of cyber-operational stress testing (source: developed by the authors)

Stage	Main task	Output
1. Critical functions	Identify digital services whose disruption would materially affect customers, compliance, or stability	Register of critical digital functions
2. Dependency mapping	Map systems, data, staff, providers, cloud services, and manual fallbacks	Dependency map and concentration view
3. Scenario construction	Build severe but plausible disruption scenarios	Scenario catalogue
4. Impact assessment	Assess operational, financial, legal, customer, and supervisory consequences	Impact profile
5. Recovery testing	Test escalation, recovery, communication, and evidence preservation	Gap analysis and test report

6. Remediation	Assign owners, deadlines, evidence, and supervisory follow-up	Remediation and accountability plan

6.2. Scenario design

Scenarios should be severe but plausible. They should contain enough operational detail to force decisions: what function is affected, who notices, what data are reliable, which provider must be contacted, which customers are harmed, whether the supervisor must be notified, and what the board needs to know. A useful scenario is not necessarily the most dramatic one. A routine Monday-morning cloud outage during a regulatory reporting deadline may reveal more about resilience than an unrealistic catastrophic attack.

Table 6 provides examples of scenarios and the supervisory concerns they raise. The catalogue should be updated after major incidents, new outsourcing arrangements, migration to cloud infrastructure, changes in digital channels, or changes in the threat environment.

Table 6. Cyber-operational scenarios and supervisory concerns (source: developed by the authors)

Scenario	Critical function affected	Supervisory concern	Accountability trigger
Ransomware on core systems	Payments, credit or leasing servicing, customer records	Continuity of services, recovery capacity, evidence preservation	Delayed escalation, weak backup, unclear board oversight
Cloud provider outage	Digital channels, customer platform, data storage	Third-party concentration, exit readiness, customer access	Untested exit plan or inadequate provider contract
Customer data breach	Onboarding, AML/KYC, customer database	Data integrity, consumer protection, legal exposure	Weak access controls or delayed disclosure
Supervisory reporting failure	Regulatory data warehouse and reporting workflow	Reliability of prudential information and audit trail	Missing manual fallback or poor data governance
Authentication disruption	Online banking, payments, digital contracts	Customer access and fraud prevention	Weak identity management or no fallback channel
Fintech or SaaS compromise	Scoring, fraud monitoring, contract management	Vendor oversight and concentration risk	Poor due diligence or weak incident notification
Cyberattack during liquidity stress	Payments, treasury, customer withdrawals	Interaction of operational and financial stress	Weak crisis governance and supervisory communication

6.3. Impact and recovery indicators

Impact assessment should combine numbers and judgment. Quantitative indicators include duration of outage, failed transactions, affected customers, reporting delay, financial loss, recovery time, data loss, and remediation cost. Qualitative indicators include customer trust, legal exposure, management decision quality, evidence preservation, and supervisory concern. A useful test report should explain not only whether the system returned to operation, but whether the institution governed the crisis well.

The resilience gap can be expressed in simple terms as $RGs = \max(0, ARTs - RTOs) + \max(0, ADLs - RPOs)$, where ARTs is actual recovery time, RTOs is the target recovery time, ADLs is actual data loss, and RPOs is the target recovery point for scenario s . The formula is intentionally modest. It is a checkpoint, not a full measurement of harm. A system may recover within target and still fail if reporting, customer notification, or evidence retention is poor.

6.4. Supervisory use of test results

Supervisors may use test results to plan inspections, require remediation, compare institutions, and identify sectoral dependency on common ICT providers. They should also review the realism of scenarios. A perfect result from an easy scenario is less informative than a difficult scenario that exposes weaknesses and produces a credible remediation plan. At sector level, repeated gaps may point to the need for guidance on provider concentration, incident reporting, data governance, or board-level crisis governance.

7. Accountability-by-Design Framework for Digital Finance

The Accountability-by-Design Framework addresses a common weakness in digital finance: responsibility is often reconstructed after a failure rather than designed before it. The framework reverses that order. It requires the institution to identify who owns each critical digital process, who controls it, what evidence must be preserved, when escalation is required, and which consequences follow if controls fail.

The framework is not meant to criminalize operational mistakes. Its purpose is to make responsibility clear enough for management, auditors, supervisors, customers, and courts to understand what happened and whether the institution acted reasonably. In practice, the framework is close to a RACI matrix, but with a stronger supervisory and legal orientation.

7.1. Design principles

Six principles guide accountability-by-design. Ex ante allocation means that responsibility is assigned before disruption. Traceability means that decisions, approvals, exceptions, incident classifications, and remediation actions are recorded. Evidence-based governance means that responsibility can be demonstrated through documents and logs rather than general statements. Proportionality means that the depth of documentation follows the institution's size and risk. Escalation discipline means that thresholds for notifying management, the board, supervisors, providers, and customers are defined in advance. Enforceability means that policies, contracts, audit findings, and remediation plans create obligations that can be reviewed and challenged.

7.2. Accountability chain and actors

The framework follows a process chain: critical digital process, risk owner, control owner, evidence and audit trail, escalation and reporting, supervisory review, remediation, and accountability consequences. External ICT providers are part of the chain, but they do not remove the regulated institution's duty to manage risk and communicate with supervisors. This point is central to DORA and to modern outsourcing guidance (European Parliament and Council, 2022; European Banking Authority, 2019b; Financial Stability Board, 2023).

Table 7 summarizes the accountability levels. The levels should not be read as a formal hierarchy only. In a real incident, they work in parallel. A customer data breach may require immediate technical containment, legal review, management decision-making, provider communication, customer notification, supervisory reporting, and board oversight.

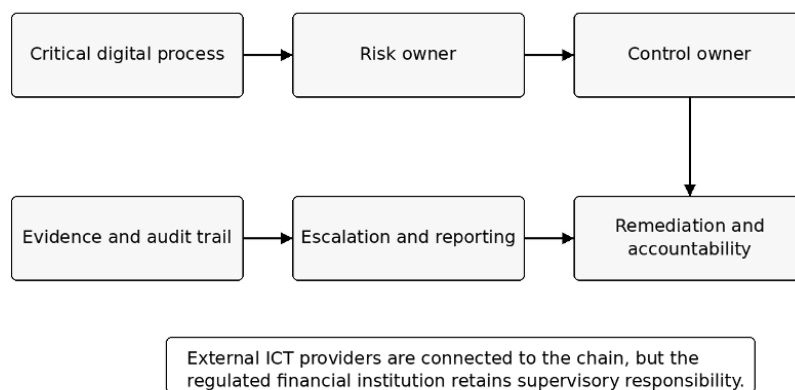


Figure 2. Accountability-by-Design Framework for Digital Finance (source: developed by the authors)

Table 7. Accountability levels in digital finance (source: developed by the authors)

Level	Main actors	Evidence of accountability
Strategic	Board or equivalent governing body	Approved strategy, risk appetite, board minutes, major incident reviews
Managerial	Senior management	Crisis records, remediation plans, management reports, resource decisions
Functional	Risk, compliance, cybersecurity, legal, data protection, internal audit	Risk registers, compliance reviews, legal opinions, audit reports, testing results
Operational	Business units and ICT teams	Service logs, recovery records, incident tickets, customer communication records
Contractual	Cloud, ICT, fintech, software, and outsourcing providers	Contracts, SLA reports, incident notices, audit rights, exit plans
Supervisory and public	Supervisors, consumer protection bodies, public authorities	Regulatory correspondence, findings, enforcement actions, public communication

7.3. Triggers and evidence

Accountability triggers are events that activate specific duties. Major cyber incidents, data breaches, disruption of critical services, failure of supervisory reporting, third-party service failure, missed recovery objectives, delayed escalation, and repeated unresolved audit findings should all trigger defined responses. The institution should know the primary accountable actor, the supporting functions, the expected evidence, and the deadline for remediation.

Table 8. Accountability triggers and required responses (source: developed by the authors)

Trigger	Required response	Primary owner
Major cyber incident	Classify, contain, escalate, notify supervisor, preserve evidence	Senior management and cybersecurity function
Critical service disruption	Activate continuity plan and customer communication	Business owner and continuity function
Customer data breach	Legal assessment, data protection response, customer notice if required	Legal, compliance, and data protection functions
Supervisory reporting failure	Correct report, explain delay, review data controls	Reporting owner and compliance function
ICT provider failure	Escalate provider, assess contract, activate fallback or exit plan	Outsourcing owner and legal function
Missed recovery objective	Root cause analysis and board-level remediation review	Senior management and business continuity function
Repeated audit deficiency	Formal remediation plan and supervisory follow-up	Board, senior management, and internal audit

7.4. Legal and public governance implications

The legal value of the framework lies in making responsibility evidentially supportable. Digital finance creates legal risks related to data protection, consumer rights, outsourcing, contractual liability, reporting duties, and disclosure. A well-designed accountability chain does not eliminate liability, but it makes the institution's conduct easier to evaluate. From a public governance perspective, accountability is also about trust. Customers and regulators need to know that digital services are not only innovative, but governable when they fail.

8. Discussion

The framework developed in this article is intentionally managerial and supervisory. It does not pretend that every financial institution can become technically immune to cyber incidents. The more realistic goal is to make institutions harder to disrupt, faster to recover, and clearer in their responsibility when disruption occurs.

Three practical mistakes are common in digital resilience work. The first is to treat cyber risk as an IT problem and then ask the board to approve policies it cannot meaningfully challenge. The second is to believe that outsourcing reduces responsibility rather than changing its form. The third is to test systems without testing decision-making, reporting, evidence, and customer communication. The four instruments proposed in this article are designed to address these mistakes.

8.1. Implications for prudential supervision

For prudential supervisors, digital resilience should become part of the risk profile. Capital, liquidity, and asset quality remain central, but they do not show whether an institution can submit reliable reports, keep payment services running, restore data, or communicate with customers during disruption. The Supervisory Digital Resilience Scorecard gives supervisors a way to structure evidence and compare institutions without losing professional judgment.

Cyber-operational stress testing is also relevant for supervisory planning. Traditional stress tests show how financial variables behave under adverse conditions. Cyber-operational tests show how critical services behave when systems, providers, staff, and communication channels are under pressure. The two approaches are complementary. A cyber incident during liquidity stress or market uncertainty can multiply the effect of both shocks.

8.2. Implications for financial institutions

For institutions, the framework requires a shift in management culture. Digital resilience should be visible in risk appetite, board reporting, outsourcing decisions, audit plans, crisis exercises, and legal review. Internal audit should test whether controls work, not only whether policies exist. Legal teams should review contracts with the same attention to operational continuity as to price and liability clauses. Compliance should treat reporting reliability as a critical digital function, not only as a deadline.

For entrepreneurial financial firms, including fintechs, digital lenders, and leasing providers, resilience can become a source of credibility. Investors, partners, customers, and regulators are more likely to trust a firm that can explain how it will continue services, protect data, and communicate during disruption. In this sense, resilience is not the enemy of innovation. It is a condition for sustainable scaling.

8.3. Implications for public governance and national economic security

In crisis-exposed economies, digital financial resilience has a public dimension. Payments, customer access to funds, digital lending, insurance claims, and supervisory reporting support not only private transactions but also the functioning of the economy. The NBU's strategic focus on financial resilience, recovery, and a sustainable financial ecosystem under wartime uncertainty shows why this issue belongs to public governance as well as corporate governance (National Bank of Ukraine, 2025).

The CSIRT-NBU model also illustrates the importance of coordination. Cyber resilience is stronger when supervisors, financial institutions, and specialized cyber-response structures can exchange information and respond to threats in a disciplined way (National Bank of Ukraine Cybersecurity Center, n.d.). The proposed framework can support such coordination by clarifying which functions are critical, which providers matter, which incidents require escalation, and which evidence supervisors should request.

8.4. Limitations and further research

The framework has limitations. It is conceptual and methodological rather than empirical. It does not test the scorecard on a sample of institutions, calculate cyber-loss probabilities, or prescribe universal weights for every jurisdiction. It also cannot remove the uncertainty created by adaptive attackers, new technologies, and opaque provider chains.

Further research should test the scorecard with banks, non-bank financial institutions, payment institutions, leasing providers, and fintech firms. A useful next

step would be sector-specific calibration: payment institutions may need heavier weights for transaction continuity, while leasing providers may need stronger attention to digital contracts, payment collection, collateral data, and customer communication. Future work may also examine real cyber incidents to test whether accountability-by-design improves reporting quality and remediation discipline.

9. Conclusions

Digital financial resilience should be treated as an explicit component of prudential supervision and institutional governance. The article has argued that cyber and ICT disruptions are not only technical events. They can interrupt critical financial services, damage consumer protection, weaken reporting reliability, and create legal, managerial, and public accountability problems.

The paper proposed four applied instruments. The Digital Financial Resilience Governance Model connects supervisory expectations, institutional governance, cyber-operational capacity, and accountability. The Supervisory Digital Resilience Scorecard makes resilience assessable through evidence-based dimensions and a maturity scale. The Cyber-Operational Stress Testing Methodology tests whether critical digital functions can continue or recover under severe but plausible disruption. The Accountability-by-Design Framework embeds responsibility into processes, contracts, reporting channels, escalation rules, and audit trails before a failure occurs.

The main conclusion is practical. A resilient financial institution is not simply one with more cybersecurity tools. It is an institution that knows which functions are critical, which dependencies could fail, who owns the risk, how evidence is preserved, when supervisors and customers must be informed, and how remediation is verified. This is especially important for emerging and crisis-exposed economies, where digital innovation, supervisory capacity, outsourcing dependence, and public resilience pressures develop at different speeds.

The framework can be used by supervisors, boards, internal auditors, compliance officers, and legal advisers as a basis for more disciplined digital resilience governance. It does not replace empirical calibration, local regulation, or supervisory judgment. It provides a structured starting point for them. Further research should test the scorecard and stress-testing methodology on real institutions and refine the accountability framework through analysis of actual cyber and ICT incidents in the financial sector.

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The role of Entrepreneurship orientation on firm growth: A systematic literature review

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Abstract

In the existing literature about firm growth, entrepreneurship orientation is one of the factors that plays a role in it, but which is the main role it plays is still a gap in the literature. To discover more in-depth, the keywords "firm growth" AND "entrepreneurship orientation" were used for a systematic literature review based on 233 articles from the Scopus database. After filtering for the area, language, and type of articles and using three known phases of the PRISMA methodology, the final 41 records were selected. The VOSviewer tool was also used to identify clusters based on keyword occurrences. Other sections are followed by trends in papers considering countries, journals, and years. For future studies, it is recommended to further verify the role of Entrepreneurship orientation because firm growth is still being discovered over the years.

Keywords: Entrepreneurship orientation, review, PRISMA, VOSviewer, Bibliometric analyses

JEL Classification: L25, L26, M13

1. Introduction

The majority of private-sector employment and a substantial share of gross domestic product across both developed and emerging markets is accounted for by small and medium-sized enterprises (SMEs). These enterprises are the backbone of most national economies. For over four decades, the strategic management and entrepreneurship literature has focused on understanding what drives their growth and performance. Among the constructs proposed to explain this variance, entrepreneurial orientation (EO) has proven exceptionally resilient. EO started out as a firm-level strategic approach that was innovative, proactive and risk-taking. Since then, a lot of research has been done linking how a firm acts strategically to the results it gets (Brown et al., 2001; Wales et al., 2023). The relevance of this research agenda extends well beyond academic interest. It is common for policymakers to point to entrepreneurial activity as a way to encourage innovation and economic strength in a region (Zabala-Iturriagagoitia, 2022). At the same time, those working in the field are looking more and more to EO-related skills to deal with digital change, limited resources and unstable institutions (Kraus et al., 2023; Woldesenbet, Beta & Gezahegn,

2025). Yet despite more than twenty years of cumulative inquiry, the literature reveals persistent ambiguity regarding the precise mechanisms, boundary conditions, and contextual factors that determine whether, and to what extent, EO translates into measurable SME growth or performance gains. The relationship has been found to have strong direct effects by some studies (Eggers et al., 2013; Craig et al., 2008), while others have found it to be substantially mediated or moderated by capabilities, flexibility, or environmental dynamism (Suder et al., 2025; Rodríguez-Peña, 2023; Santos-Vijande et al., 2022). A smaller stream of research has questioned the universality of the relationship altogether when applied to resource-constrained or institutionally weak settings (Xheneti & Bartlett, 2012; Woldesenbet Beta & Gezahegn, 2025).

This fragmentation constitutes a genuine research gap. Firstly, there is still a lack of research in some areas. Most of the research is from Western Europe and North America, and there is not enough research from emerging markets and Sub-Saharan Africa. This is important for testing the limits of EO theory, but there is not enough research in these areas (Lingwati & Mamabolo, 2023; Dwumah et al., 2024). Secondly, there is a methodological problem. This is because researchers continue to rely on two things: cross-sectional survey designs and partial least squares structural equation modeling (PLS-SEM). These things constrain what we can infer about the causality of the relationship between EO performance and its evolution over time (Suder et al., 2025). Thirdly, the mechanisms of value creation through which EO operates are not yet fully understood, a gap that recent theoretical work has only begun to address (Wales et al., 2023). Fourthly, a growing issue is the combination of EO with digitalisation and sustainability, both of which have only recently become important in this field (Kraus et al., 2023; Chistov et al., 2023; Cai et al., 2026).

The pursuit of these two complementary objectives is the approach taken by this study in order to address the identified gaps. The first is to methodically combine the empirical and theoretical literature on entrepreneurial orientation and SME growth/performance that has been published in Scopus-indexed journals, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. The second is to conduct a bibliometric analysis of the resulting corpus to characterize its intellectual structure. This includes annual scientific production, the most productive authors and influential journals, the most cited contributions, geographic collaboration patterns, and keyword co-occurrence networks. These reveal the field's thematic architecture. When considered as a whole, these analyses provide a comprehensive overview of a literature that has become increasingly diverse but has not yet been thoroughly mapped.

The remainder of this article is organised as follows. Section 2 looks at the literature in terms of its themes. It goes through the ideas that lie behind EO, the direct relationship between EO and performance/growth, the ways in which this relationship is affected by other things, the conditions in the context and the institution that affect it, and the new digital and sustainability dimensions. Section 3 provides a comprehensive overview of the bibliometric methodology, encompassing the

selection of databases, the formulation of search strategies, and the utilisation of PRISMA-based screening criteria. The results of the bibliometric analysis are presented in Section 4. The identified research gaps are taken into consideration when discussing the findings in Section 5. Theoretical and practical implications are outlined in sections 6 and 7, respectively. The limitations of the study are acknowledged in Section 8, which also puts forward a plan for future research. The final section, Section 9, brings the study to a close.

2. Literature review

The literature on entrepreneurial orientation and SME growth/performance can be organised into five thematic clusters that emerge consistently across the reviewed corpus. (a) The theoretical and conceptual underpinnings of EO; (b) the direct relationship between EO performance and growth; (c) mechanisms that moderate and mediate; (d) the conditions that are contextual and institutional; and (e) the emerging digital and sustainability dimensions. Each is examined in turn, with attention to points of convergence and unresolved inconsistency.

2.1. Conceptual and Theoretical Foundations of Entrepreneurial Orientation

The idea of EO was first set out by Stevenson (1983), who saw entrepreneurship as a way of taking advantage of opportunities. This idea was then developed by Brown and others (2001) into a way of measuring EO that could be used in practice. This is still the article that is cited most often in the research that has been reviewed. This instrument is different from the Covin and Slevin (1989) and Miller (1983) EO scales. It led to a lot of empirical studies, but also made the measurements in the literature very varied. This variation has continued until now. Research is increasingly pointing to the idea that this variety is not just a result of different methods, but also highlights significant disagreements about whether EO can be seen as a unidimensional strategic position or a multidimensional construct made up of separate, independently changing sub-dimensions (Wales et al., 2023; Suder, 2025).

More recently, Wales et al. (2023) sought to resolve this ambiguity by inductively deriving EO as a theory of new value creation. They argued that the field's forty-year emphasis on antecedents and outcomes has outpaced its theorization of the causal mechanisms linking EO to performance. This theoretical repositioning is significant because it reframes EO not as a static firm attribute but as a dynamic capability oriented towards continuous novelty and customer benefit enhancement. This perspective resonates with dynamic capability-based accounts of strategic renewal in international new ventures (Ahmed et al., 2025).

2.2. The Direct EO-Performance and EO-Growth Relationship

The empirical core of the literature is dedicated to establishing and refining the direct relationship between EO and firm-level outcomes. Combining entrepreneurially oriented positioning with family-based brand identity leads to growth and profitability

outcomes, as demonstrated by Craig et al. (2008) using structural equation modeling on family business samples. Eggers et al. (2013) also found that entrepreneurial orientation has a strong positive effect on SME growth. However, this influence operates partly through customer orientation and partly independently of it. The validity of the proposition that EO is performance-enhancing is supported by the fact that these findings are broadly corroborated across diverse industry settings, including agribusiness (Kruja, 2020), retail pharmacy (Smith & Jambulingam, 2018), and technology-oriented ventures (D'Angelo & Presutti, 2019).

However, the literature shows inconsistencies in the size of the effect and, in some cases, the direction of the effect. Chistov et al. (2023), for instance, show that the relationship between sustainability orientation and venture growth is not straightforward and varies according to the developmental stage of the firm, while Sorgner and Wyrwich (2022) demonstrate that the allocation of entrepreneurial talent toward productive versus unproductive activity is highly sensitive to institutional change, complicating any assumption of a universally positive EO-performance relationship. This pattern indicates that, while the direct-effects literature is empirically robust overall, it needs to specify contingency conditions with increasing care.

2.3. Moderating and Mediating Mechanisms

A substantial and increasingly sophisticated stream of research investigates the mechanisms that condition the strength of the EO-performance relationship, with the aim of improving our understanding of how and why these relationships occur. Santos-Vijande et al. (2022) demonstrate that innovation and architectural marketing capabilities function as channeling mechanisms through which EO's sub-dimensions of innovativeness, risk-taking, and proactiveness are translated hierarchically into market advantage. Kusa et al. (2024) also demonstrate that the relationship between environmental performance and information and knowledge management is played by these two things working together among small furniture manufacturers. This is shown using a design that uses both fsQCA and PLS-SEM, which captures both linear and configurational effects.

The moderating role of environmental and organisational contingencies has been a particular focus. Rodríguez-Peña (2023) revisits the corporate entrepreneurship-performance relationship and finds that environmental dynamism significantly moderates its strength among large firms in emerging economies, while Suder (2025) extends this logic to the hotel industry, showing that the external environment functions alternately as a determinant and as a moderator of specific EO dimensions. Suder et al. (2025) make the picture even more complicated by testing whether firm flexibility has an effect on the EO-growth relationship under different market conditions. They conclude that its role is not fixed, but depends on other things. Another consistently identified moderator is network ties, which have been shown to strengthen the EO-performance association among Ghanaian SMEs (Dwumah et al., 2024) and to shape strategic outcomes among U.S. apparel manufacturers (Miller et al., 2021).

2.4. Contextual and Institutional Boundary Conditions

A recurring theme across the corpus is that the relationship between EO performance and context is not context- invariant. In this respect, institutional theory features prominently: The growth trajectories of entrepreneurial firms in post-communist Albania were shaped by institutional constraints, as demonstrated by Xheneti and Bartlett (2012). This is different from the patterns seen in Western Europe. Meanwhile, Terjesen and Hessels (2009) found that the quality of national institutions was a significant factor in the variation of export-oriented entrepreneurial activity across Asian economies. Contributions from more recent studies expand this institutional perspective to Sub-Saharan Africa. Woldesenbet, Beta and Gezahegn (2025) document how entrepreneurial leadership affects the effectiveness of MSMEs in conditions of institutional voids and resource constraints. Lingwati and Mamabolo (2023) explore how ethical misconduct affects the growth of entrepreneurs in emerging markets.

The family business context constitutes a second major boundary condition. Miller et al. (2016) claim that family firms are often overlooked in mainstream entrepreneurship research, and that they exhibit distinctive advantages across the founding, growth, and maturity phases. They argue that these advantages merit closer theoretical attention. This claim is substantiated empirically by Charupongsopon and Puriwat (2017) and Swee Lin Tan et al. (2014), who show that family business resources and market orientation jointly shape marketing and supply chain performance outcomes. The third boundary condition is represented by geographic and regional context. Capello and Lenzi (2016) demonstrated that the entrepreneurship-regional growth relationship is mediated by the characteristics of the local innovation environment, and Zabala-Iturriagagoitia (2022) showed that public procurement policy instruments can be deliberately designed to foster regional entrepreneurial ecosystems.

2.5. Emerging Digital and Sustainability Dimensions

The most recent literature, which is focused on the years 2022–2026, shows how the field is responding to the demands of digitalisation and sustainability. In their 2023 study, Kraus et al. examined how digital strategies and enterprise architecture (EA) can work together to support new and innovative business models. They found that the balance between a company's entrepreneurial spirit and its digital capabilities is crucial for success in a platform-based business environment. Tippmann et al. (2023) take this logic a step further by looking at globally scaling digital firms. They show that these firms have to deal with a contradiction. This contradiction is between how quickly they are growing and the way digitisation affects companies. This contradiction is not something that was thought about much when international entrepreneurship was being thought about before the digital age. Liu et al. (2024) provide a different viewpoint by looking at how a CEO's entrepreneurial spirit affects their workers' innovative actions through an attention-based viewpoint. This adds to

EO theory by expanding it from the level of the company to the level of how managers think.

In parallel, sustainability has emerged as a distinct thematic strand. Chistov et al. (2023) show that sustainability orientation does not directly go well with growth objectives. Meanwhile, Cai et al. (2026) look at how knowledge management and sustainable entrepreneurship meet, and decide that this is a very important way of helping resource-constrained start-ups. The field is in the early stages of integrating EO theory with the digital and sustainability transformations that are reshaping the broader competitive environment, suggest these contributions when considered as a whole. This trend is likely to intensify in the coming years, given its still-limited representation in the corpus.

3. Methodology

In this systematic literature review, PRISMA methodology is used for the collection, selection, and evaluation of each author's contributions, and points out conclusions for what is already unknown. This methodology is mostly used for medical studies, but nowadays has also been used for social sciences and management studies (Ankrah & Omar, 2015).

The steps below have been used for the selection process:

1. Identification phase: A total of 233 records were identified from the Scopus database using the keywords: "firm growth" AND "entrepreneurship orientation"
2. Screening phase: After applying the filters, document type was restricted to articles; language was restricted to English, and article areas were limited automatically to "Business Economics";
3. Inclusion phase: Finally, 41 records were included for further analysis of the systematic literature review.

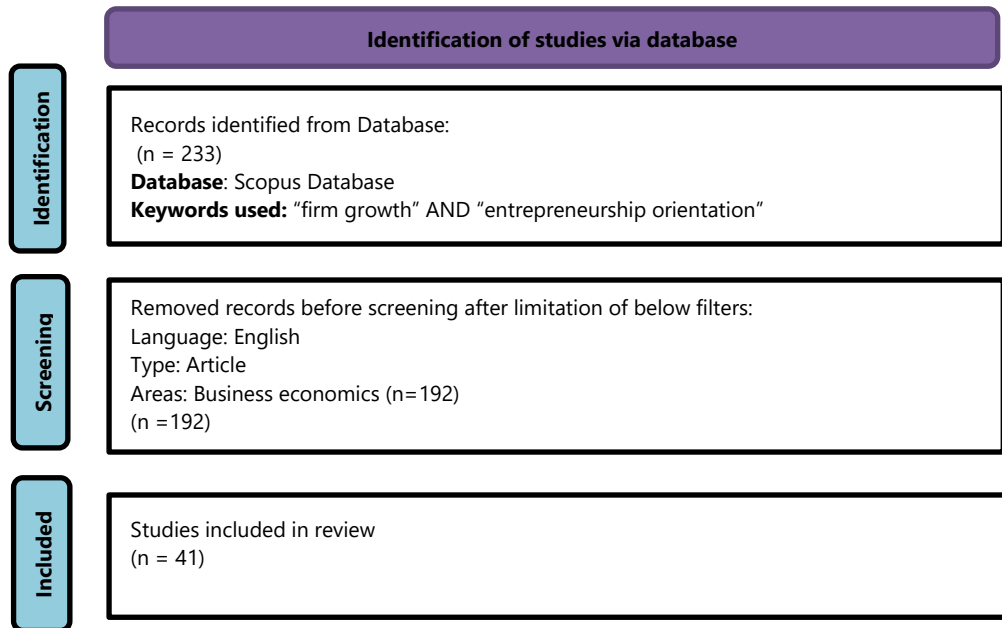


Figure 1: Prisma flow map - data in the Scopus database (source: by author)

4. Results

This section reports the descriptive and structural characteristics of the reviewed corpus, covering annual scientific production, author and journal productivity, citation impact, geographic distribution, and keyword-based thematic structure.

4.1. Annual Scientific Production

Annual scientific production on entrepreneurial orientation and SME growth/performance shows a markedly uneven trajectory. The earliest article in the corpus dates to 2001 (Brown et al.), followed by a sparse and irregular publication pattern through the 2000s and early 2010s. Production density increases visibly from 2016 onward, with a pronounced acceleration beginning in 2021 and peaking in 2023, which alone accounts for eight articles, nearly one-fifth of the entire corpus. The years 2022, 2024, and 2025 each contributed four to five articles, indicating that the field has entered a phase of sustained, rather than transient, growth.

Table 1. Annual scientific production (2001-2026) (source: by authors, 2026)

Year	Articles
2001	1
2008	1
2009	1
2012	2
2013	1
2014	1
2016	2
2017	3
2018	2
2019	1
2020	2
2021	2
2022	5
2023	8
2024	4
2025	4
2026	1

4.2 Most Influential Journals

Publication activity is dispersed across a wide range of outlets rather than concentrated in a small number of dominant journals, a pattern consistent with the interdisciplinary nature of the EO construct, which spans strategic management, entrepreneurship, and international business. The Journal of Innovation and Knowledge is the single most productive outlet in the corpus, followed by four journals tied at two articles each: Asia Pacific Journal of Management, Cogent Business and Management, Journal of Small Business and Enterprise Development, and Small Business Economics. The remaining articles are distributed across 20 additional journals, each contributing a single article, including flagship outlets such as the Strategic Management Journal, Journal of Business Venturing, and Global Strategy Journal.

Table 2. Most productive journals - top 5 (source: By author, 2026)

Year	Articles
Journal of Innovation and Knowledge	4
Asia Pacific Journal of Management	2
Cogent Business and Management	2
Journal of Small Business and Enterprise Development	2
Small Business Economics	2

4.3. Most Cited Articles

Citation impact is highly skewed, a pattern typical of mature research streams in which a small number of foundational contributions accumulate disproportionate influence. Brown et al. (2001) is by far the most cited article in the corpus (394 citations), reflecting its status as the field's principal measurement instrument. Craig et al. (2008) and Eggers et al. (2013) follow as the second and third most cited contributions, both exceeding 200 citations. Notably, several of the most cited works are not the most recent, illustrating the citation-accumulation lag characteristic of bibliometric analysis, while several 2023-2025 contributions (e.g., Kraus et al., 2023, with 158 citations) demonstrate unusually rapid uptake, suggesting strong contemporary relevance.

Table 3. Ten most cited articles (source: by author, 2026)

Number	Authors	Year	Citations	Journal
1	Brown, Davidsson & Wiklund	2001	394	Strategic Management Journal
2	Craig, Dibrell & Davis	2008	290	Journal of Small Business Management
3	Eggers, Kraus, Hughes, Laraway & Snyckerski	2013	214	Management Decision
4	Kraus, Vonmetz, Bullini Orlandi, Zardini & Rossignoli	2023	158	Technological Forecasting and Social Change
5	D'Angelo & Presutti	2019	90	International Business Review
6	Miller, Steier & Le Breton-Miller	2016	68	Entrepreneurship: Theory and Practice
7	Xheneti & Bartlett	2012	61	Journal of Small Business and Enterprise Development
8	Santos-Vijande, López-Sánchez, Loredó, Rudd & López-Mielgo	2022	56	Journal of Innovation and Knowledge
9	Wales, Covin, Schüller & Baum	2023	54	Journal of Technology Transfer
10	Tippmann, Monaghan & Reuber	2023	49	Global Strategy Journal

4.4. Most Productive Authors

Author-level productivity within this corpus is comparatively dispersed, consistent with a field driven by independent research teams rather than a small, tightly connected core. Suder M. is the most productive author, appearing as (co-)author on three articles, all published between 2024 and 2025, reflecting a concentrated and recent stream of work on EO in the hospitality and SME growth context conducted with recurring collaborators Kusa R. and Duda J. (two articles each). Wales W.J. and Kraus S. also each appear on two articles, both as part of larger international co-authorship teams, underscoring the collaborative nature of contemporary EO scholarship.

4.5. Country Collaboration Patterns

Geographic analysis of author affiliations reveals a corpus anchored predominantly in Western institutions, though with meaningful representation from emerging and transition economies. The United Kingdom and the United States are the two most represented countries by affiliation count, followed by Italy and Spain. Poland, Germany, and Canada form a second tier of moderately represented countries. Beyond this core, the corpus includes contributions affiliated with South Africa, Ghana, Ethiopia, Thailand, India, Bangladesh, and Peru, indicating that while emerging-market perspectives remain a minority, they are present and growing, particularly in the most recent (2023-2025) publication years.

Table 4. Most represented countries by author affiliation - top 10 (source: By author, 2026)

Country	Affiliation count
United Kingdom	15
United States	13
Italy	10
Spain	9
Poland	5
Germany	5
Canada	5
South Africa	4

4.6. Keyword Co-Occurrence

The systematic review of the literature on entrepreneurship orientation and firm growth highlights different themes through keyword occurrences. Minimum number of occurrences of a keyword is five and of the 977 keywords, 36 meet the threshold. As shown in Fig. 2, the term co-occurrence network identifies eight major clusters. Cluster 1 shows enterpreneurial orientation and firm performance; cluster 2 focus on

sustainable entrepreneurship; cluster 3 main focus on business development; cluster 4 highlight entrepreneurship and strategic orientation; cluster 5 shows growth and market orientation.

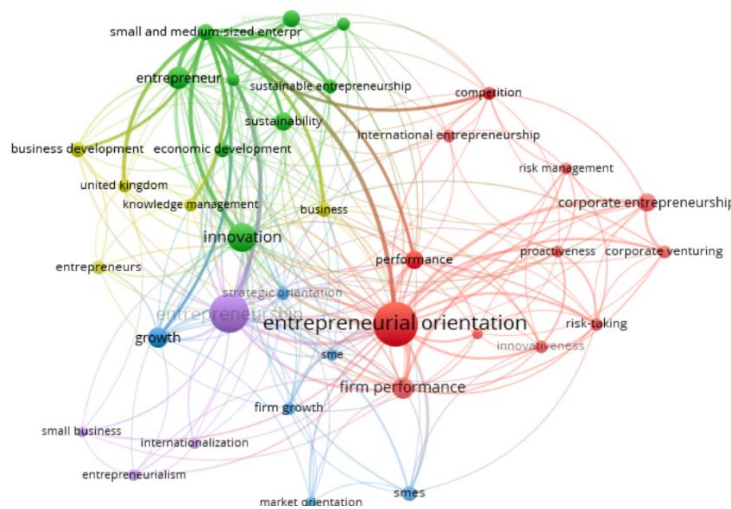


Figure 2: Keyword Co-occurrence Network (VOSviewer Output). Source: Scopus, processed by author

5. Discussion

The evidence presented above, which is bibliometric and thematic, jointly indicates that the research field is in a state of active maturation rather than settled consensus. The findings demonstrate that the direct, positive relationship between entrepreneurial orientation and SME performance/growth is well established empirically, corroborated across multiple industries, geographies, and methodological approaches (Eggers et al., 2013; Craig et al., 2008; Kruja, 2020). Since 2020, there has been a significant increase in the number of publications dealing with moderating and mediating mechanisms. This indicates that the field has shifted its focus from basic direct-effects testing to a more contingency-oriented research agenda. This move aligns with the calls from Wales et al. (2023) for a more robust theoretical understanding of the mechanisms behind EO's effects.

The fact that a small number of foundational articles, most notably Brown et al. (2001), have the greatest impact on citations shows a common pattern for constructs that use a dominant, widely adopted measurement instrument. This is because subsequent empirical studies often cite the original instrument, regardless of their specific theoretical contribution. This can make it difficult to see genuine theoretical progress behind the sustained volume of citations. By contrast, the rapid accumulation of citations to more recent contributions, such as Kraus et al. (2023), indicates that digitalisation-related extensions of EO theory are being adopted unusually quickly by

the scholarly community. This trend is consistent with the broader prominence of digital transformation research across management disciplines during this period.

The fact that most of the corpus is concentrated geographically in the United Kingdom, the United States, Italy, and Spain means that we need to be cautious when interpreting it. This pattern probably reflects a combination of factors, including the historical location of entrepreneurship research infrastructure, language and publication-outlet biases favouring English-language, Western-edited journals, and genuinely higher research investment in these regions. However, the growing number of contributions from Ghana, Ethiopia, South Africa and other developing countries (Dwumah et al., 2024; Woldesenbet & Gezahegn, 2025; Lingwati & Mamabolo, 2023) suggests that researchers are gradually testing the boundary conditions of EO theory outside its original institutional context. This is a significant development in terms of theory, as resource-constrained and institutionally weak environments are arguably the most challenging test of EO theory's presumed universality.

Finally, the thematic evolution indicates that the field's conceptual structure is not static, which is important to consider when analysing the field. Since 2022, there has been a clear trend of digitalisation and sustainability emerging as distinct thematic clusters. This indicates that, rather than merely applying it, EO theory is being actively extended to address contemporary strategic challenges. This is in line with a field that responds to its environment, but it also increases the risk of stretching the core EO construct too far. This can happen when it is used to explain a wider range of phenomena without the theory being made clearer.

6. Theoretical Implications

This study makes several theoretical contributions. Firstly, it synthesises findings from the direct-effects, moderating/mediating, and contextual literatures to offer an integrative account. This complements Wales et al.'s (2023) call for a more mechanism-based theory of EO. The account suggests that future theoretical development should explicitly incorporate institutional and resource-based contingencies rather than treating them as peripheral moderators. Secondly, the bibliometric evidence of thematic diversification since 2022 suggests that EO theory is entering a phase of theoretical elaboration. In this phase, its intersection with digital capability theory and sustainable entrepreneurship theory warrants dedicated conceptual development. This means that it should no longer be treated as incidental extensions of the core construct. The third finding of the study is that theoretical progress in this field should be evaluated with some caution when relying solely on citation counts. This is because of the disproportionate and somewhat mechanical citation of foundational measurement instruments independent of a given study's substantive theoretical contribution.

7. Practical Implications

For SME managers and entrepreneurs, the reviewed evidence suggests that cultivating entrepreneurial orientation, particularly its innovativeness and proactiveness dimensions, remains a defensible strategic priority for growth-seeking

firms, but that its performance benefits are unlikely to be fully realized without complementary investment in enabling capabilities such as knowledge management systems (Kusa et al., 2024), organizational flexibility (Suder et al., 2025), and network relationships (Dwumah et al., 2024; Miller et al., 2021). For managers operating in family firms, the evidence further suggests that entrepreneurial posture can be productively combined with family-based brand identity and resource endowments to enhance marketing and growth outcomes (Craig et al., 2008; Charupongsopon & Puriwat, 2017).

For policymakers, particularly those in regional development and innovation agencies, the findings reinforce the relevance of institutional quality and public procurement design as levers for fostering entrepreneurial activity and regional growth (Zabala-Iturriagagoitia, 2022; Terjesen & Hessels, 2009). In institutionally weaker or resource-constrained environments, the evidence from Ethiopia, Ghana, and Albania suggests that generic EO-promotion policies transplanted from Western contexts may require substantial contextual adaptation to be effective (Woldesenbet Beta & Gezahegn, 2025; Xheneti & Bartlett, 2012).

8. Limitations and Future Research

This study is subject to several limitations that should temper the interpretation of its findings and inform future research. Methodologically, the analysis is confined to a single database (Scopus), which, while broad in coverage, may exclude relevant work indexed exclusively in Web of Science or in regional and non-English-language databases, constituting a database-coverage limitation. The corpus size ($n = 41$) is moderate; while sufficient for a focused thematic and descriptive bibliometric analysis, it is smaller than the samples typically required for network-based bibliometric techniques such as co-citation analysis or bibliographic coupling using dedicated software (e.g., VOSviewer or Bibliometrix/Biblioshiny), which this study did not apply. Future replications with a larger corpus could productively apply such network-analytic techniques to validate and extend the frequency-based thematic clusters identified here.

A further limitation concerns the PRISMA reporting itself: because the dataset supplied for this analysis corresponded only to the final, post-screening sample, the intermediate identification- and screening-stage counts required for a complete PRISMA flow diagram could not be reported and are flagged here as requiring verification against the original search records. Contextually, despite encouraging signs of geographic diversification, the corpus remains skewed toward Western European and North American affiliations, limiting the generalizability of aggregate conclusions to underrepresented regions. Temporally, the inclusion of a single 2026 article reflects a database snapshot taken early in that publication year and should not be interpreted as representative of that year's eventual output.

Future research should prioritize four directions consistent with the gaps identified in this review. First, methodologically, longitudinal and mixed-methods designs are needed to complement the prevailing cross-sectional PLS-SEM approach and to better establish causal ordering in the EO-performance relationship. Second, contextually, further empirical work in underrepresented emerging-market and institutionally weak settings would meaningfully test the boundary conditions of EO theory. Third, theoretically, deeper integration of EO with digital capability and

sustainable entrepreneurship theory is warranted, building on the nascent clusters identified in Section 4.

8. Conclusion

The findings indicate a field that has grown substantially since 2021, is anchored by a small number of highly cited foundational contributions, and is increasingly diversifying into digital and sustainability-related thematic territory. While the direct EO-performance relationship enjoys strong empirical support, the literature reveals persistent contextual, methodological, and theoretical gaps, particularly regarding the mechanisms and boundary conditions that govern this relationship in institutionally diverse and resource-constrained settings. By synthesizing these findings into an integrative framework, this study contributes both a critical assessment of the field's current state and a concrete agenda for advancing entrepreneurial orientation theory in ways that are more mechanism-explicit, contextually inclusive, and responsive to the digital and sustainability transformations reshaping contemporary SME strategy.

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