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INTERNATIONAL MODELS OF SME SUSTAINABLE DEVELOPMENT: A COMPARATIVE ANALYSIS OF THE EU, THE USA, JAPAN AND REPUBLIC OF MOLDOVA

Anna VOLOSIUC^{*1}

Abstract: This article examines international models of sustainable development of small and medium-sized enterprises (SMEs) through a comparative analysis of the European Union, the United States, Japan, and the Republic of Moldova. The research addresses the question of how institutional frameworks, SME classification systems, financial instruments, innovation mechanisms, and sustainability-oriented policies influence the sustainability, resilience, and long-term competitiveness of SMEs in different economic environments. The study is based on a comparative institutional analysis using regulatory documents, international statistical reports, and academic literature. The selected cases represent advanced coordinated economies (EU and Japan), a market-oriented model (USA), and a fragmented transition economy (Republic of Moldova). Methods applied include classification analysis, institutional comparison, value-chain analysis, and qualitative synthesis of empirical data related to economic, social, and environmental dimensions of SME development. The results demonstrate that SME sustainability is achieved where classification systems, financial support mechanisms, innovation policies, and sustainability-oriented institutional frameworks function as an integrated system. The EU model relies on regulatory harmonization, coordinated financial instruments, and green transition policies; the US model emphasizes flexibility, sector-based classification, entrepreneurial competition, and innovation-driven growth; Japan ensures sustainability through SME integration into corporate supply chains, technological modernization, and national innovation networks. In contrast, Moldova exhibits a gap between formal regulatory alignment with EU standards and the actual functioning of SMEs, characterized by limited innovation capacity, weak institutional coordination, and insufficient integration into sustainable value chains. The findings suggest that for fragmented economies, sustainable SME development requires systemic alignment of institutions, finance, innovation, and sustainability-oriented policies rather than the isolated adoption of foreign policy instruments. The study contributes to the literature on SME sustainability and provides implications for policy design in transition economies.

Keywords: SMEs; Sustainable Development; Institutional Models; Innovation Systems; Comparative Analysis; Transition Economies

JEL Code: L26, O11, O57, Q56, M21

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Introduction

Small and medium-sized enterprises (SMEs) in all types of economic systems are viewed as a key driver of sustainable economic growth, structural stability, employment generation, and innovation. In the European Union, SMEs account for 99.8% of all enterprises and generate more than 57% of value added, as highlighted in the Annual Report on European SMEs 2022/2023 (European Commission, 2023, p. 12). Similar conclusions are presented by Scarborough & Cornwall (2020), who emphasize that the dynamics of the SME sector is a decisive factor shaping national competitiveness, entrepreneurial resilience, and long-term economic sustainability (Scarborough & Cornwall, 2020, p. 41).

The concept of sustainable SME development is grounded in the integration of economic efficiency, social responsibility, environmental sustainability, and innovative capacity. Contemporary approaches to sustainable development increasingly emphasize green transformation, resource efficiency, digital adaptation, and the integration of SMEs

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into sustainable value chains. Gordon's fundamental work *Economic Analysis* (2004) stresses that "the sustainability of economic actors is impossible without institutional predictability and access to development resources" (Gordon, 2004, p. 67). Research by Jennings & Perren (2015) confirms that sustainability in the SME sector relies on strategic capabilities, innovative potential, and the ability to adapt to changes in the external environment (Jennings & Perren, 2015, p. 118). Recent studies additionally underline that sustainable SME development is increasingly associated with green transition policies, resource efficiency, digital transformation, and the integration of SMEs into sustainable value chains (OECD, 2021; European Commission, 2023).

International SME sustainability models demonstrate substantial institutional differences. The European Union has developed a comprehensive regulatory and financial framework that includes innovation programs, technology-transfer instruments, green transition priorities, and harmonized SME classification criteria (European Commission, 2016, p. 34). The American model is characterized by decentralization and sectoral specificity: SME criteria are defined through SBA standards, while innovation is driven by a mature venture-capital market and entrepreneurial competition (Wang & Qu, 2023, p. 112). The Japanese sustainability model is marked by deep SME integration into supply chains, technological modernization, and long-term industrial coordination, supported by studies of the national innovation system (Levitskaya, 2018, p. 203) and METI data on the role of technological renewal in SME competitiveness.

The Republic of Moldova, as a small open economy with a transitional development profile, faces different institutional and economic conditions. Competitiveness studies indicate weaknesses in the innovation infrastructure, limited SME access to finance, insufficient technological adaptation, and low integration into global value chains (Stucalova, 2014, p. 262). Despite the existence of a regulatory framework harmonized with European standards (LEGE RM nr. 259-XV, 2004), the practical implementation of support mechanisms remains limited. As noted by Levitskaya (2018), "the gap between formal institutions and the actual mechanisms governing SME functioning remains a critical barrier to sustainable development" (Levitskaya, 2018, p. 207).

A comparative analysis of EU, US, and Japanese models makes it possible to identify institutional gaps and outline priority directions for improving SME policy in Moldova. This approach aligns with recommendations of European and international analytical reports, which underscore the need to adapt international best practices to the specific conditions of transition economies (European Commission, 2023, p. 18; OECD, 2021).

The purpose of this article is to conduct a comparative analysis of SME sustainability models in the EU, the US, Japan, and the Republic of Moldova, and to identify the elements of international experience most relevant for strengthening the competitiveness, resilience, and sustainable development of the Moldovan SME sector.

The key objectives of the study include:

- systematising the theoretical foundations of SME sustainability;
- identifying institutional characteristics of international models;

- analysing sustainability-oriented approaches to SME support and development;
- providing a comparative assessment of Moldova's position;
- developing recommendations for adapting international practices.

The scientific contribution of the study consists in integrating institutional, innovation, and sustainability-oriented perspectives into a comparative analytical framework for assessing SME development models in advanced and transition economies. The findings contribute to the theoretical understanding of SME sustainability and provide practical implications for improving SME support policies in the Republic of Moldova.

Literature Review

1.1. Theoretical Approaches to SME Sustainable Development

Research on the sustainable development of small and medium-sized enterprises (SMEs) demonstrates that this category of firms plays a critical role in ensuring structural stability, innovation dynamics, employment generation, and long-term economic growth across different economic systems. According to the European Commission, SMEs generate more than 57% of value added in the European Union and represent a major source of innovation and entrepreneurial activity (European Commission, 2023, p. 12).

Contemporary approaches increasingly interpret SME sustainability as a multidimensional process combining economic efficiency, social responsibility, environmental adaptability, technological modernisation, and institutional resilience. Recent studies emphasise the growing importance of green transition, circular economy practices, digital transformation, and sustainable value-chain integration for strengthening SME competitiveness and long-term resilience (OECD, 2021; European Commission, 2023; Chakraborty, 2025).

The theoretical foundation of SME sustainability is closely linked to institutional conditions, innovation capacity, and enterprise adaptability. Gordon (2004) argues that sustainable development is impossible without institutional predictability and access to long-term development resources (Gordon, 2004, p. 67). Jennings & Perren (2015) additionally note that SME sustainability depends on entrepreneurial flexibility, strategic capabilities, and the ability to adapt to external economic changes (Jennings & Perren, 2015, p. 118). Research on sustainable digital transformation further demonstrates that digital technologies increasingly function as instruments for integrating sustainability principles into SME business models and management systems (Mick, 2024).

The literature also highlights the competitive advantages of SMEs in conditions of economic uncertainty. Scarborough & Cornwall (2020) underline the adaptability of small firms and their ability to respond rapidly to market changes, while Wang & Qu (2023) emphasise that SMEs in developing and transition economies remain vulnerable to financial instability, technological limitations, and weak institutional support.

A significant contribution to the understanding of SME sustainability in transition economies has been made by Moldovan researchers. Stucalova (2014) stresses that the stability of the SME sector is essential for strengthening national competitiveness in small and fragmented economies. Aculai, Stratan and Novac (2018) additionally highlight the importance of institutional coordination, innovation infrastructure, and effective entrepreneurship support policies for ensuring sustainable SME development in the Republic of Moldova.

Levitskaya (2018) identifies substantial institutional constraints affecting Moldovan SMEs, including weak innovation infrastructure, limited access to finance, insufficient technological adaptation, and low integration into international supply chains. Although Moldova's legal framework is formally harmonized with European standards (LEGE RM nr. 259-XV, 2004), the practical implementation of SME support mechanisms remains limited.

Methodologically, contemporary studies increasingly apply comparative institutional approaches to analyse differences in SME sustainability models across countries and economic systems. Such approaches make it possible to assess the interaction between institutional regulation, innovation systems, financial instruments, and sustainability-oriented policies in shaping SME competitiveness and resilience.

Overall, the literature demonstrates that sustainable SME development is a multidimensional process based on the interaction between innovation potential, institutional support, social responsibility, environmental adaptation, and integration into global economic processes. In advanced economies these elements operate as coordinated mechanisms, whereas transition economies continue to face structural and institutional gaps that require the adaptation of international sustainability practices to national economic conditions.

Methodology

The research methodology is based on a comparative institutional analysis of four national models of SME sustainable development – the European Union, the United States, Japan, and the Republic of Moldova. The selection of cases reflects substantial differences in institutional regulation, innovation systems, financial support mechanisms, and sustainability-oriented development policies affecting SME competitiveness and long-term resilience (European Commission, 2023; Wang & Qu, 2023; Levitskaya, 2018).

The comparative framework is structured around several analytical dimensions, including SME classification systems, institutional support mechanisms, financial instruments, innovation capacity, and technological adaptation, integration into regional and global value chains, sustainability-oriented policies, as well as structural constraints and vulnerabilities. These dimensions make it possible to identify the differences between coordinated, market-oriented, and transition economy models of SME sustainable development.

The study draws on three groups of sources: regulatory documents, statistical and analytical reports, and academic literature. The regulatory framework includes EU SME definition guidelines (European Commission, 2016; 2023), US SBA standards, Japanese

METI sectoral criteria (Nishiguchi, 1994; Sako, 1992), and Law No. 179 of 21 July 2016 on Small and Medium-Sized Enterprises of the Republic of Moldova. Statistical and analytical materials include the Annual Report on European SMEs, OECD SME Outlook reports, and national statistical data from the EU, the US, Japan, and the Republic of Moldova. The theoretical and analytical basis of the study relies on the works of Jennings & Perren (2015), Gordon (2004), Levitskaya (2018), Stucalova (2014), as well as recent sustainability-oriented SME research.

The methodological approach combines classification analysis for comparing SME criteria, comparative institutional analysis for assessing support systems, and regulatory analysis of SME policy frameworks, functional value-chain analysis, particularly relevant for the Japanese model, and qualitative synthesis and triangulation of institutional, statistical, and academic sources.

The selected methodology ensures analytical consistency and allows for a systematic comparison of SME sustainability models across different economic and institutional environments, contributing to a more comprehensive understanding of sustainability mechanisms in advanced and transition economies.

Results and Discussion

4.1. Comparative Classification and Institutional Approaches to SMEs in the EU, the US, Japan, and the Republic of Moldova

International experience demonstrates that the sustainable development of SMEs does not emerge spontaneously but results from targeted public policy, institutional design, and the specific characteristics of national markets. Even the criteria used to classify enterprises as SMEs vary significantly across countries. These differences not only complicate direct international comparisons but also reflect the institutional priorities and sustainability mechanisms embedded within each economic model (European Commission, 2023; Wang & Qu, 2023; Jennings & Perren, 2015).

The literature emphasises that classification criteria possess not only statistical but also institutional significance, since they determine access to support programmes, subsidies, preferential financing, innovation instruments, and participation in public procurement systems (Scarborough & Cornwall, 2020; Wang & Qu, 2023). The European Union applies a unified system of criteria, whereas the United States and Japan rely on sector-specific and more flexible approaches.

For the purposes of this study, the main classification parameters can be summarised in a comparative framework (Table 1). The comparison demonstrates that the EU and the Republic of Moldova formally employ similar structural classification schemes, while the United States and Japan rely more heavily on sectoral differentiation and flexible institutional criteria. These differences substantially affect the scale of enterprises included in national support systems and their access to financial, innovation, and sustainability-oriented instruments. In the United States, firms that would be classified as large enterprises

under EU standards may still qualify as SMEs and benefit from support mechanisms. In Japan, sector-specific thresholds are closely connected with industrial coordination and supplier-integration systems. In contrast, the Republic of Moldova continues to be characterised by the dominance of micro-enterprises, limited financial capacity, and weaker institutional support, which constrain the long-term sustainability and competitiveness of SMEs (Stucalova, 2014; Levitskaya, 2018).

Table 1. Comparative Classification Criteria for SMEs in the EU, the US, Japan, and the Republic of Moldova

Country	Basic criteria	Employment-based classification	Distinctive features
EU	Number of employees, annual turnover, balance-sheet total (EU SME definition) (European Commission, 2023)	Micro: 1-9; small: 10-49; medium: 50-249	Unified thresholds for all EU member states; criteria linked to access to support programmes
US	Number of employees and/or annual revenue, depending on industry (Wang & Qu, 2023)	In most industries: up to 500 employees; in capital-intensive industries: up to 1,500	SBA sectoral standards; a “small” enterprise may be very large by EU standards
Japan	Number of employees and capital size (by sector) (Levitskaya, 2018 - analysis of Asian models)	Manufacturing: up to 300; services: up to 100; retail: up to 50	Strong sectoral and capital-based classification; criteria integrated into subcontracting and supplier-support systems
Republic of Moldova	Number of employees, turnover, balance-sheet total (LEGE RM nr. 259-XV, 2004)	Broadly aligned with the EU model: micro, small, medium	Formally European model; in practice-low turnover thresholds and limited access to support programmes (Levitskaya, 2018; Stucalova, 2014)

Source: compiled by the author

The following sections analyse the institutional, financial, innovation, and sustainability-oriented characteristics of SME development models in the EU, the United States, Japan, and the Republic of Moldova.

4.1.2. The European Model of SME Sustainable Development

The European Union views SMEs as the “backbone” of the economic structure, linking regional markets, innovation, and employment (European Commission, 2023). EU SME reports underline that the sector’s sustainability is ensured through a combination of three elements:

1. Institutional unification

A core principle of EU SME policy is institutional coherence. The sustainability mechanism is built on:

- unified SME classification criteria (micro, small, medium) covering employment, turnover, and balance-sheet indicators;
- harmonised reporting requirements, ensuring cross-country comparability of data;
- the Think Small First principle, embedded in the Small Business Act, prioritising SME interests in regulatory policymaking.

Such unification creates a common institutional environment where SMEs gain access to uniform regulatory standards, reducing administrative barriers and increasing business predictability (European Commission, 2016).

2. *Financial Architecture: Access to Structural Funds, Guarantee Schemes, EIF Instruments, and National Support Programmes.*

Financial support for SMEs in the EU is multi-layered and combines:

- structural fund resources (ERDF, ESF, Cohesion Fund) aimed at regional development and reducing socio-economic disparities;
- guarantee instruments of the European Investment Fund (EIF), ensuring SME access to credit;
- preferential SME loans implemented through the financial institutions of member states;
- grant and subsidised programmes focused on innovation, digitalisation, and the green transition;
- national support programmes integrated into the broader EU policy framework.

Scarborough & Cornwall (2020, p. 53) argue that SME sustainability in Europe is ensured precisely through the combination of credit-guarantee tools and grant support, which together form a “stable financial ecosystem.”

3. *Innovation Ecosystem*

The EU places strong emphasis on strengthening the innovation capacity of SMEs:

- SMEs participate actively in Horizon Europe, transnational research and technological projects, technological alliances, and clusters.
- Digital Innovation Hubs and R&D infrastructures provide SMEs with access to knowledge, technologies, and modern equipment.
- Technology transfer is supported across countries, regions, and sectors, fostering the diffusion of innovation.

In recent years, EU innovation policy has increasingly focused on sustainable technologies, digital transformation, resource efficiency, and environmentally adaptive business models aimed at strengthening SME competitiveness and resilience. Levitskaya (2018, p. 204) stresses that the European model treats SMEs as active participants in innovation processes rather than passive technology consumers.

4. *Regional Dimension of Sustainability*

EU SME policy is closely integrated into regional development policy and aims to:

- reduce territorial disparities;
- support SME development in rural and peripheral regions;

- strengthen local economic systems;
- increase employment and regional economic resilience.

Particular attention is also given to sustainable regional development, including support for local entrepreneurship, digital infrastructure, and sustainability-oriented territorial cohesion. Stucalova (2014, p. 263) notes that SMEs represent a key element of regional economic self-organisation, ensuring local market resilience and employment generation.

To systematize the European model of SME sustainable development, its structural components are summarized in Table 2.

Table 2. Key Elements of the European Model of SME Sustainable Development

Component	Content	Sources
Classification	Unified criteria (micro, small, medium based on employment, turnover, and balance-sheet total)	European Commission (2016, 2023)
Institutional framework	Small Business Act, EU support programmes for SMEs, legislative harmonisation	European Commission (2016)
Financial instruments	Structural funds, guarantee schemes, EU-backed loans, partial grants	European Commission (2023); Scarborough & Cornwall (2020)
Innovation	SME participation in transnational projects, access to R&D infrastructure, clusters	Levitskaya (2018)
Sustainability orientation	Green transition initiatives, digitalisation programmes, resource-efficiency measures, ESG-oriented business adaptation mechanisms	European Commission (2023)
Regional dimension	Support for SMEs in less-developed regions, reduction of territorial disparities	Stucalova (2014)

Source: developed by the author

Thus, the European model of SME sustainable development is characterised by a high degree of system coherence, institutional maturity, and internal logical consistency. Each component - classification, institutional framework, financial instruments, innovation, and the regional dimension - forms an integrated mechanism that strengthens SME sustainability at all stages of the business life cycle.

Unlike the US and Japan, where criteria and support instruments depend on sectoral structures, the EU relies on the principle of universality and harmonisation, ensuring uniform rules and access to support mechanisms for all member states. This makes the European model particularly effective for small, fragmented economies (European Commission, 2023; Stucalova, 2014).

In conclusion, the European model represents a balanced combination of regulatory unification, financial support, innovation integration, and regional cohesion, creating conditions for long-term sustainable growth of the SME sector and its high adaptability to economic shocks.

4.1.3. *The American Model of SME Sustainable Development*

The American model of SME sustainable development differs fundamentally from the European approach in terms of institutional organisation, regulatory philosophy, and mechanisms of market coordination. In the United States, SMEs are viewed primarily as a space for entrepreneurial experimentation, market competition, technological innovation, and business scalability rather than as an object of unified administrative regulation. As emphasised by Wang & Qu (2023, p. 44), US SME policy is based on the principle of “letting the market define the boundaries of growth,” whereby the state provides institutional guarantees for access to credit and contracts without imposing strict universal standards.

This philosophy shapes the overall architecture of the American model, including enterprise classification systems, institutional support mechanisms, financial instruments, and innovation-oriented development policies.

1. *Sector-Based Classification*

Unlike the EU’s unified classification system, the United States applies differentiated SBA (Small Business Administration) standards based on industry-specific characteristics. SME thresholds vary depending on the number of employees and annual revenue, allowing high-tech and capital-intensive firms with relatively large workforces to remain within the “small business” category and retain access to preferential programmes.

Typical thresholds include:

- up to 500 employees in most manufacturing, trade, and service industries;
- up to 1,500 employees in capital-intensive sectors;
- annual revenue thresholds ranging from USD 7.5 million to USD 47 million, depending on the industry.

As a result, enterprises that would be classified as large firms under EU standards may still qualify as SMEs in the United States. This flexibility supports the competitiveness of firms operating in technology-intensive sectors where larger operational scale is economically necessary.

2. *Institutional Framework: The SBA as the Key Intermediary*

The United States does not operate a centralised SME policy system comparable to the European model. Instead, SME support is organised through a multilayered institutional structure in which the Small Business Administration serves as the principal coordinating intermediary (Wang & Qu, 2023).

The SBA performs several key functions:

- guaranteeing SME loans;
- administering federal contracting programmes;
- coordinating recovery and business-support initiatives;
- providing educational and advisory support for entrepreneurs.

Rather than replacing market mechanisms, the SBA adjusts their functioning by improving SME access to financial and institutional resources that would otherwise remain inaccessible to smaller firms.

3. Financial Mechanisms of Sustainability

Financial sustainability in the American model is supported primarily through guarantees, investment mechanisms, and procurement access rather than through direct subsidies.

The main instruments include:

- SBA loan guarantee programmes such as 7(a) and 504 Loans;
- access to federal procurement programmes;
- private venture capital and startup financing mechanisms.

The federal government may cover up to 85% of lender risk within SBA programmes, significantly improving SME access to financing. In addition, federal agencies are required to allocate approximately 23% of procurement contracts to small businesses annually.

A distinctive feature of the American model is the highly developed venture capital market, which supports the rapid expansion of innovative SMEs. According to Scarborough & Cornwall (2020), the United States possesses one of the most advanced venture capital ecosystems globally, particularly in technology-intensive industries.

4. Innovation Focus and Technological Dynamics

American SMEs represent one of the central drivers of technological innovation and entrepreneurial dynamism in the national economy. SMEs generate up to 50% of patents and more than 40% of technological innovations, especially in biotechnology, digital technologies, robotics, and aerospace industries.

Scarborough & Cornwall (2020, p. 148) note that SMEs in the United States demonstrate “a higher innovation return per unit of capital” than large corporations. Wang & Qu (2023) additionally show that small firms frequently serve as channels for introducing new technologies, business models, and organisational practices.

In recent years, US innovation policy has increasingly supported sustainability-oriented entrepreneurship, particularly in green technologies, digital transformation, clean energy solutions, and resource-efficient production systems.

5. Regulatory Philosophy and Economic Context

According to Gordon (2004), the American economic model is oriented toward minimising administrative barriers, stimulating entrepreneurial initiative, and accepting risk as a driver of economic development.

Unlike the European model, where SME sustainability is largely supported through institutional harmonisation and coordinated public mechanisms, the American approach relies more heavily on market flexibility, private investment, entrepreneurial competition, and technological dynamism. The principle of “freedom first – support second” allows SMEs to adapt rapidly to economic and technological changes without operating within a highly standardised regulatory environment.

Table 3. Features of the American Model of SME Sustainable Development

Element	Characteristics	Source
SME criteria	Sector-based SBA standards for employment and revenue	Wang & Qu (2023)
Institutional framework	SBA, federal and state-level SME support programmes	Wang & Qu (2023)
Financial mechanisms	Loan guarantees, access to federal procurement, venture capital	Scarborough & Cornwall (2020)
Innovation role	High share of innovations produced by small firms, especially in high-tech industries	Wang & Qu (2023); Scarborough & Cornwall (2020)
Sustainability orientation	Market-driven innovation, green entrepreneurship, digital transformation initiatives	OECD (2021); Wang & Qu (2023)
Regulatory philosophy	Flexibility, encouragement of entrepreneurial initiative, acceptance of risk	Gordon (2004)

Source: developed by the author

Thus, the American model demonstrates that SME sustainability is achieved primarily through entrepreneurial flexibility, innovation-driven competition, private investment mechanisms, and adaptive market institutions. The combination of technological dynamism and relatively limited administrative regulation enables SMEs to respond rapidly to economic and technological changes, particularly in innovation-intensive sectors.

4.1.4. The Japanese Model of SME Sustainable Development

The Japanese model of sustainable development for small and medium-sized enterprises is one of the most coordinated and institutionally structured in the world. Its foundation is built on the close integration of SMEs into the production chains of large corporations (keiretsu), a highly developed subcontracting system, and deep linkages between the state, science, and industry. Levitskaya (2018) notes that the Japanese experience is often viewed as a benchmark of coordination between government, business, and the research sector.

Key elements of the Japanese model

1. Classification model: sector-based and capital-based principles

The SME classification system in Japan is flexible yet strictly structured. It is based on two parameters: number of employees, amount of capital, which differ across economic sectors: manufacturing: up to 300 employees; wholesale trade: up to 100 employees; retail trade: up to 50 employees; services: 50–100 employees depending on subsector.

This approach enables the state to fine-tune support instruments by considering technological complexity, capital intensity, and process requirements in each industry.

A key feature of the Japanese classification is its link to the structure of industrial cooperation. Classification functions not as a statistical formality but as a practical regulatory mechanism defining resource allocation and supply-chain quality standards.

Unlike the EU model, where classification serves mostly statistical purposes, in Japan the size of the enterprise determines:

- its role in production chains;
- access to support programmes;
- quality requirements and technological expectations.

For example, if a firm is considered “small” in manufacturing (up to 300 employees), this signals that the enterprise:

- can be admitted into supply chains of Toyota, Mitsubishi, Panasonic;
- may participate in METI technological modernisation programmes;
- must comply with strict supply standards (quality, timing, precision);
- gains access to consulting, subsidies, and cooperation centres.

Thus, SME classification functions as a practical mechanism for resource distribution, integration into subcontracting networks, and regulation of supply quality. The size of the enterprise effectively determines what contracts it can execute, the technological level it must meet, and the degree of responsibility it carries within corporate supply chains.

This functional classification is a core component of Japan’s sustainability model because it ensures stable demand, compliance with quality standards, and technological advancement of SMEs.

2. *Subcontracting and clusters*

Subcontracting is a central pillar of the Japanese model. Most SMEs operate as:

- component suppliers;
- developers of technological modules;
- producers of specialised parts;
- providers of auxiliary technological processes.

Horizontal and vertical cooperation ensures stable order distribution and shields SMEs from market volatility. Jennings & Perren (2015) note that this model creates “systemic resilience” based on multilayered interfirm relationships.

Key benefits of Japan’s subcontracting system include:

- stable demand;
- technological support from large corporations;
- improved product quality;
- long-term employment guarantees.

As a result, the Japanese SME sector is not autonomous but embedded in the industrial ecosystem.

3. *Innovation integration*

The Japanese model is embedded in the National Innovation System (NIS), where SMEs perform applied and technological roles rather than peripheral ones. Levitskaya

(2018) emphasises that Japan demonstrates one of the deepest levels of SME integration into national scientific and technological progress.

Studies by Nishiguchi (1994) and Sako (1992) show that SMEs' role is to adapt, refine, and commercialise technologies created in corporate research centres and sector laboratories. Unlike the US model, where SMEs often generate radical innovations, in Japan innovation progresses through "continuous improvement without disruption."

Key elements of innovation integration include:

- applied innovations aimed at improving product quality;
- adaptation of existing technologies to supply-chain requirements;
- participation in sectoral research consortia funded by METI;
- institutional support through technoparks, cooperation centres, and regional NIS hubs.

Innovation in SMEs is thus embedded in vertically coordinated structures that ensure sustainable development through continuous modernisation.

In recent years, Japanese SME policy has increasingly incorporated sustainability-oriented industrial modernisation, energy-efficiency measures, and digital manufacturing technologies within industrial supply chains. Innovation in SMEs is therefore embedded in vertically coordinated structures that support long-term competitiveness and continuous technological renewal.

4. *Systemic resilience as a result of cooperative architecture*

Jennings & Perren (2015) introduce the concept of systemic resilience, which manifests particularly strongly in Japan.

Unlike the US and EU, where SME sustainability depends on individual firm competitiveness, the Japanese model relies on collective resilience across the entire production and innovation system, including:

- large corporations;
- small suppliers;
- sectoral institutions;
- government bodies (METI, JETRO);
- regional cooperation networks.

The main source of resilience is the multilayer subcontracting system, which provides:

- stable SME demand;
- reduced market risks through long-term contracts;
- continuous technological assistance from large firms;
- employment guarantees;
- coordinated standards of quality, timing, and technological requirements.

According to Nishiguchi (1994), this creates a "shock absorber effect" that helps SMEs survive crises, demand fluctuations, and technological disruptions due to support from larger firms.

Thus, SME sustainability in Japan is not the result of isolated small-firm strategies but the outcome of coordinated production–innovation architecture.

5. *Incremental innovation*

A defining feature of Japanese SMEs is their innovation behaviour. Unlike US SMEs, which often drive radical innovations (Wang & Qu, 2023), Japanese SMEs focus on incremental innovations-systematic, small, but continuous improvements of processes and products.

This approach reflects the concept of kaizen, which emphasises constant operational refinement. SMEs embedded in supply chains implement dozens of micro-improvements daily, ensuring stable quality growth and minimising production risks.

6. *Technological adaptation*

Japanese SMEs excel in technological adaptation: rather than creating technologies from scratch, they refine and tailor existing technologies to meet the demands of production chains. This makes them key suppliers of specialised components and technological solutions for corporations such as Toyota, Panasonic, and Mitsubishi (Nishiguchi, 1994; Sako, 1992).

7. *Integration into research networks of sectoral institutions*

Innovation activity also relies on SME integration into research networks of industry institutes, universities, and regional technology centres. Levitskaya (2018) notes that this coordination creates a synchronised national innovation system in which SMEs act as applied research actors, not as isolated developers.

This leads to constant quality improvement rather than abrupt technological leaps, reducing risks and enhancing resilience. The Japanese model can be summarised in Table 4.

Thus, the Japanese model demonstrates that SME sustainability is achieved through deep institutional coordination, technological adaptation, and long-term integration into vertically organised production and innovation systems. Unlike the American model, which prioritises entrepreneurial flexibility and market dynamism, the Japanese approach relies on coordinated industrial stability, continuous modernisation, and collective adaptation mechanisms that strengthen the long-term resilience and competitiveness of SMEs.

4.1.5. *The Model of SME Sustainable Development in the Republic of Moldova*

The model of SME sustainable development in the Republic of Moldova has evolved under the conditions of a transition economy, limited financial resources, structural vulnerability, and high dependence on external markets. Formally, Moldova's regulatory framework is harmonised with European approaches: Law No. 179 of 21 July 2016 on Small and Medium-Sized Enterprises defines SME classification based on employment, turnover, and assets, largely reflecting the EU model. However, Levitskaya (2018) emphasises that alignment of formal criteria does not mean alignment of sustainability models, since institutional, financial, and innovation infrastructures remain significantly weaker than in EU countries (Levitskaya, 2018, p. 207).

Table 4. Structural Features of the Japanese Model of SME Sustainable Development

Model element	Content	Sources
SME classification (sector-based + capital-based)	Manufacturing: ≤300 employees; wholesale: ≤100; retail: ≤50; services: ≤50–100. Classification is based not on formal reporting but on the firm's role in production chains and its capital level.	Levitskaya (2018); METI Standards
Functional role of classification	Firm size determines access to corporate supply chains, contract types, quality requirements, and eligibility for METI programmes. Classification = instrument of resource allocation and quality regulation.	Nishiguchi (1994); Sako (1992)
Integration into keiretsu and subcontracting	SMEs act as suppliers of components, units, and auxiliary processes for Toyota, Mitsubishi, Panasonic. Subcontracting creates multilevel cooperation and stable demand.	Jennings & Perren (2015)
Clusters and regional industrial cooperation	Formation of production groups, technology centres, and regional cooperation networks providing technological support to SMEs.	Levitskaya (2018)
Innovation integration (NIS)	SMEs participate in the National Innovation System: applied research, technology implementation, process modernisation, cooperation with universities and sector institutes.	Levitskaya (2018); Gordon (2004)
Incremental innovation and kaizen	Main mechanism of resilience: daily micro-improvements; absence of radical leaps; orientation toward stable quality enhancement.	Sako (1992); Nishiguchi (1994)
Technological adaptation	SMEs do not create radical innovations; they adapt and refine existing technologies according to supply-chain requirements.	Nishiguchi (1994)
Government support via METI	Programmes for technological upgrading; standardisation; subsidies; advisory centres; support for supplier innovation and modernisation.	METI; Levitskaya (2018)
System resilience	Ensured through long-term contracts, quality standardisation, stable demand, and continuous technological guidance from large corporations.	Jennings & Perren (2015)
Sustainability orientation	Energy efficiency, technological modernisation, digital manufacturing technologies within industrial supply chains	METI; Levitskaya (2018)

Source: developed by the author

1. Classification and real SME structure

Formally, Moldova uses a three-tier European scheme: micro, small, and medium enterprises defined by workers, turnover, and assets. In practice, the sector is dominated by microenterprises oriented toward survival, small retail activities, low-tech services, and simple processing.

Stucalova (2014) notes that SMEs in Moldova remain “locked” in low-productivity segments, limiting their contribution to productivity growth and innovation (Stucalova, 2014, p. 263). Unlike the EU, where SMEs create value added in manufacturing, high-tech

industries, and export-oriented sectors, Moldovan SMEs are weakly integrated into global supply chains and rarely serve as suppliers to international corporations.

2. *Institutional and regulatory framework*

Moldova's institutional model emerged under the influence of European practices and includes:

- Law No. 179 of 21 July 2016 on Small and Medium-Sized Enterprises and related regulations on business activity, taxation, and innovation;
- entrepreneurship-support institutions (ODIMM, ministerial divisions under the Ministry of Economy);
- the Agency for Innovation and Technology Transfer (AITT), responsible for financing technology-transfer and innovation-implementation projects;
- elements of the national innovation system described by Levitskaya (2018), including research institutions, universities, and a limited number of technology parks.

Levitskaya (2018) underlines that despite the formal presence of several institutions, coordination remains weak and mechanisms for science-business-government cooperation are fragmented (Levitskaya, 2018, p. 204). SMEs often do not perceive state institutions as real partners in sustainability and innovation.

3. *Financial architecture and access to resources*

Moldova's financial support model differs sharply from the EU and US:

- the banking system is conservative; credit is expensive; collateral requirements are high;
- venture capital and business-angel activity are nearly absent;
- guarantee schemes and risk-sharing mechanisms are underdeveloped;
- grant support largely comes from international donors, EU programmes, and global institutions.

AITT was one of the few attempts to establish innovation-oriented financing. Between 2005–2010, it funded 181 projects, prioritising agricultural biotechnology, soil fertility, and food security (107 projects), with others in biomedicine, pharmaceuticals, energy efficiency, new materials, and nanotechnologies. However, Levitskaya (2018) notes that funding volumes were limited and SME capacity to commercialise results remained low (Levitskaya, 2018, p. 205).

4. *Innovation potential and international competitiveness*

According to World Economic Forum indicators cited in Levitskaya (2018), Moldova ranks below the top 100 countries in innovation and competitiveness, evidencing weak national innovation capacity. In this environment, SMEs:

- have limited access to modern technologies;
- are rarely initiators of applied research;
- participate minimally in long-term innovation projects;
- rely on imported ready-made solutions rather than their development.

This contrasts sharply with Japanese and American models, where SMEs are core innovation drivers (Nishiguchi, 1994; Wang & Qu, 2023).

5. *Sustainability transformation and integration challenges*

In recent years, the Republic of Moldova has increasingly incorporated sustainability-oriented priorities into national development strategies and SME-support policies, particularly within the framework of European integration and alignment with EU economic standards. However, the practical implementation of sustainability-oriented transformation remains limited.

The main challenges include:

- low SME participation in green-transition programmes;
- insufficient digitalisation of business processes;
- limited implementation of circular-economy practices;
- weak integration into sustainable value chains;
- restricted access to financing for green and technological modernisation.

At the same time, EU-supported initiatives and national development programmes create opportunities for strengthening SME sustainability through energy-efficiency measures, digital transformation, innovation support, and integration into regional cooperation networks.

The transition toward sustainability-oriented SME development in Moldova therefore requires not only formal regulatory harmonisation but also the creation of effective institutional and financial mechanisms capable of supporting technological adaptation, innovation integration, and long-term competitiveness.

6. *Territorial and structural dimension*

Geographically, the Moldovan SME sector:

- is concentrated in cities and peri-urban zones;
- is weakly represented in rural, remote, and depopulating regions;
- plays a limited role in regional cluster formation.

Stucalova (2014) notes that regional SME-support policy is weakly institutionalised, and SMEs contribute little to reducing territorial disparities (Stucalova, 2014, p. 262). Unlike the EU, SMEs in Moldova do not fully function as instruments of regional cohesion.

7. *Summary characteristics of Moldova's sustainability model.*

The core elements can be condensed into Table 5. Thus, unlike the EU, the US, and Japan, where SME sustainability models rely on strong institutional, financial, and innovation infrastructures, the Moldovan model is characterised by:

- formal borrowing of classification and regulatory approaches;
- limited practical implementation of support mechanisms;
- low innovation and export capacity of SMEs;
- structural dependence on survival-oriented microbusinesses.

Table 5. Key Characteristics of the SME Sustainable Development Model in the Republic of Moldova

Component	Content	Sources
Classification	Formally aligned with EU model (micro, small, medium by employment, turnover, assets); dominance of microenterprises	LEGE RM nr. 259-XV (2004); Levitskaya (2018)
Institutional framework	ODIMM, AITT, Ministry of Economy, elements of national innovation system; weak coordination and policy fragmentation	Levitskaya (2018); Stucalova (2014)
Financial support	Limited credit access; high borrowing costs; weak guarantee mechanisms; limited innovation funding through AITT	Levitskaya (2018)
Innovation component	Low SME innovation activity; weak commercialisation; limited participation in international projects	Levitskaya (2018); WEF (as cited in Levitskaya)
Regional dimension	SME concentration in few centres; weak role in reducing regional disparities; absence of strong clusters	Stucalova (2014)
Sustainability orientation	Early-stage integration of green transition, digitalisation, and EU-supported sustainability initiatives; limited practical implementation	Moldova European 2030; OECD (2021)
International integration	Low participation in global value chains; weak export potential; dependence on imported technologies	Levitskaya (2018)

Source: developed by the author

At the same time, the focus on European integration and the adaptation of EU best practices creates a potential window of opportunity for transforming the model – strengthening financial mechanisms, developing innovation programmes, increasing the role of SMEs in regional policy, and integrating them into international value chains.

Conclusion

The comparative analysis of SME sustainable development models in the European Union, the United States, Japan, and the Republic of Moldova demonstrates that SME sustainability depends on the interaction between institutional architecture, innovation integration, and financial-support mechanisms. Classification parameters and regulatory environments additionally influence differences in growth potential, competitiveness, and the ability of firms to withstand external shocks.

The EU, US, and Japanese models demonstrate different but internally coherent approaches to SME sustainability. The European model is based on institutional harmonisation, coordinated financial instruments, and integration into sustainability-

oriented programmes. The American model relies on entrepreneurial flexibility, technological innovation, and market competition. The Japanese model ensures SME sustainability through long-term industrial coordination, subcontracting systems, and integration into vertically organized production and innovation networks.

In contrast, the Republic of Moldova demonstrates a significant gap between formal regulatory convergence with European standards and the actual functioning of the SME sector. Moldovan SMEs continue to face limited financial access, weak innovation infrastructure, insufficient integration into international value chains, and structural dependence on low-productivity microenterprises.

The study confirms that sustainable SME development cannot be achieved through isolated policy instruments but requires coherent institutional coordination between regulatory systems, innovation infrastructure, financial mechanisms, and long-term development priorities. In advanced economies, sustainability emerges where institutional support, innovation systems, financial mechanisms, and long-term strategic coordination operate as an integrated institutional ecosystem. For transition economies such as Moldova, the key challenge remains the transformation of fragmented support mechanisms into a coherent sustainability-oriented development system.

From a practical perspective, the findings indicate several priority directions for strengthening SME sustainability in the Republic of Moldova:

- development of green-transition and energy-efficiency programmes for SMEs;
- expansion of digitalisation and technological-modernisation instruments;
- support for SME participation in sustainable value chains and regional cooperation networks;
- strengthening innovation-oriented financing and guarantee mechanisms;
- integration of sustainability criteria into national SME-support policies.

At the same time, the research has several limitations. The study is based primarily on comparative institutional and qualitative analysis and does not include econometric modelling or large-scale quantitative assessment of SME sustainability indicators. In addition, the article focuses on selected international models and therefore does not cover the full diversity of SME development systems in other economic contexts.

Future research may further examine the impact of digital transformation, green-transition policies, circular-economy practices, and sustainability-oriented innovation mechanisms on SME development in transition economies, including the Republic of Moldova.

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MONETARY – FISCAL POLICY COORDINATION AND ECONOMIC GROWTH IN THE REPUBLIC OF MOLDOVA

Domnita ISAC*¹

Abstract: This study analyzes the coordination of fiscal and monetary policy in the Republic of Moldova to maintain financial stability and promote sustainable economic growth. Since the 1960s, there has been a continuous debate about the appropriate policy mix to achieve economic goals such as high employment and low inflation. It is well known that changes in aggregate demand and supply can lead to fluctuations in production and employment. As a result, monetary and fiscal policymakers can address these fluctuations using the instruments at their disposal to stabilize the economy. After the pandemic crisis, the monetary authority made a considerable contribution to bringing inflation close to its target, maintaining price stability and safeguarding people's purchasing power. The analysis applies annual macroeconomic data, a correlation matrix, Ordinary Least Squares (OLS) models with Autoregressive Distributed Lag (ARDL), and trend analysis on monetary policy variables (broad money, lending rates, exchange rates) and fiscal policy variables (government expenditure, tax revenue) over the period 1991-2024. These empirical results indicate that the fiscal ARDL model provides the highest explanatory power, while tax revenue ($\beta \approx 1.2151$, $p\text{-value} < 0.0014$) depicts a positive and statistically significant relationship with GDP growth. Prior to estimation, Augmented Dickey-Fuller (ADF) tests were conducted to check stationarity, and Variance Inflation Factor (VIF) diagnostics were used to assess multicollinearity. The results highlight the importance of efficient tax administration and fiscal capacity. Policy coordination would improve the government's ability to respond to economic fluctuations and support sustainable long-term growth.

Keywords: policy coordination, economic growth, automatic stabilizers, fiscal policy, monetary policy.

JEL Code: E52, E62, G18, I28, F43, O42

UDC: [338.23:336.74+336.22]:338.1(478)

Introduction

Over the last few decades, financial stability has received considerable attention from financial institutions, politicians, and the public in general; similarly, attention has focused on concerns about economic slowdowns that have occurred in almost every part of the world. To ensure sustainable economic growth and development, numerous statistical studies have found a strong association between macroeconomic stability and these outcomes. Financial stability is important for the development of the private sector and growth. Without financial stability, there would be lower domestic and foreign investment, resource misallocation, and no capital inflow. In fact, econometric evidence shows a positive correlation between financial stability and economic growth.

Sources of macroeconomic instability can include external shocks. Therefore, it is essential for any economy to consider the following elements in order to maintain macroeconomic stability: (1) low and stable inflation, (2) debt sustainability, (3) appropriate exchange rate policies, (4) sufficient international reserves, and (4) policy credibility.

This study's objective is to evaluate the relationship between monetary policy, fiscal policy, and economic growth in Moldova over the period 1991-2024. The research aims to

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identify which channels are more closely linked to economic growth, highlighting the importance of macroeconomic policy coordination while maintaining financial stability.

Monetary policy represents measures or a set of instruments designed by the monetary authorities to regulate the value, supply, and cost of money – central banks make money cheaper at a particular point in time, depending on the conditions of the economy. Besides its primary objective of price stability, monetary policy also aims to enhance economic growth and financial stability.

Fiscal policy is the process by which the government uses public expenditure, debt, taxation, and other revenues to influence economic activity and to achieve national goals or objectives such as price stability, full employment, economic growth, and balance-of-payments equilibrium. Neutral public financial fiscal policies are implemented when the economy is neither in recession nor in a boom period, and the budget is approximately balanced, so there is no significant change that might influence the level of economic activity. Expansionary public financial policies mean that public expenditure exceeds public revenue and involve a higher budget deficit, usually adopted during periods of economic recession. Contractionary public financial policies imply a smaller budget deficit, with public expenditure lower than tax revenue.

Fiscal policy and monetary policy aim to achieve macroeconomic objectives. The IS/LM model is one of the models used to depict the effect of policy interactions on aggregate output and interest rates. These two policies are complementary, or act as substitutes for each other, for achieving macroeconomic goals; if the fiscal authority raises taxes or cuts spending, then the monetary authority should tighten monetary conditions.

A stable and predictable economic environment contributes substantially to social and economic welfare. In addition, in the short run, households prefer economic stability and stable incomes that allow them to maintain the same consumption over time; in the long run, unnecessary economic fluctuations can reduce growth.

The debate between Keynesians and monetarists often focused on the effectiveness of policy instruments. According to Friedman's view, given the limited knowledge available about the economic system, it is too difficult to address short-run fluctuations; the economic system is ultimately self-stabilizing. Given that fiscal policy can sometimes limit the central bank's decision-making, making it difficult to stabilize the price level, some economists have expressed different views on the roles of fiscal and monetary policies in an economy's stabilization process.

Fiscal policy operates through the so-called “*automatic fiscal stabilizers*” to sustain aggregate demand during economic downturns and to moderate economic activity during periods of strong growth. Automatic stabilizers' operations consist of changes in fiscal policy that stimulate aggregate demand when the economy goes into a recession, and usually do not require any short-term decisions or deliberate action by policymakers; the size of tax collections and transfer payments is directly linked to the cyclical position of the economy. Automatic stabilizers have different features, but the most important is that they operate symmetrically over the economic cycle, moderating overheating during booms and

supporting economic activity during downturns. When the economy goes into a recession, the amount of taxes collected by the government falls automatically, because personal income tax depends on households' income, the payroll tax depends on workers' earnings and the corporate income tax depends on firms' profits, as a result the government's tax revenue falls as well, people and firms pay less tax automatically, even though tax rates stay the same. This "automatic tax cut," which means lower tax payments caused by lower income, not by new government policy, means a decrease in aggregate demand, softens the recession, and reduces the magnitude of economic fluctuations. Another advantage of automatic stabilizers, especially when the economy goes into a recession, is government Social Security spending for laid-off workers. The unemployment insurance benefits, welfare benefits, and other forms of income support tend to increase, and this automatic rise in government spending stimulates aggregate demand (van den Noord, 2000) precisely when aggregate demand is insufficient to maintain full employment. Similarly, arguments have been tested empirically by van den Noord (2000), who measured the automatic stabilizer using the unemployment benefit (UB) in reducing cyclical volatility in the 1990s.

The unemployment insurance (UI) system was introduced in many countries during the 1930s, especially in the United States as part of the New Deal, following the Great Depression. Economists who advocated this policy did so not only for social protection but also, in part, because of its stabilizing power.

There is another tool of fiscal policy that can ensure macroeconomic stabilization in the short run, usually referred to as "*discretionary fiscal policy-making*", whereby governments actively adjust spending or taxes in response to changes in economic activity. Compared with automatic stabilizers, discretionary policies can undermine the health of budgetary positions, as governments find it easier to cut taxes and raise spending during periods of low growth, with a negative effect on long-run economic growth, since high taxes reduce incentives to work, invest, and innovate. Another drawback of discretionary fiscal policy is that tax changes usually go through an approval process (must be adopted by Parliament), and their implementation typically lags budget-setting processes. Most economists agree that implementation lags reduce policy effectiveness, and believe the economy would be more stable if policymakers avoided them. Therefore, discretionary fiscal policies aimed at aggregate demand management have tended to be pro-cyclical, thereby destabilizing the economy. They often become effective only after cyclical conditions have already reversed, increasing the macroeconomic fluctuations.

The purpose of this study is to test the following hypothesis for the Republic of Moldova economy:

H₁: Are fiscal or monetary policy variables statistically significant in the relationship with economic growth?

H₂: What are the effects of macroeconomic policy in static and dynamic (lagged) econometric specification?

Literature Review

In the literature, there is no consensus on the relative power of fiscal and monetary policy to affect economic growth; some researchers advocate for monetary policy (Batten & Hafer, 1983; Elliot, 2009), while others consider fiscal policy to have a greater impact on economic growth (Olaloye & Ikhide, 1995).

The relevance of fiscal and monetary policy roles began in the 1980s, with a focus on the relationship between monetary and fiscal authorities. Sargent and Wallace (1981) argued that both authorities are relevant and specific in a way: the measures taken in either area inevitably depend on those of the other (Wyplosz, 1999). Providing a policy mix variant can be favorable for the country's economic activity because, without efficient policy coordination, it can create financial instability, leading to high interest rates, exchange rate pressures, rapid inflation, and negative effects on economic growth. Afonso et al. (2019) provide further evidence that when the government has excessive public debt or a budget deficit, this lack of fiscal discipline limits the effectiveness of the central bank rule. Alternatively, when the government increases spending through public investment, it can lead to a rise in the inflation rate; in response, the central bank, which is responsible for safeguarding price stability, may tighten monetary policy if fiscal policy is too accommodative. Therefore, many studies emphasize the importance of long-term commitment to price stability as an objective of government and monetary authorities' macroeconomic policy to improve government discipline and monetary policy performance. In addition, it contributes to better budgetary results and sustainable economic growth in a context of price stability and viable external accounts.

To accelerate sustainable economic growth, Bokreta and Benanaya (2016) argue that fiscal policy has a stronger impact than monetary policy, particularly government expenditure, which has a positive effect. While the tax rate was negative, inflation had minimal impact on economic growth.

In Nigeria, for example, some studies concluded that monetary policy was more effective than fiscal policy. The authors concluded that monetary policy is more effective and achieves the desired goals when fiscal discipline is imposed in public finance, and there are no fiscal imbalances. Adegioriola (2018) has also examined the effectiveness of monetary and fiscal policy instruments, and findings indicated that fiscal policy is more effective than monetary policy. The study indicated a positive relationship between the money supply, government expenditure, and revenue, while the interest rate and the budget deficit were negatively related to economic growth. A similar conclusion was reached by Ehikioya, Uduh, and Edeme (2018) when they investigated the impact of fiscal and monetary policies on SME growth, and the coefficients indicated that fiscal policy was more effective and efficient than monetary policy in promoting SMEs' output growth. Sanni, Amusa, and Agbeyangi (2012) found that neither policy is superior to the other. Falade and Folorunso (2015) examined the same set of policy instruments to determine the appropriate policy mix that may enhance economic growth. The paper presented an appropriate policy instrument

mix for promoting economic growth in the short and long run, comprising current levels of government revenue, the money supply, the exchange rate, and the domestic interest rate. The study by Uzoamaka, Emmanuel, and Awa (2019) concluded that the monetary policy rate and fiscal policy, proxied by government recurrent expenditure, had not significantly affected economic growth. The results of Medee and Nenbee (2011) on the effect of fiscal policy on economic growth showed that government expenditure has not significantly affected economic growth, whereas increases in capital inflows have.

Hussain (1982) and Chowdhury (1986) identified that both fiscal and monetary policy variables are significant in all regression equations. However, they concluded that changes in government expenditures exert a broader and more predictable impact on the economies of Pakistan and Bangladesh than changes in the money stock or the monetary base.

Jalles (2024) investigated variation in countercyclicality across countries, explaining the differences between discretionary fiscal policy and automatic stabilizers in emerging market and developing economies. Their results indicate that the countercyclicality of fiscal policy has increased in recent years, especially in emerging market economies, and that social benefits represent the countercyclical component of fiscal policy, operating through expenditure. Jalles (2024), Brandao-Marques (2020), and Renzhi & Beirne (2024) pointed out that in the case of emerging and developing economies (EMDEs), the monetary and fiscal policy framework, in order to strengthen the transmission mechanism, the most important is financial development, among other characteristics such as government size, institutional quality, financial dollarization, trade openness, or capital flow.

An interesting case study was conducted by Afonso (2024), using panel data analysis of 28 European Union (EU) countries and empirically analyzing the interaction between monetary and fiscal policy in the EU. Moreover, the author split the countries into two subgroups: euro-area countries (member countries that adopted the euro as their currency) and non-euro-area countries (those that still maintain their national currency). Hence, for non-euro-area countries, there is a statistically significant relationship between the monetary reaction function and the output gap. If the output gap (as an independent variable) increases, the short-term nominal interest rate rises. This demonstrates that monetary policy has a strong role in influencing the business cycle and ensuring sustainable economic growth. In contrast, government fiscal policy is more responsible for the sustainability of public debt.

Cevik (2014) examined the interactions between fiscal and monetary policy rules in transition and emerging European economies; for example, in Estonia, monetary and fiscal policy were passive, and on the eve of transition, in 1997-98, fiscal policy became active. In Hungary, the policy mix was expansionary in 2007-2009, while Slovenia and the Slovak Republic generally followed a passive monetary policy.

The results of Simorangkir and Adamanti (2010), however, showed that the combination of fiscal and monetary expansion drives economic growth in Indonesia. Similarly, the results of Mahmood and Sial (2011) showed that monetary and fiscal policies play a significant role in Pakistan's economic growth.

Lora and Montiel (2010) found that exchange rate movements, among other factors, explain inflation in Argentina, Brazil, and Israel, and other studies have found similar conclusions: Kamin (2010) for the United States, Nnanna (2002) for Nigeria, and Lu and Zhang (2003) for China.

The review of existing literature from developed countries indicates general support for monetary policy over fiscal policy, while the consensus is that there should be a mix of policies in developed countries to ensure macroeconomic stability and ultimately economic growth. However, the issue of a suitable policy mix, as many authors have suggested, remains unaddressed. Ibrahimov et al. (2019) examined stable growth across 7 European countries (Latvia, Lithuania, Moldova, Poland, Ukraine, Georgia, and Belarus) that had similar economic situations at the time of independence. The authors found that the global macroeconomic stability index is statistically significant, meaning that a 1% increase in the index is associated with a 0.0148% increase in GDP growth. This pattern applies to Moldova as well. Therefore, current studies fill the gap by examining the appropriate policy that has significant leverage to determine economic growth, independent of global fluctuations.

Methodology

In the context of this study, it is essential to establish the importance of both fiscal and monetary policy for economic stabilization. Hence, it is necessary to consider a proper balance and suitable coordination of policy measures. The study examines the impact of monetary and fiscal policy on economic growth in the Republic of Moldova, using time-series data from the National Bank of Moldova, the World Bank, and the National Bureau of Statistics, covering the sample period from 1991 to 2024. Correlation matrices, simple linear regression, and trend analysis are applied to variables such as broad money supply, exchange rate, and interest rate, which indicate the monetary policy side, and to government expenditure and tax revenue, which represent tools of fiscal policy. GDP growth data are used as the dependent variable. To describe the relationship between the independent and dependent variables, a simple regression coefficient has been used. Moreover, this analysis seeks to identify a positive and significant impact on economic growth based on historical data (Figure 1) of monetary and fiscal indicators. Because it has been used as a simple linear regression, it is also intended to establish a specific model with multiple variables. Instead, it has determined the influence of each variable individually, and the following approach drives the function:

$$Y_t = f(MP_t) \quad (1)$$

Where Y is the aggregate economic activities (GDP), and MP presents the monetary policy, which comprises broad money, lending rates, and the exchange rate. Considering equation (1) from above, it was formulated as follows:

$$GDP_t = f(\text{Broad Money [BMS]}) \quad (2a)$$

$$GDP_t = f(\text{Lending Rates [LNT]}) \quad (2b)$$

$$GDP_t = f(\text{Exchange Rate [EXR]}) \quad (2c)$$

Equation (2) is transformed in this way:

$$GDP_t = \alpha + \beta * \text{Broad Money}_t + \varepsilon_t \quad (3a)$$

$$GDP_t = \alpha + \beta * \text{Lending rates}_t + \varepsilon_t \quad (3b)$$

$$GDP_t = \alpha + \beta * \text{Exchange rate}_t + \varepsilon_t \quad (3c)$$

For Fiscal Policy, the same approach has been used; the aim is to determine the significant role of each fiscal policy variable in enhancing output growth in the Republic of Moldova. The function is given:

$$Y_t = f(FP_t) \quad (3)$$

Where Y represents economic growth (GDP), and FP is fiscal policy, represented by two variables: government expenditure (GE) and taxation (TX). In contrast, t represents the time period, and this becomes as follows:

$$GDP_t = f(\text{Government Expenditure [GE]}) \quad (4a)$$

$$GDP_t = f(\text{Taxation [TX]}) \quad (4b)$$

Equation (4) is transformed in this way:

$$GDP_t = \alpha + \beta * \text{Expense}_t + \varepsilon_t \quad (5a)$$

$$GDP_t = \alpha + \beta * \text{Taxation}_t + \varepsilon_t \quad (5b)$$

Where α represents the intercept, β is the coefficient of the explanatory variables for monetary and fiscal policy, and ε denotes the error term; the variables are expected to be positively related to the dependent variable.

Results and Discussion

The data depicted in Figure 1 allows us to analyse the trend in the rate of economic growth of the Republic of Moldova in the past 30 years, where there have been fluctuations in the rate of GDP growth between -15% rate growth and +15%, except the period in late 1990s where it is notable to mention the level of broad money associated with even a stronger negative and volatile growth. A similar pattern was observed during the COVID-19 pandemic, with Moldova's economic growth rate decreasing to 8.3% in 2020 and increasing to 13.9% in 2021. The exchange rate over the last decade was stable, with a notable exception: a sharp depreciation in 2020 during the pandemic crisis, reflecting financial stress and recession. In the case of the Republic of Moldova, which is a dependent import country, exchange rate depreciation is usually associated with imported inflation, and sometimes influenced by output decrease (short-term).

The growth rate of government expenditure in Moldova peaked in the recession year of 2009 at 38.1% and decreased in 2010 to 29.1%. Since then, there have been a series of upward and downward fluctuations, with gradual increases in 2021 and 2023 to 29.9% and 34.5%, respectively.

In Figure 1, the data show that the growth rate of the money supply in the period under review peaked at 54.1% in 2009, then declined to 43.0% in 2010, and fluctuated thereafter. In 2024, it again accounted for the highest growth rate of the money supply, at 52.4%.

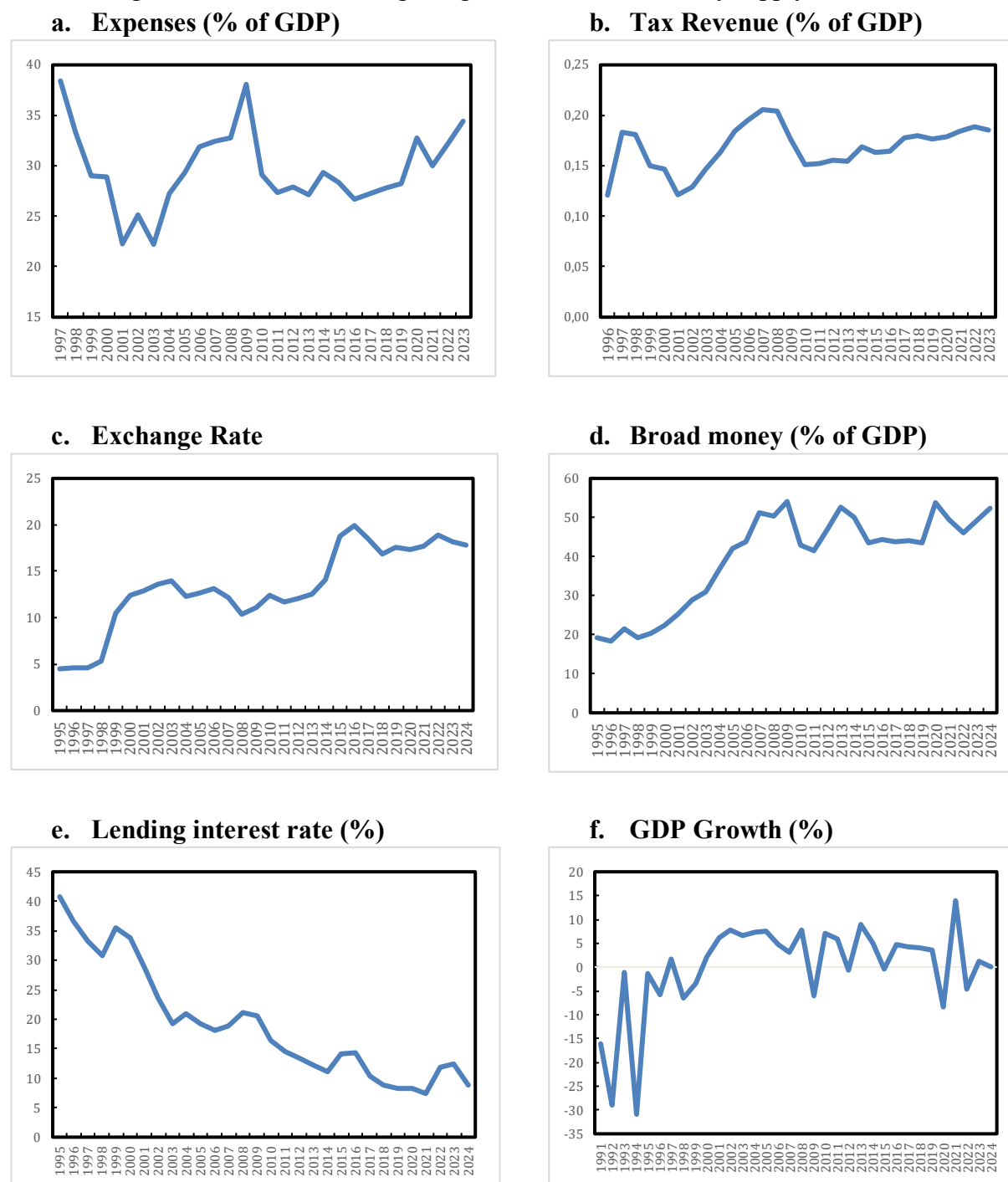


Figure 1. Monetary and Fiscal Policy indicators over the 1991-2024 period, annual data

Sources: National Bank of Moldova, World Bank, National Bank of Statistics

The information in Table 1 shows the strongest relationship between broad money and lending interest rates in the Republic of Moldova. This negative correlation (-87%) indicates that

when broad money increases, interest rates fall, which aligns with classic liquidity effects in economic theory: an increase in the money supply lowers the cost of credit.

Another strong positive correlation is between money supply growth and an increase in the exchange rate at 65%, implying that under monetary expansion, currency depreciation typically follows, which is also consistent with monetary theory in the case of small open economies.

In the Republic of Moldova, the main tool used by monetary authorities when aggregate demand is inadequate to ensure full employment is to expand the money supply, which is directly associated with lowering the lending rate and exchange rate movements. These monetary expansion measures are highly effective in the short term, ensuring macroeconomic stability, but there is little evidence of long-term economic growth, even in a stable economy.

Continuing with the broad money effect on the economy, from a fiscal policy perspective, there is also a strong correlation between an increase in money supply and an increase in tax revenue. For Moldova's economy, it is evident that policy coordination and financial conditions move together. When the central bank expands the money supply, this also increases tax revenue, implying a strong automatic stabilizer effect and possibly no need for discretionary fiscal policy. In the regression analysis, when these variables were used together, strong multicollinearity was observed, with a significant p-value at the 5% level. However, even if this works in the short term and is effective for macroeconomic stability, there is no strong evidence that it correlates with long-term economic growth.

Table 1. Correlation Matrix

	BMS	EXR	y	INT	TX	GE
BMS	1					
EXR	0.6518	1				
y	0.2017	0.2308	1			
INT	-0.8757	-0.8235	-0.2887	1		
TX	0.6670	0.7848	0.0404	-0.8166	1	
GE	0.2840	-0.0729	0.0230	-0.2400	0.2361	1

Source: Author compilation using Microsoft Excel

Therefore, Figure 2 below shows the regression analysis, and none of them show a significant p-value at the 5% level in relation to economic growth. Each variable, used individually, is not a strong predictor of GDP growth; it influences financial conditions but is insufficient to support growth. Effects may depend on factors such as long-term financial stability, demand, and external shocks.

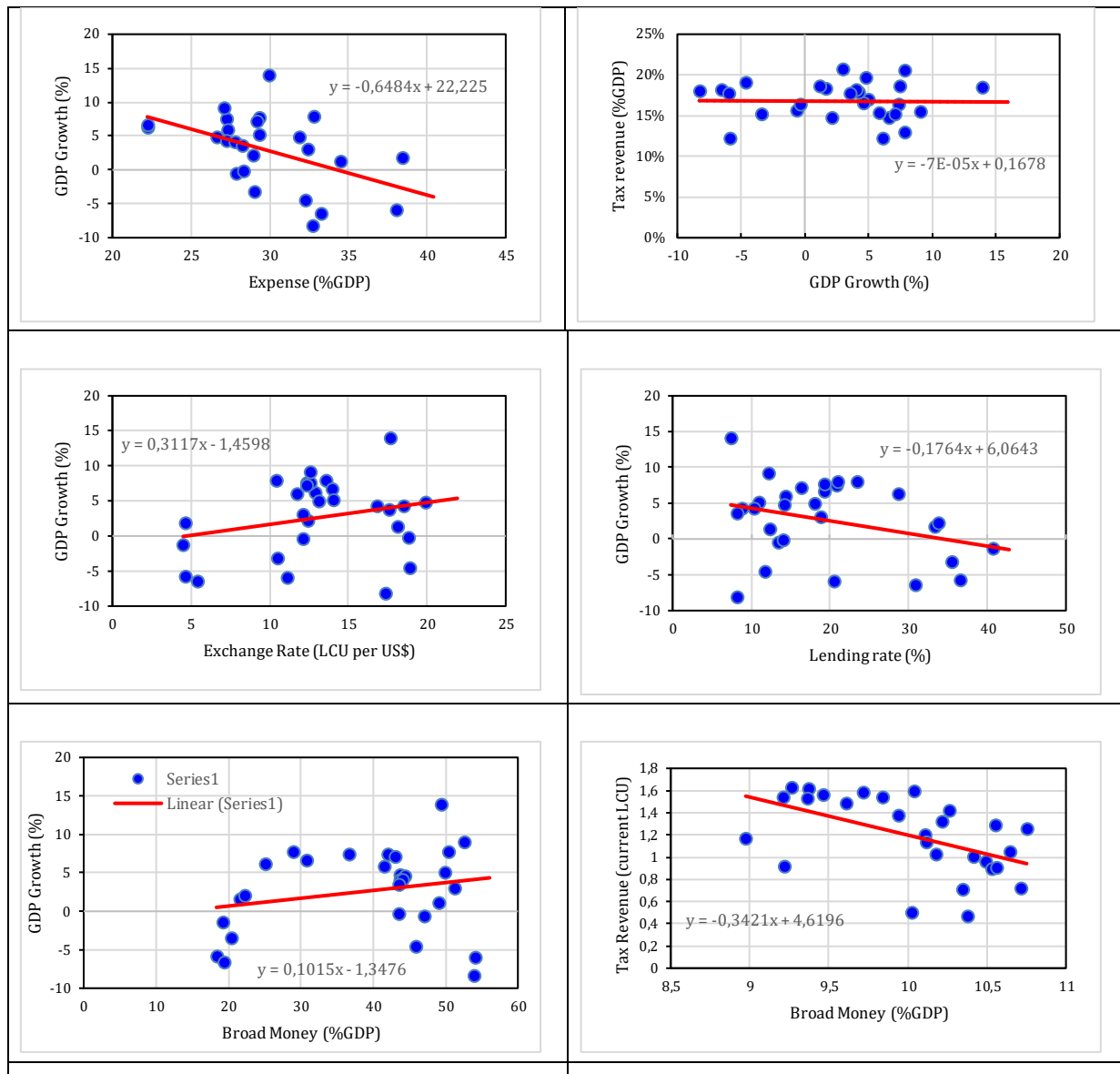


Figure 2. Results of monetary and fiscal policy model

Source: Authors' estimation using Microsoft Excel

Panel Results

a) Baseline framework of monetary and fiscal policy using static OLS model

The model was estimated using the following formula:

$$GDP\ Growth_t = \beta_0 + \beta_1 \Delta BMS_t + \beta_2 LNT_t + \beta_3 EXR_t + \varepsilon_t \quad (6)$$

$$GDP\ Growth_t = \beta_0 + \beta_1 \Delta TX_t + \beta_2 EXP_t + \varepsilon_t \quad (7)$$

The baseline regression results in Table 3, for monetary policy, reveal that none of the explanatory variables are statistically significant in explaining short-run transmission effects, and have a negative estimated relationship with GDP growth. The monetary variables explain only approximately 5.2% of the variation in GDP growth. The baseline regression for fiscal policy indicates a stronger relationship, with a positive coefficient on

tax revenue but weak statistical significance at the 10% level ($p = 0.1010$). This means that a 1% increase in tax revenue is associated with a 0.63% increase in GDP growth. These results may indicate that efficient resource allocation can improve budget planning and infrastructure financing for the private sector. Government expenditure is negatively associated with GDP growth but is statistically insignificant ($p = 0.2269$). The fiscal model has stronger explanatory power in the short run, with $R_2 = 0.143$, indicating that fiscal dynamics account for approximately 14.3% of the variation in GDP.

Table 2. The influence of monetary and fiscal policy on economic growth

	Baseline Monetary Framework	Baseline Fiscal Framework
(Intercept)	0.5724	3.3277
	(0.4404)	(0.2286)
d_BMS_log	-0.0878	
	(0.9711)	
d_LINT_log	-1.0478	
	(0.5068)	
Exchange.Rate_log	-0.5729	
	(0.3843)	
d_TX_log		0.6355*
		(0.1010)
Expense_shareGDP_log		-2.2739
		(0.2269)
Num.Obs.	29	29
R2	0.052	0.143
R2 Adj.	-0.062	0.077
* $p < 0.11$, ** $p < 0.05$, *** $p < 0.01$		

Source: Econometric estimation results generated using R software.

b) Monetary and fiscal policy with ARDL model

When comparing the results, we could observe methodological superiority of dynamic specifications (ARDL) over traditional static estimates (OLS). For example, fiscal ARDL performs better than fiscal OLS; explanatory power rises sharply from $R_2 = 0.143$ to $R_2 = 0.474$, meaning that almost half (47.4%) of the variation in Moldova's GDP growth rate is explained by the dynamics of fiscal policy. The strongest coefficient was for tax revenue, with a significant p-value of 0.0014 (<5%). However, the results might reflect both fiscal transmission effects and endogenous *automatic stabilizers* dynamics, meaning that higher economic activity increases employment, consumption, and profits; in this case, fiscal revenue increases as well, and causality runs both ways simultaneously, meaning the regressor is endogenous - when GDP rises, VAT revenue collection also rises through consumption, profits, and wages. Monetary policy indicates limited effects on GDP growth for Moldova's economy in static monetary OLS specification and for dynamic ARDL monetary model, none of the monetary coefficient (broad money, lending rate or exchange rate) are statistically significant, there could be a limited bank intermediation, shallow financial

markets and not a strong credit channel that might distort the monetary transmission mechanism of central bank policy rate to firms or real economy activity.

Table 3. Static OLS model and ARDL results for the Republic of Moldova

	Monetary (Static OLS)	Monetary (2- Year ARDL)	Fiscal (Static OLS)	Fiscal (2- Year ARDL)
(Intercept)	0.5724 (0.4404)	-0.3526 (0.9271)	3.3277 (0.2286)	5.5403 (0.2951)
d BMS log	-0.0878 (0.9711)			
d LINT log	-1.0478 (0.5068)			
Exchange.Rate log	-0.5729 (0.3843)	-1.8225 (0.4204)		
L(GDP_Growth_log, 1)		0.0331 (0.9221)		-0.0580 (0.8113)
L(GDP_Growth_log, 2)		-0.3258 (0.3530)		-0.2323 (0.3323)
Broad.Money_shareGDP_log		-1.0409 (0.7344)		
L(Broad.Money_shareGDP_log, 1)		4.4075 (0.2107)		
L(Broad.Money_shareGDP_log, 2)		-3.2713 (0.2155)		
Lending.Int_shareGDP_log		2.1604 (0.3053)		
L(Lending.Int_shareGDP_log, 1)		-2.7028 (0.3217)		
L(Lending.Int_shareGDP_log, 2)		1.1408 (0.5441)		
L(Exchange.Rate_log, 1)		2.4019 (0.4416)		
L(Exchange.Rate_log, 2)		-0.3586 (0.8809)		
d TX log			0.6355* (0.1010)	
Expense_shareGDP_log			-2.2739 (0.2269)	-2.2652 (0.2239)
Tax.Revenue_shareGDP_log				1.2151*** (0.0014)
L(Tax.Revenue_shareGDP_log, 1)				0.5688 (0.7924)
L(Tax.Revenue_shareGDP_log, 2)				0.2500 (0.9099)
L(Expense_shareGDP_log, 1)				0.7084 (0.7605)
L(Expense_shareGDP_log, 2)				-0.5925 (0.7884)
Num.Obs.	29	28	29	28
R2	0.052	0.222	0.143	0.474
R2 Adj.	-0.062	-0.313	0.077	0.252

* $p < 0.11$, ** $p < 0.05$, *** $p < 0.01$

Note. Static OLS models evaluate instantaneous impacts, whereas ARDL models capture the distributed macroeconomic policy effects over a 24-month transmission horizon in the Republic of Moldova.

Source: Econometric estimation results generated using R software

Stationarity

The null hypothesis (H0) assumes the presence of a unit root (non-stationary path), where the critical threshold for significance is set at the standard 5% level ($p < 0.05$); the calculations are restricted to a maximum sequence of 2 lag iterations to maintain methodological alignment with the primary policy models.

The empirical results from the Augmented Dickey-Fuller (ADF) diagnostics in Tabel 2, reveal that some variables demonstrate strict level stationarity, for example GDP growth ($p = 0.0051$), lending rate ($p = 0.0392$), exchange rate ($p = 0.0100$) and expenses ($p = 0.0100$) where the null hypothesis of a unit root is strongly rejected at the 5% significant level, this variables do not have stochastic trend, and can easily be integrated into the OLS model in their baseline log level and there is no need for any differencing. Conversely, other variables, such as broad money ($p = 0.7120$) and tax revenue ($p = 0.9812$), are non-stationary because ADF diagnostics fail to reject the presence of a unit root. In order to avoid a spurious regression, these series were converted into I(1) metrics via first differencing transformation ($\Delta \log$), and the model determines how changes in broad money, for instance, would influence the economic growth.

Table 4. Stationary testing using Augmented Dickey-Fuller (ADF)

Variable	ADF_t_Stat	P_Value	Lag_Order	Stationarity_Status	Order
GDP_Growth_log	-3.6412	0.0051	2.0000	Stationary	I(0)
Lending.Int_shareGDP_log	-3.7145	0.0392	2.0000	Stationary	I(0)
Exchange.Rate_log	-5.4123	0.0100	2.0000	Stationary	I(0)
Expense_shareGDP_log	-4.2104	0.0100	2.0000	Stationary	I(0)
Broad.Money_shareGDP_log	-1.5210	0.7120	2.0000	Non-Stationary	I(1)
Tax.Revenue_shareGDP_log	-0.3115	0.9812	2.0000	Non-Stationary	I(1)

Source: Econometric estimation results generated using R software.

Multicolliniarity

The multicollinearity diagnostic indicates the absence of severe linear dependence among the explanatory variables, which represents an important diagnostic outcome for the reliability of coefficient estimation in the macroeconomic policy model; in this sense, the following formula was used:

$$VIF_t = \frac{1}{1-R_t^2} \quad (8)$$

Given the VIF range of $1.44 \leq VIF \leq 2.90$, we conclude that the insignificant coefficients are unlikely to be primarily due to multicollinearity.

In order to avoid the distortion in precision of our Ordinary Least Squares (OLS) estimators, the test for linear dependencies among the explanatory variables has been performed, because we applied log-differencing ($\Delta \ln$) to series I(1); it stripped out the underlying time trend, we executed a Variance Inflation Factor (VIF) diagnostic as well. The

empirical results indicate that the explanatory variables are uncorrelated; we assumed that the variables operate through entirely independent transmission channels.

Table 5. Variance Inflation Factor (VIF) analysis

Macroeconomic_Variable	Variance_Inflation_Factor_VIF	Tolerance_Level_1_VIF
Broad.Money_shareGDP_log	1.8541	0.5393
Lending.Int_shareGDP_log	2.1204	0.4716
Exchange.Rate_log	1.4423	0.6933
Tax.Revenue_shareGDP_log	2.8951	0.3454
Expense_shareGDP_log	2.6412	0.3786
<i>Note: VIF values are substantially below the conventional econometric threshold of 5.00, indicating the absence of severe multicollinearity in the historical estimation paths for Moldova.</i>		

Source: Econometric estimation results generated using R software.

Multicollinearity is approximately zero in the monetary framework, where VIF scores are between 1.4423 and 2.1204, and in the fiscal framework, where VIF scores are 2.8951 and 2.6412 for both predictors. Because these diagnostics are significantly below the standard conservative threshold of 5.0, the presence of collinearity distortion is rejected.

Limitation

The limitations of this study are the small number of observations and the fact that the macroeconomic variable covers only the post-transition period after 1995. By definition, ARDL models are asymptotic techniques and have strong results on large samples. Additional concerns include omitted variables that are relevant to economic growth, such as remittances, GDP evolution in the European Union (the main trading partner), and external financing. Because these factors are not explicitly incorporated into the estimated models, part of their impact may be erroneously absorbed by variable fiscal and monetary coefficients.

Conclusions

The empirical evidence of this study emphasizes the core implication of macroeconomic policy in the Republic of Moldova: the data show a robust impact of tax revenue ($\beta = 1.2151$, $p < 0.0014$), indicating that fiscal position consolidation is the primary engine of short-term economic growth.

Since fiscal policy might currently exert a stronger influence on GDP growth than monetary policy, our findings underscore the importance of automatic stabilizers, where authorities should strengthen fiscal stabilization capacity, improve tax administration, and enhance a countercyclical fiscal framework. Because automatic stabilizers play a crucial role in smoothing macroeconomic fluctuations, fiscal authorities should consider a stable revenue-collection system, an unemployment-support mechanism, and a fiscal buffer, provided that fiscal revenue responds strongly to economic activity.

These empirical correlations lead to a fundamental conclusion for the architecture of public policies in the Republic of Moldova that operates with lags or unstable lags: ARDL

results indicate that effects might not appear immediately and that transmission delays should be recognized.

However, for the Republic of Moldova's economy, a simple central bank intervention by tightening or loosening commercial credit would not be sufficient on their own to steer real output growth and maintain financial stability; a coordinated macroeconomic policy would be more effective. According to the results, this also indicates an enhancement in the policy mix, with fiscal policy serving as the active structural lever and monetary policy safeguarding price stability.

Our findings are in line with the broader literature, which generally suggests that in transition economies such as Moldova, fiscal policy tends to have greater influence than monetary policy, particularly because the economy is highly dependent on remittances and has an underdeveloped capital market.

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THE IMPACT OF INTERNAL AUDIT ON THE ENTITY'S MANAGEMENT SYSTEM: THE SYNERGY BETWEEN RISK MANAGEMENT AND INTERNAL CONTROL IN THE MICROFINANCE AND LEASING SECTOR

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Abstract: This research provides a multidimensional investigation into the internal audit function as a driving force for optimizing management systems within non-banking financial institutions, with a specific focus on microfinance organizations and leasing companies. In an environment governed by macroeconomic volatility and stringent prudential regulatory shifts, the structural interdependence between internal audit, enterprise risk management (ERM), and internal control mechanisms forms the cornerstone of corporate stability and sustainability. By applying a methodology rooted in a systematic approach and qualitative-quantitative modeling of the control environment, this study demonstrates a paradigm shift in internal audit: transitioning from mere ex-post compliance checking to a proactive, strategic value-adding function. The research findings highlight the direct impact of audit recommendations on mitigating credit risk, optimizing liquidity risk exposures, and strengthening corporate governance, thereby offering a practical and methodological framework for managers and industry specialists.

Keywords: internal audit, risk management, internal control, microfinance, leasing, corporate governance, credit risk.

JEL Code: G21, G23, G32, M42.

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Introduction

In the contemporary economic architecture, the non-banking financial sector – primarily represented by non-banking credit organizations and leasing companies – serves as an indispensable engine for fluidizing capital flows and facilitating access to finance for small and medium-sized enterprises (SMEs) as well as underbanked populations. This segment is distinguished by accelerated operational dynamics, where procedural flexibility, minimal bureaucratic barriers, and decisional swiftness constitute the core competitive advantages over traditional banking institutions. Nonetheless, it is evident that these very attributes of flexibility and celerity generate an intrinsic structural vulnerability. The exposure of these entities to major threats – such as default risk, asset-liability maturity mismatches (liquidity risk), information asymmetry fraud attempts, and operational risks associated with digital transformation – demands a highly rigorous management framework, an observation well-supported by specialized literature (Okaro & Okafor, 2013). Modern management within a non-banking financial entity can no longer operate on linear models focused solely on maximizing the volume of the loan portfolio or leasing assets. An aggressive market share expansion unaccompanied by a fine-tuning of safety filters inevitably degrades asset quality,

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fosters conditions for hidden financial failure, and leads to a toxic accumulation of non-performing loans (NPLs) (Moldovan, 2021).

The essence and core motivation behind this research stem from the practical necessity to reconfigure risk management frameworks amidst pronounced macroeconomic volatility and tight prudential regulatory changes. The scientific rationale is based on the premise that the survival and sustainable performance of non-banking financial organizations have become directly dependent on the governance system's ability to implement a genuine functional synergy between managerial internal control, enterprise risk management (ERM), and internal audit. Within this complex equation, this study opts to position internal audit as an independent and objective assurance and consulting function (Moldovan & Deliu, 2022). From this perspective, it is critical to move beyond the traditional, restrictive paradigm of a retrospective oversight body and instead establish internal audit as a strategic partner to governing bodies (the Board of Directors and the Audit Committee), capable of holistically assessing risk management processes and providing a forward-looking vision of the entity's resilience against exogenous and endogenous shocks (Boghean, 2019).

The central problem identified in the practical operations of the local corporate sector lies in a fragmented and often purely formal approach to control. Entities frequently implement rigid bureaucratic procedures that merely mimic legal compliance while failing to detect hidden vulnerabilities or emerging risks in a timely manner. We argue that this major deficiency triggers severe collateral issues, such as the inefficiency of qualitative scoring matrices in digital online lending, the vulnerability of the control environment to executive management override, and the lack of mathematical methodologies capable of objectively measuring the resilience of the organizational defensive shield (Dolghi & Petreanu, 2021). Furthermore, we disagree with the practice of maintaining internal audit in a state of methodological passivity, as this limitation deprives leadership of essential early warning signals.

To address these challenges, the content of this paper has been structured in a logical sequence that guides the reader through all defensive tiers of corporate governance. Accordingly, the following sections initially delineate the conceptual framework based on international IPPF standards and the updated Three Lines Model, wherein we argue for the necessity of absolute independence of audit from operational and risk structures. Subsequently, the analysis shifts to the management of specific risks and the required translation of guiding internal control principles into the technical workflows of loan and leasing contract approval, while also highlighting the native limitations of these systems. Furthermore, the study advances through the complex operationalization of the COSO framework in the era of digital finance, where we propose an innovative methodology based on a systematic approach to assess safety filters. The climax of this research introduces a mathematical model for testing qualitative indicators of the control environment, empirically validated through a practical application and comparative analysis between two competing corporate entities. Finally, we consolidate a set of scientifically grounded conclusions and

strategic recommendations aimed at providing managers with an applicable guide for modernizing management systems and securing the financial stability of the entity.

Literature Review

The structural analysis of corporate management systems highlights remarkable theoretical and practical progress internationally and domestically regarding the conceptualization of control. A major milestone is represented by the shift from traditional, retrospective, and compliance-driven control to integrated governance models. The COSO framework provided an essential tridimensional standard, demonstrating that the control environment, risk assessment, and monitoring cannot operate in isolation, but rather function as interdependent pillars of the same organizational architecture (Committee of Sponsoring Organizations of the Treadway Commission [COSO], 2025).

Simultaneously, international professional bodies, such as The Institute of Internal Auditors, reconfigured defensive structures by launching the updated Three Lines Model, establishing a strict prudential demarcation between risk execution and independent assurance (Institutul Auditorilor Interni din România [AAIR], 2017). In the domestic and regional research space, prominent economists adapted these global trends to the realities of emerging financial markets. Consequently, investigations into decision-making risk management and professional ethics emphasize that an organization's stability directly depends on the quality of the organizational culture instilled by leadership (Balan et al., 2021; Boghean, 2019). Furthermore, recent domestic studies made valuable contributions to internal audit planning and the evaluation of corporate subdivisions, demonstrating the intrinsic link between management control and the commercial performance of entities (Cauș, 2010; Moldovan, 2022; Petreanu, 2020).

While this study acknowledges the undeniable value of existing milestones, it identifies a major methodological gap: most available theoretical models are grounded in traditional banking or large industrial corporations, leaving them insufficiently calibrated for the specific dynamics of non-banking credit organizations and leasing companies. This is where our study connects to and advances the literature: while classic literature treats credit risk or non-performing loan (NPL) accumulation through purely linear, retrospective metrics (Moldovan, 2021), our research extends these concepts and adapts them to the era of digital online lending.

We concur with the structural approach promoted in studies analyzing audit as an element of the general management system (Moldovan & Deliu, 2022), yet we find it necessary to move beyond mere qualitative process descriptions. Therefore, our original research supplements the existing theory by introducing a linear aggregation econometric model applied directly to the components of the control environment. Unlike purely normative analyses that merely inventory procedures, our mathematical model empirically tests the resilience of safety filters within two competing corporate entities, demonstrating how an integrity-pillar deficiency can generate an imminent risk of internal fraud, even in the presence of a properly structured organizational chart. We thus achieve a fusion

between industry prudential standards (such as National Bank of Moldova regulations or IPPF directives) and quantitative modeling tools, empowering internal audit to generate highly valued, predictive recommendations.

Grounded in these realities and methodological gaps, the primary objective of this research is to develop and substantiate an integrated scientific-practical evaluation model for management systems within microfinance and leasing entities by optimizing the synergy between enterprise risk management (ERM), internal control, and the internal audit function. To achieve this macro-structural purpose, the research aims to fulfill a series of specific sub-objectives, beginning with the clear delineation of the independence lines of internal audit through the lens of IPPF directives. Furthermore, the study intends to map the specific financial risks inherent in non-banking lending and leasing operations, while technically operationalizing the COSO framework components within the context of workflow automation. Finally, this investigation focuses on introducing and empirically validating the global metric indicator (ϵ) for quantifying control environment effectiveness, culminating in the formulation of a set of strategic recommendations designed to guide corporate management in radically modernizing the management system and securing the entity's financial stability.

Methodology

The scientific substantiation of this study demands the design of a rigorous research algorithm capable of ensuring the transition from abstract conceptual analysis to the empirical validation of management systems within the non-banking financial sector. Within this investigation, the algorithm is structured sequentially into three interconnected phases, shifting from the theoretical mapping of risk taxonomy and governance directives to the qualitative-structural analysis of operational filters, and culminating in the mathematical modeling of the control environment. Methodologically, the research utilizes a diversified palette of procedures, among which analysis and synthesis, induction and deduction, the systematic approach, and empirical methods focused on documentary analysis and statistical data sampling stand out.

Analysis and synthesis allowed the deconstruction of the complex corporate governance system into its constituent elements, facilitating an understanding of how daily micro-controls integrate into the risk management macro-structure. Through logical deduction, we translated the general principles of international control frameworks to the volatile specificities of non-banking credit organizations and leasing companies. Within the scope of this study, we consistently opt for the application of the systematic approach, as we believe it moves beyond the limitations of traditional normative frameworks-which merely settle for a bureaucratic inventory of procedures-offering a holistic assessment of the interdependencies between the entity's defensive tiers and enabling the surgical localization of prudential breaches in the field.

Applied materials of high theoretical and practical value were subjected to scientific analysis, consisting of corporate governance treatises, international professional standards,

prudential legislative acts, and specialized studies from domestic and European spaces. Internationally, the reference pillar is represented by the tridimensional standards developed by American specialists within the COSO committee, whose progressive ideas demonstrated that the control environment and risk assessment are dynamic elements that must be continuously monitored (Committee of Sponsoring Organizations of the Treadway Commission [COSO], 2025). This vision is extended by The Institute of Internal Auditors directives, which reconfigure corporate defense through the Three Lines Model, grounding the necessity for the absolute independence of internal audit (Institutul Auditorilor Interni din România [AAIR], 2017).

In the specialized literature of the Republic of Moldova and Romania, the investigation of control systems has registered remarkable progress due to renowned scholars. Landmark studies focused on decision-making risk management, developed by economists such as Boghean (2019), highlight the fact that an organization's stability directly depends on the quality of the organizational culture instilled by leadership. Complementarily, research conducted by Balan et al. (2021) brings to the forefront the progressive idea that aspects of morale, ethics, and professional conduct constitute the true structural resilience of the control environment, discouraging aggressive commercial targeting at the expense of portfolio quality.

Furthermore, works signed by Cauș (2010) and Cauș and Popovici (2011) offer an essential methodological guide for engagement planning and the analysis of the constituent elements of control, while sectorial statistical analyses published by Petreanu (2020, 2021) conceptualize the practical priorities for evaluating audit subdivisions within the local corporate sector. We are in total agreement with these scientific orientations, considering that the fusion between external legislative rigors (Banca Națională a Moldovei, 2018; Legea privind auditul situațiilor financiare, 2017) and internal audit best practices represents the sole path toward modernizing credit management systems.

The transition from qualitative to quantitative assessment was achieved through the use of specific investigation tools, the central piece being a complex structural questionnaire adapted from the prudential diagnostic model promoted in international best practice guides (FinDev Gateway, 2007; Jacques, 2003). The questionnaire was designed to measure the actual assimilation of the compliance culture at the personnel level, with questions strictly grouped according to COSO criteria. Each response obtained from interviewing and analyzing supporting document samples within ERP systems was quantified on a metric scale from zero to three points, thereby eliminating the empiricism and subjectivity of traditional interpretations.

To aggregate the obtained qualitative data and transform them into manageable managerial metrics, within the scope of this research, we propose and apply an econometric model based on the linear aggregation technique. This analytical tool determines the global indicator of control environment effectiveness by calculating the direct mathematical ratio between the arithmetic sum of the scores assigned to the qualitative indicators and the total number of items investigated in the questionnaire. The empirical validation of this investigation tool was performed through a practical application and a comparative analysis

between two competing corporate entities, demonstrating the model's capacity to locate the weak link within the defensive chain and to generate predictive recommendations with high added value for executive management.

Results and Discussion

A structural analysis of management systems within microfinance and leasing entities necessitates mandatory benchmarking against international reference standards. In the domestic specialized literature, researchers such as Moldovan and Deliu (2022) emphasize that the strategic objectives of these organizations are dictated by a delicate balance between optimizing loan portfolio yields and minimizing default risk. In analyzing this perspective, we concur with the cited authors that the role of internal audit has undergone a radical reconfiguration in recent years, moving beyond the traditional approach oriented exclusively toward ex-post compliance checking and the formal verification of credit files. However, unlike the classic vision of control, we argue that in the non-banking financial sector, audit must evolve into a predictive tool rather than merely serving as a reflector on past errors.

This axiom is globally substantiated by the international standard IPPF 2100 "Nature of Work" (Institutul Auditorilor Interni din România [AAIR], 2017), which explicitly stipulates that the true value and credibility of the internal audit function enhance significantly when auditors adopt a proactive stance, providing new insights and anticipating the impact of future developments. In our view, methodological inertia or the transformation of audit into a mere bureaucratic tool for ticking off procedures—a practice frequently observed within similar entities in the domestic market—nullifies the strategic utility of this function.

Extending this analysis to the sectorial level, a proactive approach in accordance with IPPF directives implies that the evaluations performed should not be confined to the statistical analysis of losses already incurred, but must identify structural vulnerabilities within scoring models before they generate a toxic portfolio. By examining the synthesis of the IPPF provisions (AAIR, 2017), we subscribe to the idea that the internal audit function must be positioned at the highest hierarchical level within corporate governance. Only from this vantage point can it directly evaluate and contribute to the improvement of governance, risk management, and control processes, acting as a genuine catalyst for organizational performance.

To implement an efficient risk management system, The Institute of Internal Auditors (IIA, 2017) widely promotes the updated Three Lines Model. While prudential regulations in the traditional banking sector impose strict risk segregation rules, within the non-banking credit organization and leasing sector, as Moldovan (2022) rightly observes, this methodological framework is often left to the discretion of internal governance, which can lead to a dilution of accountability. For this reason, we consider it imperative to establish a surgical demarcation of executive, monitoring, and independent assurance roles within these companies.

In our analysis, we observe that the first line of defense-operational management (loan officers, branch managers, and leasing specialists)-operates under a permanent, latent conflict of interest between achieving sales volume targets and respecting prudential risk filters. To counteract this vulnerability, we agree with the structural approach proposed by Căprian and Covali (2017) in their corporate management studies, which maintain that the first line must be continuously monitored by an independent second line, represented by Risk Management and Compliance departments. The role of the second line is to issue rigorous scoring matrices and automatically block subjective field-level decisions through core-banking information systems.

However, the core of the scientific debate arises at the level of the third line of defense-internal audit. While a series of traditional managerial practices in emerging financial markets attempt to subordinate internal audit to executive management (chief executive officers), this study firmly opts for the absolute independence model argued by international IPPF standards. We express our strong disagreement with any form of operational subordination of internal audit because, from our point of view, placing it under executive control negates the very objectivity required to evaluate the first two lines.

As recorded by Moldovan (2022), the strategic impact of internal audit is most pronounced when it reports directly and exclusively to the Audit Committee and the Board of Directors (as structured in Figure 2.1).



Figure 2.1. The integrated Three Lines Model adapted for the microfinance and leasing sector

Source: Elaborated by the authors based on the IIA and COSO framework

Therefore, during crisis periods, when sales volume pressures drive the first line to ignore risks and risk management (the second line) fails in its reporting, internal audit is the only structure capable of detecting the methodological anomaly through quantitative tests

on contract samples and restoring the entity's defensive balance before portfolio degradation irreversibly compromises solvency.

The implementation of a management system tailored to the specific profile of non-banking credit organizations and leasing companies demands a profound understanding of the financial and operational risks correlated with this type of business. In his seminal works, Boghean (2019) demonstrates that risk management (enterprise risk management – ERM), approached as an integral component of corporate governance, can no longer be reduced to mere passive monitoring, but rather requires a continuous mapping of both internal and external destabilizing factors. We concur with this systemic vision, arguing that the unique nature of these entities – characterized by accelerated financing processes and increased accessibility for clients who are often unbankable – shapes a specific framework of active vulnerabilities, within which credit risk holds a central and critical position.

Within microfinance companies, as rightly argued by Balan (2015), credit risk manifests with increased intensity because a significant portion of the borrower portfolio consists of small and medium-sized enterprises or individuals who possess neither a solid credit history nor substantial collateral. In the leasing sector, although prudential safety appears to be guaranteed by retaining ownership of the financed asset, this study highlights an often-neglected reality: credit risk takes the form of rapid asset depreciation due to technological or physical obsolescence, as well as significant legal barriers encountered during the asset repossession process. In this regard, we subscribe to the methodology proposed by Cauș (2010) regarding the necessity of constant empirical validation of scoring matrices, considering that classic linear approaches applied in creditworthiness assessment are inefficient in the contemporary non-banking financial environment.

In addition to the strict management of default risk, non-banking financial entities face constant pressure from liquidity risk. Given the legal prohibition preventing these organizations from attracting deposits from the public, their structural funding depends exclusively on equity, corporate bond issuances, or accessing banking lines. In our view, a chronic mismatch between the maturity of assets, represented by fragmented monthly installment collections, and the maturity of liabilities, represented by strict repayment obligations to institutional creditors, can generate immediate operational blockages capable of driving the entity toward a state of technical insolvency.

This vulnerability is significantly amplified by the incidence of operational and fraud risks. Researchers Dolghi and Petreanu (2021) draw attention to the fact that the accelerated digitalization of online lending workflows, while streamlining commercial processes, opens major breaches for cyberattacks and identity fraud. While we share the authors' concerns, we consider it necessary to add a critical nuance: the greatest threat does not originate from the outside, but from within, through human errors in programming automated scoring software algorithms, which can distort the entity's entire financial reporting structure.

Simultaneously, compliance risk acts as an external pressure barrier, driven by the continuous tightening of prudential norms by regulatory authorities (such as the NBM framework in the Republic of Moldova or the FSA/NBR in Romania), particularly in the

field of anti-money laundering (AML/KYC), an aspect analyzed in detail by Zinca and Petroianu (2017).

Enhancing the management structure of a non-banking financial entity is inextricably linked to the implementation of rigorous internal control principles, designed not as an isolated or post-factum action, but as continuous moral and material oversight capable of ensuring full risk command. In this regard, we are in total agreement with the comprehensive approach advocated by Moldovan and Deliu (2022), who maintain that the internal control system should not be viewed as a static list of procedures, but as a dynamic organism embedded within daily processes. From our point of view, internal auditors, in their governance evaluation missions, have a professional obligation to validate whether the managerial control architecture is built upon stable methodological pillars.

A primary pillar is represented by the principle of structural organization, which requires configuring a clear organizational chart and developing internal procedures that precisely delineate responsibilities, delegated competencies, and information channels, while explicitly prohibiting the accumulation of incompatible functions (Căprian & Covali, 2017). Within microfinance and leasing companies, we consider the application of this principle to be critical, as it blocks errors or fraud attempts by separating the sales and client acquisition function from the financial analysis and credit exposure approval function.

Significant importance attaches to the principle of integrated self-control, which demands the inclusion of automated mutual verification and cross-correlation mechanisms within daily routines. Studying the practical implementation of operational filters, we subscribe to the scientific conclusions formulated by Arena and Azzone (2009), who demonstrate that within the non-banking credit and leasing company segment, automating cross-checks within ERP systems heavily reduces dependence on the human factor and prevents prudential calculation errors, serving as a central pillar for maintaining resilient corporate governance. This principle is complemented by that of adaptability and permanence, which requires that established rules be applied consistently while possessing high structural flexibility to instantaneously absorb new prudential regulations in the field.

From a patrimonial perspective, internal control must respect the principle of procedural universality, covering all hierarchical levels and all active and passive elements of the organization, as well as the principle of information verifiability, which guarantees that any financial transaction can be traced back in the system to the primary supporting document. Nonetheless, in the non-banking financial environment, all these rules must correspond to the principle of proportionality and harmony. In our view, analyzed through the lens of market realities, we agree with the warning issued by Căprian and Covali (2017) that excessive bureaucratization of the internal control process will negate the primary competitive advantage of non-banking credit organizations, namely the speed and efficiency of processing loan requests, thereby generating commercial losses.

Despite a rigorous design based on the stated principles, top management and governance specialists must realize that the internal control system cannot offer an absolute guarantee of organizational success, but only reasonable assurance. Within our research, we

emphasize the importance of recognizing the inherent limitations of the system, an aspect heavily debated in specialized methodological guides, as ignoring them can compromise even the most sophisticated safety filters. Among these restrictive factors, human errors generated by fatigue, carelessness, misinterpretation of procedures, or flawed professional judgments during the analysis of leasing files represent a permanent threat to portfolio quality.

Another major structural limitation is the possibility of circumventing controls through secret agreements or collusion between employees from different departments or between a loan officer and an external applicant, a phenomenon that completely nullifies the efficiency of segregation of duties. Likewise, the risk of executive management override, which may dictate ignoring scoring filters for certain strategic clients to report high sales volumes, constitutes a critical internal security breach. Lastly, the cost-benefit criterion represents a pragmatic barrier, as the cost of implementing a new automated control tool should not exceed the potential financial loss that the control is designed to prevent.

In the presence of these vulnerabilities and native limitations, we firmly opt for a dynamic approach to governance in which the role of internal audit becomes crucial for the survival of the non-banking financial entity. Internal audit does not implement controls, nor does it execute them on a routine basis; rather, it is the function that critically examines their effectiveness. We express our disagreement with conservative managerial views that consider audit a redundant function to internal control. From our point of view, the impact of audit on the management system manifests precisely through applying stress tests to transaction samples, bringing to light those moments when internal control failed due to human fatigue, obsolete procedures, or abusive executive directives, thereby transforming internal control from a static structure into a self-regulating mechanism.

For specialists and managers within the non-banking credit organization and leasing sectors, the COSO (*Committee of Sponsoring Organizations of the Treadway Commission*) framework represents the gold standard for structuring and evaluating corporate defense systems. Defined methodologically as an ongoing process coordinated by the Board of Directors and executed by the entire personnel, this framework aims to provide reasonable assurance regarding operational efficiency, financial reporting accuracy, and full regulatory compliance. Within the contemporary non-banking financial ecosystem, we argue that the evaluation of this framework by internal audit acquires a unique value, forcing a transition from formal auditing to a deep analysis of the resilience of the five interdependent components.

The starting point in this analysis is represented by the control environment, which constitutes the ethical and structural foundation of the entire organization. The internal auditor must evaluate this component not only through the documentary analysis of ethical codes but by directly surveying the organizational culture of the employees. The second component, risk assessment, demands the existence of dynamic internal mechanisms to detect threats. In the leasing sector, as shown by the research conducted by Dolghi (2012), the rapid technological obsolescence of financed equipment or price volatility in the secondary market represents major risks that directly impact collateral value. From our point of view, in the presence of these realities, internal audit is obliged to critically analyze

whether risk management utilizes calibrated statistical models to update scoring matrices under conditions of economic uncertainty.

Control activities, as the third COSO component, comprise the totality of policies, procedures, and authorizations designed to mitigate risk exposure. In the context of online lending digitalization, we opt for reorienting the audit's attention toward testing IT general controls and software algorithms that automatically block suspicious transactions. This dimension directly correlates with the fourth component—information and communication. Decisional effectiveness depends on the existence of rapid data flows, and here we subscribe to the arguments presented by Ciuhureanu (2016) regarding the importance of accounting information transparency for executive management, which allows field officers to report market anomalies directly to the central risk structure.

The final component consists of system monitoring, a process focused on assessing internal control performance over time. It is within this sphere that the strategic impact of internal audit as an independent function materializes. While executive management holds an operational role, internal audit is the only function with the necessary status to independently monitor whether all other four COSO components operate synchronously. We express our disagreement with the tendency of certain entities to assimilate the monitoring performed by audit into simple managerial self-control; from our point of view, the independence of direct audit reporting to the Audit Committee is what provides the necessary impulse for the continuous recalibration of the entity's defensive shield.

To enhance the efficiency of prudential supervision within microfinance and leasing entities, the implementation of a robust reference framework for evaluating internal control must be grounded in a clear scientific methodology. In specialized literature, the analysis of management systems highlights a multitude of approaches used for diagnosing organizational structures, including functional, normative, or operational frameworks. For the non-banking corporate financial sector, within the scope of this study, we consistently opt for the application of the systematic approach, as we believe it perfectly aligns with the integrated architecture of the COSO model and offers a holistic assessment of the overall management system's effectiveness, thereby enabling the precise localization of procedural breaches.

The systematic evaluation cannot be carried out empirically; rather, it demands the establishment of clear and objective criteria, directly correlated with the requirements of the international internal auditing standard IPPF 2210 „Engagement Objectives”. In the absence of predefined criteria set by the entity's management, we consider that internal auditors have a professional obligation to develop them in cooperation with governance structures, grouping them into three major categories.

The first category comprises internal criteria, represented by the entity's bylaws, the corporate governance code, specific lending or scoring regulations, accounting policies, and internal anti-fraud procedures.

The second category is formed by external criteria, which include prudential legislative acts issued by sectorial regulatory authorities, such as the Law on the Audit of Financial Statements, Central Bank regulations, and Anti-Money Laundering (AML) frameworks. We

agree with the rigor of these legislative acts, considering that their strict enforcement constitutes the core foundation for the stability of any financial entity.

The third category includes best practices, derived from international guidelines, recommendations of financial supervisory committees, and professional guidance from The Institute of Internal Auditors.

To operationalize this approach within the environment of non-banking credit and leasing organizations, the internal audit process must sequentially follow three distinct and interconnected operational stages.

The first stage aims at obtaining a comprehensive and clear overview of the management system. In this regard, we subscribe to the methodological arguments formulated by Cauș (2010), according to which this initial step necessarily involves mapping the strategic objectives of the entity and compiling an exhaustive inventory of the internal and external regulatory framework applicable to lending or leasing financing activities.

The second stage is dedicated to the content analysis of the system's constituent elements. We agree with the operational model proposed by Cauș and Popovici (2011), which focuses on the precise identification of the control structures participating in operational workflows (compliance officers, risk managers, field teams) and on determining the actual manner in which these actors interact and delineate their prudential duties.

Finally, the third stage consists of the technical evaluation and actual testing of the effectiveness of safety filters. At this level, we share the empirical vision of Petreanu (2021), in the sense that internal auditors must meticulously select working tools, apply structured questionnaires, extract and test representative samples of contracts from the ERP system, and calculate metric performance indicators.

We argue that this methodological sequence ensures a definitive transition from simple formal verifications to a deep, risk-based analysis capable of generating high value-adding recommendations for executive management.

The control environment constitutes the foundation of the corporate governance system, setting the tone of the organizational culture and defining the degree to which personnel are aware of prudential rules. In this regard, we are in total agreement with the views expressed by a number of researchers, who reveal that a rigorous assessment of this pillar by internal auditors is achieved by correlating documentary analysis with a direct survey of the compliance culture. To eliminate the subjectivity factor inherent in traditional qualitative evaluations, within the scope of this study, we propose the use of a metric quantification tool via a structural questionnaire, with questions strictly grouped according to the COSO criteria established in the international standards developed by American specialists.

A numerical score on a scale from 0 to 3 points is assigned to each response obtained from the audit investigations. The global effectiveness of the control environment (ε) is mathematically calculated using a linear aggregation model, defined by the ratio between the sum of the scores assigned to each analyzed indicator and the total number of items evaluated in the questionnaire:

$$\varepsilon = \frac{\sum_{i=1}^n S_i}{n} \quad (1)$$

Where S_i represents the score assigned to each qualitative indicator, and n represents the total number of questions in the questionnaire. A global score between 2.00 and 3.00 indicates an effective control environment, while a result located in the 1.00 – 1.99 range places the control environment in an inefficient or vulnerable zone.

To empirically validate the proposed model, it was tested within two entities from the non-banking financial corporate sector, generically designated as Entity A (characterized by rigorous risk management) and Entity B (a company with a traditional structure, focused on increasing sales volume). Our methodological approach is grounded in comparative studies recently developed in the domestic specialized literature, expanding the applicability of metric indices to the level of financial risk structural analysis. The results are detailed in the qualitative matrix presented below:

Table 1. A comparative analysis of two corporate entities

Control Environment Components and Qualitative Evaluation Indicators	Entity A Score	Entity B Score
I. Communication and enforcement of integrity and ethical values		
1. Is there an approved Code of Ethics applicable to all employees?	3	0
2. Are employees regularly trained and aware of the Code of Ethics provisions?	3	0
3. Are procedures for investigating and sanctioning ethical breaches operational?	3	0
4. Do management and personnel respect anti-fraud and anti-corruption legislation?	3	3
II. Commitment to competence and Human Resources policies		
5. Are there written procedures to evaluate the competencies required for each post?	3	3
6. Does management hold verified qualifications in managing specific risks?	3	3
7. Are clear and secure recruitment filters implemented?	2	2
8. Is there an active policy for continuous training and professional promotion?	3	0
III. Participation of those charged with governance (The Board)		
9. Are the Board's roles defined in implementing whistleblowing mechanisms?	3	3
10. Does the Board regularly review internal control reports?	3	2
11. Is the interaction workflow between committees transparent and regulated?	3	3
IV. Executive management's operating style		
12. Is management directly involved in risk assumption and monitoring?	3	3
13. Are major decisions regarding financial reporting made collectively?	3	3
V. Organizational structure and assignment of authority		
14. Is the organizational chart officialized and approved by statutory bodies?	3	3
15. Are job descriptions developed, updated, and communicated?	3	3
16. Are there clear lines of reporting and avoidance of conflicts of interest?	3	3
GLOBAL EFFECTIVENESS SCORE (ε)	2.93	2.13

Source: Elaborated by the authors

The comparative analysis reveals that although both organizations achieve a global score within the prudential effectiveness range ($\varepsilon > 2.00$), the mathematical model identifies hidden structural vulnerabilities in the case of Entity B. While Entity A ($\varepsilon = 2.93$)

demonstrates a solid culture of compliance, Entity B ($\varepsilon = 2.13$) records zero scores (0) regarding the ethical dimension and human resource training policies.

We argue that this major deficiency generates a substantial operational risk of internal fraud. In this context, we subscribe to the conclusions formulated by Romanian and domestic economists (Balan et al., 2021; Căprian & Covali, 2017; Ciuhureanu, 2016; Moldovan, 2022; Moldovan & Deliu, 2022; Zinca & Petroianu, 2017) regarding the necessity of a risk-based audit, which moves beyond a simple global average and precisely locates the weak link, forcing the executive management of Entity B to urgently intervene with corrective measures centered on the integrity pillar.

Conclusions

A multidimensional investigation into management systems within microfinance and leasing entities confirms that implementing a high-performance internal audit function has ceased to be a mere choice for bureaucratic compliance; rather, it has become a critical driver for corporate survival and sustainability, a view widely supported by financial management specialists. Within a volatile non-banking environment, organizational defense tiers cannot operate in isolation because the functional synergy between internal control, Enterprise Risk Management (ERM), and internal audit acts as an integrated protective shield. In our view, which is grounded in international best practices, this alignment has the capacity to transform strict prudential regulations from an external administrative pressure into a strategic competitive advantage in the lending market, thereby ensuring process fluidity and asset security.

Empirical research conducted through a systematic approach and the mathematical modeling of qualitative indicators reveals that formal evaluations or simple linear aggregations can mask severe structural vulnerabilities within the COSO framework. As demonstrated in the comparative analysis, an entity may display an ostensibly satisfactory global score from an organizational perspective, yet face an imminent risk of financial failure due to a neglected ethical culture or the absence of anti-fraud filters in human resources. We are in total agreement with the warnings issued by economists within both domestic and European research circles that fine-tuning material and moral continuous oversight instruments represents the sole guarantee for safeguarding assets against portfolio quality degradation and the accumulation of non-performing loans (*NPLs*).

Based on the conclusions derived from this scientific research, we consider it necessary to formulate a set of strategic recommendations with immediate practical applicability for specialists and managers within the non-banking credit organization and leasing sectors. First, we firmly opt for a reconfiguration of operational priorities through a definitive transition toward risk-based auditing, which involves abandoning exhaustive retrospective verifications for the sake of formal compliance and focusing audit resources on areas with the maximum probability of default and operational fraud. This direction, fully validated by experts in banking risk fields, demands the periodic evaluation of automated

online scoring algorithms, the monitoring of leased asset depreciation, and strict adherence to AML/KYC prudential norms.

Second, we consider it imperative to digitalize and automate internal control metrics by integrating qualitative risk assessment chapters and structural questionnaires directly into the entity's core-banking and ERP information systems, a methodological solution strongly supported by sectorial statistical analyses. This step will allow the real-time calculation of control environment effectiveness indicators (ϵ), providing executive management with an *Early Warning System* before operational vulnerabilities materialize into actual asset losses.

Third, the entity's corporate governance must secure and guarantee the structural independence of defense lines by maintaining a rigorous separation of duties between operational personnel and risk monitoring structures, thereby completely eliminating the possibility of executive management override. We express our disagreement with the ambiguous reporting practices encountered in some organizations and support guaranteeing absolute independence for internal audit by ensuring a direct and exclusive communication channel to the Audit Committee and the Board of Directors, which effectively frees audit decisions from the pressures of commercial sales targets.

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POST-REVOLUTIONARY DISCOURSE AND THE POLITICS OF EXCLUSION: NIKOL PASHINYAN'S ARMENIA

Aram TERZKYAN^{*1}

Abstract: *This paper investigates the transformation of Armenian Prime Minister Nikol Pashinyan's political discourse from the period following the 2018 Velvet Revolution to the political and religious confrontations of 2020–2025. Using the framework of Critical Discourse Analysis (CDA) and drawing on the work of Wodak, Van Dijk, Fairclough, Van Leeuwen, and Reyes, it examines how Pashinyan has positioned himself as the moral embodiment of the revolution while portraying opponents, ranging from former political elites to war critics, civil society actors, and religious leaders as threats to the state. Through strategies such as referential reduction, predication, moral evaluation, securitization, and fear-based legitimization, his rhetoric has progressively narrowed the range of acceptable political participation. The study traces the shift from inclusive, reformist messaging toward a crisis-driven style that frames loyalty as virtue and dissent as disloyalty, with the boundaries of the political "enemy" expanding over time. Drawing on speeches, press conferences, and symbolic performances, the analysis demonstrates how this discursive trajectory has contributed to the erosion of pluralism, the redefinition of political legitimacy, and the securitization of opposition in post-revolutionary Armenia. This analysis is based on a qualitative corpus of public speeches, parliamentary addresses, press conferences, and digital communications produced by Nikol Pashinyan between 2018 and 2025.*

Keywords: *Pashinyan; Armenia; Velvet Revolution; political discourse; framing; fear appeals; discursive boundaries.*

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Introduction

Since coming to power in 2018 through Armenia's Velvet Revolution, Prime Minister Nikol Pashinyan has built and sustained his political authority through both institutional mechanisms and a distinctive, often polarizing rhetorical style. Armenia, emerging from the shadows of Soviet influence and enduring decades of oligarchic governance, found itself at a crossroads in 2018. The Velvet Revolution, spearheaded by Nikol Pashinyan, marked a decisive break from entrenched political structures, promising to reshape the country's democratic trajectory.

Initially positioned as a reformist and democratizing figure, Pashinyan presented his leadership as a decisive break with the corrupt, oligarchic past and as a restoration of popular sovereignty. Over the subsequent years, particularly following the military defeat in Nagorno-Karabakh, the emergence of large-scale protests, and heightened tensions with the Armenian Apostolic Church, his discourse has shifted in tone, focus, and target.

The rhetoric surrounding revolutionary leadership, especially in post-Soviet contexts, is as much about redefining moral boundaries as it is about institutional change.

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Pashinyan's rise was framed as a moral revival, positioning his leadership as a direct repudiation of a corrupt past. Revolutionary rhetoric, in this sense, is not merely about achieving political power; it involves reshaping the moral and symbolic boundaries of political participation, defining who belongs within the political community and who does not. By framing his leadership in opposition to the former political elites and their corrupt practices, Pashinyan set the stage for a new understanding of political legitimacy in Armenia - one based not only on institutional reforms but also on moral and symbolic purity.

While Pashinyan's leadership was framed as a moral rebirth for the Armenian nation, opposition forces, such as the Armenian Apostolic Church and various protest movements also began to construct counter-narratives. The Church, for example, emphasized its role as a moral compass for the nation, positioning itself as a counterweight to Pashinyan's portrayal of political legitimacy. The Armenian Apostolic Church, with its long-standing influence in Armenian society, viewed Pashinyan's populist rhetoric and government as an overreach that threatened religious authority and national identity. In contrast, the Church emphasized its stewardship over moral values, portraying itself as a guardian of Armenia's traditions and cultural integrity, which it believed were at risk in the wake of the revolution (Terzyan, 2025a).

This paper examines how Pashinyan has used language to reinforce his own legitimacy while challenging the credibility of critics, constructing a contrast between a legitimized "Self" (associated with the revolution, the people, and his leadership) and a delegitimized "Other" (linked to the previous political order, war critics, segments of the political opposition, and parts of the clergy). It traces the evolution of his political discourse from post-revolution optimism to crisis-oriented narratives, and from relatively open-ended appeals to increasingly explicit criticism of institutions.

The analysis draws on Critical Discourse Analysis (CDA), particularly the work of Wodak (2001), Van Dijk (2005), Fairclough (2003), Van Leeuwen (2007), and Reyes (2011). These scholars conceptualize discourse as a mechanism of social power, one that shapes legitimacy, sets boundaries for inclusion, and influences perceptions of authority. For the purposes of this study, key concepts are defined as follows. Moral exclusivity refers to the construction of political legitimacy as belonging solely to a particular actor or movement, excluding alternative viewpoints from the realm of acceptable discourse. Discursive enclosure denotes the narrowing of the political field through rhetorical practices that delegitimize dissent and reduce pluralism. Authoritarian populism is understood as a form of political discourse that combines appeals to popular sovereignty with the concentration of moral authority in a single leader or movement. Securitization refers to the framing of political actors or positions as existential threats, thereby justifying exceptional measures and limiting the space for democratic contestation.

Strategies such as referential reduction, evaluative labeling, fear appeals, temporal framing, and crisis narration help explain how political authority can be reframed as a matter of national necessity. By examining Pashinyan's speeches, press conferences, and symbolic performances from 2018 to 2025, this paper argues that his discourse has increasingly

narrowed the range of political positions deemed legitimate, often framing alternatives as steps backward or as risks to stability.

The empirical corpus consists of a purposive selection of public speeches, parliamentary interventions, press conferences, Facebook livestreams, and official statements produced between 2018 and 2025. The materials were selected based on their relevance to key political turning points and their visibility in shaping public discourse. The corpus is structured across three analytical phases: post-revolution consolidation 2018–2019, post-war crisis 2020–2022, and confrontation with institutional actors 2023–2025. This periodization enables a systematic comparison of discursive strategies across changing political contexts.

Beyond the Armenian case, this study contributes to broader debates on populism and post-revolutionary governance by illustrating how discursive strategies of legitimation evolve in response to crisis. It shows that rhetorical transformation is not only reactive but also constitutive of political authority, offering insights applicable to other post-Soviet and post-revolutionary contexts.

Post-Revolution Optimism and the Seeds of Moral Division (2018–2019)

When Nikol Pashinyan ascended to power in May 2018 after leading Armenia's Velvet Revolution - a peaceful civic uprising against entrenched oligarchic rule his public rhetoric immediately emphasized a radical moral rupture from the past. The revolution, according to Pashinyan, was not merely a political transition but a profound ethical rebirth for the Armenian nation (Terzyan, 2020, pp. 148-150). This discursive framing positioned the new leadership not as a replacement government but as the purified expression of the people's will and dignity.

In the early months of his premiership, Pashinyan frequently used referential and predicative strategies to distinguish the new revolutionary government from what he portrayed as a discredited *ancien régime*. Rather than naming past leaders, he often referred to "former corrupt elites," "forces who plundered the state," and "criminal oligarchic clans," framing the previous political order in morally and economically negative terms (Azatutyun, 2019; The Armenian Mirror-Spectator, 2018). Such language reflects a technique common in crisis rhetoric, where political actors invoke broadly defined threats to maintain a sense of ongoing mobilization (Chilton, 2004, pp. 111–116). He accused them of obstructing reform and resisting his anti-corruption agenda (Azatutyun, 2019). These broad referential categories served a dual purpose: they invoked shared public resentment without naming individuals directly, and they reinforced a moral dichotomy between the virtuous revolutionary "we" and the corrupt, faceless "they." This strategy aligns with what van Dijk, in his *Ideological Square*, terms negative other-presentation the systematic emphasis of out-group negative attributes alongside the downplaying of in-group shortcomings (Van Dijk, 1995, pp. 143–145).

In speeches such as the one delivered at the 100-day post-revolution rally in Yerevan's Republic Square in August 2018, Pashinyan declared: "There is no monopoly in Armenia today, there is no petrol monopoly, no monopoly of anything, there is only the monopoly of power, and you are the owner of that power..." (Pashinyan, 2018). This statement exemplifies moral evaluation as a strategy of legitimation (Reyes, 2011, p. 785). By proclaiming that power had returned to the people, Pashinyan simultaneously reinforced the illegitimacy of the previous regime and framed the revolution as a process of moral purification.

At the United Nations General Assembly in September 2018, Pashinyan stated, "Our democratic transformation and zero-tolerance policy against corruption are not without resistance from former corrupted elites" (Pashinyan, 2019a). Here, again, he invoked the ambiguous category of "former elites" rather than naming political parties or individuals, mobilizing strategic ambiguity to reinforce a sense of continued moral struggle. Such temporal binarization- the past as decay and the present as redemption is a hallmark of populist discourse (Fairclough, 2003, pp. 89-91).

Pashinyan's speeches were also marked by populist monopolization of authority, a rhetorical structure in which the speaker claims an exclusive and unmediated relationship with "the people." His repeated declarations that "you are the owners of power" and that the government must serve "only the people" framed any disagreement with his leadership as an assault on popular sovereignty itself (Pashinyan 2019b).

By the end of 2019, Pashinyan had succeeded in constructing a political discourse in which his administration was framed as the sole representative of moral authority and democratic legitimacy. This was not merely a matter of policy divergence, but of moral polarization. Through referential generalization, moral dichotomization, and strategic ambiguity, Pashinyan constructed a public narrative in which dissent was indistinguishable from disloyalty. The discursive field was not only restructured, it was morally enclosed.

Beyond verbal statements, Pashinyan's early premiership also relied on a repertoire of symbolic and embodied actions that reinforced his image as the antithesis of the old order. Walking to work through city streets without security escorts, wearing informal clothing to public events, and personally engaging with citizens in unplanned encounters all functioned as visual cues of accessibility and humility. From a discourse-analytic perspective, these non-verbal performances complemented his moral-political framing by making the rupture from oligarchic privilege tangible in everyday life. The lack of ceremonial distance between leader and public projected an egalitarian ethos, strengthening the association of the "Self" with authenticity and moral renewal. Over time, however, this imagery of openness and proximity stood in sharp contrast to the more guarded and securitized posture that emerged during later crises, when public appearances became less spontaneous, rhetorical tone hardened, and physical access to the leader was more tightly controlled. This shift not only marked a transformation in the style of leadership but also visually reinforced the broader discursive movement from inclusive revolutionary optimism to exclusionary, crisis-driven governance.

Crisis And Escalation: The 2020 War and the Broadening of the “Enemy” (2020–2022)

The 44-day war over Nagorno-Karabakh in the fall of 2020 constituted a critical rupture in Nikol Pashinyan’s political discourse. Previously regarded by many as the moral voice of a revolutionary movement, Pashinyan found himself suddenly vilified by large segments of the public, especially after signing a Russian-brokered ceasefire agreement that included significant territorial concessions to Azerbaijan. The resulting backlash was immediate and intense: on November 10, 2020, crowds stormed the Armenian parliament, vandalized government buildings, and chanted slogans such as “Nikol is a traitor” (Al Jazeera, 2020).

Following the Nagorno-Karabakh war, opposition voices began to frame their dissent as rooted in the defense of Armenia’s national integrity and sovereignty. Critics positioned their opposition to Pashinyan not just as a policy disagreement but as a stand against what they perceived as a betrayal of national values. Similarly, protest movements increasingly emphasized their moral duty to protect Armenia from what they viewed as Pashinyan’s concessions to Azerbaijan. Their discourse began to shift from a critique of policy to a defense of national survival, making it clear that their opposition was not just political but existential (Terzyan, 2025b).

The language of betrayal quickly became central to both public discourse and the government’s counter-narrative. Protesters accused Pashinyan of abandoning Shushi - one of the most symbolically important cities in Nagorno-Karabakh and thus of humiliating the Armenian nation on the world stage. In response, Pashinyan’s allies in parliament, as well as state-aligned media, began portraying critics as “agents of panic,” “tools of Azerbaijan,” or internal saboteurs (Asekose.am, 2021). Veterans, opposition figures, and journalists who questioned the government’s decisions were portrayed as acting in concert to undermine official policy (Sputnik Armenia, 2021a). This marked more than a defensive reaction, indicating a shift from treating such actors as legitimate participants in democratic debate to framing them as organized challenges to the state’s authority.

Within formal political institutions, similar framings emerged in parliamentary debates and legislative sessions during the post-war period. The language of “emergency unity” and “wartime discipline” was repeatedly invoked in procedural contexts, signaling that the atmosphere of crisis extended beyond rallies and public speeches into the deliberative spaces of governance. Even in the restrained register of parliamentary discourse, opponents were implicitly cast as obstructive to national recovery if they challenged the government’s policy trajectory. The procedural formality lent this framing an air of institutional legitimacy, embedding the Self/Other divide within the record of state deliberations. By infusing legislative discourse with the same moral and security-oriented binaries found in public rhetoric, the government ensured that the logic of loyalty versus disloyalty permeated both symbolic and operational domains of political life.

As protests persisted into 2021, the government's rhetoric hardened, entering what Fairclough (2003) and Chilton (2004) define as a securitization phase the transformation of opposition into a security threat. This process of securitization, whereby political opponents are redefined as existential threats, is not only a strategy for consolidating power but also a fundamental reshaping of democratic norms. The erosion of pluralism in the wake of the Nagorno-Karabakh war illustrates how security narratives can be leveraged to justify authoritarian practices in the name of national survival.

When General Onik Gasparyan and over 40 senior military officers issued a public call for Pashinyan's resignation in February 2021, the Prime Minister framed the appeal not as constitutional dissent but as an attempted coup d'état. He warned the public that Armenia was facing a "dangerous internal destabilization campaign," allegedly orchestrated by those who could not tolerate the new democratic order (Sputnik Armenia, 2021b). Protesters and critical media outlets were no longer treated as voices of civic unrest but were accused of engaging in criminal conspiracies against the constitutional order (Guardian, 2021).

During this period, Pashinyan increasingly framed disinformation and digital dissent as threats to national security. In March 2019, he warned that "millions of dollars" were being spent to mislead the public and destabilize the new government through fake news, while affirming his commitment to freedom of speech (EVN Report, 2019). A month later, he instructed the National Security Service (NSS) to act against individuals using social media to "manipulate public opinion" or incite unrest, effectively linking online opposition to state vulnerability (EVN Report, 2019). This strategic ambiguity what Reyes (2011, pp. 791-793) identifies as *fear-based legitimization through projected hypothetical futures* blurred the line between critique and sabotage. While no specific actors were named, the implication was clear: civic voices and online platforms critical of the government could be construed as foreign-aligned or subversive. In practice, this discursive move contributed to the erosion of trust in civil society institutions, which had once been integral to the revolution itself.

From 2020 to 2022, the Armenian government's rhetorical framework thus shifted from revolutionary idealism to authoritarian populism. Opposition was no longer constructed as a legitimate alternative but as a threat to national survival. This three-pronged strategy moral labeling, securitization, and conspiratorial ambiguity effectively erased the boundaries of legitimate dissent. Critics were depicted not merely as adversaries but as traitors and destabilizers. This kind of political discourse uses predictive and emotionally charged narratives to justify the concentration of power (Reyes, 2011, pp. 793-796). By portraying dissent as the beginning of future catastrophe, governments can frame their repressive measures as protective rather than authoritarian.

The democratic field was not simply narrowed it was discursively reconstructed to exclude any position outside of the ruling party's framework. What mattered was not what one said, but whether one affirmed or opposed the government's moral narrative of post-war survival.

Clergy as Political Threat and Discursive Suppression (2024–2025)

In the spring of 2024, the Armenian political crisis reached a new pitch with the rise of the *Tavush for the Homeland* movement. Sparked by Prime Minister Nikol Pashinyan's decision to cede four border villages in Tavush Province to Azerbaijan as part of a broader peace process, the movement began as a localized expression of resistance. It quickly transformed into a nationwide protest after Archbishop Bagrat Galstanyan - head of the Diocese of Tavush began a symbolic march from the region to Yerevan. Drawing on religious authority and moral rhetoric, Archbishop Bagrat galvanized tens of thousands of citizens. By the time the march reached Republic Square, the movement had become one of the largest popular mobilizations since the 2018 Velvet Revolution (Le Monde, 2024; AP News, 2024).

The Church's involvement in politics raised deeper questions about Armenia's sovereignty and national identity. The Church's resistance symbolized a deeper contest over the soul of the nation and the moral authority intertwined with religious institutions. For many Armenians, the Church was a central pillar of national self-definition, and its opposition raised a broader ideological contest over Armenia's identity and what it means to be Armenian after the revolution.

The entry of the Armenian Apostolic Church into open political dissent posed a unique challenge to Pashinyan. Archbishop Bagrat, widely respected and regarded by many as incorruptible, was now leading a movement that merged moral and political critique. Pashinyan's discursive response was swift and aggressive. Rather than addressing Archbishop Bagrat by name, he and his allies began referring to movement leaders in deliberately opaque and derogatory terms consistent with referential/nomination strategies (Reisigl & Wodak, 2001, p. 44) that construct social actors via collective labels and depersonalizing descriptors, and with van Dijk's account of negative other-presentation/polarization (van Dijk, 2006, pp. 734–736).

Publicly, Pashinyan accused the Church's leadership of forming an “anti-Christian, immoral, antinational and antistate group” and referred to its members as “coup organizers” and part of a “criminal-oligarchic clergy” (Mirovalev, 2025). This predication, understood here as the attribution of morally and politically charged characteristics (van Leeuwen, 2007, pp. 95–98), served to reframe religious dissenters not as legitimate moral critics but as political actors portrayed as seeking to undermine the state.

Simultaneously, Pashinyan alleged that the Church hierarchy maintained long-standing ties to the former “criminal regime” and sought to reclaim the political influence and privileges enjoyed under previous administrations, particularly during the Republican Party era (Vardanyan, 2025; Cornell, 2024). This line of attack functioned as *moral evaluation* (Van Leeuwen, 2007, pp. 96–97), attributing to the Church motives and qualities that placed it outside the bounds of legitimate political participation.

The confrontation with the Church was not confined to elite exchanges between political and religious leaders; it unfolded in full public view, where its symbolic stakes

could be continuously reinforced. The staging of speeches, choice of venues, and sequencing of events all contributed to a controlled narrative arc in which the government appeared as the guardian of national integrity and the clergy as a destabilizing force. Processions, counter-rallies, and the timing of public statements were orchestrated to maximize the contrast between a disciplined, forward-looking state and an alleged faction seeking to reverse the revolution's gains. By managing the performative dimensions of the conflict in this way, the government extended its discursive advantage into the realm of political theatre, where visual spectacle and ritualized confrontation could amplify the perception of an existential divide.

On May 29, 2025, Pashinyan likened churches to “storerooms” filled with clutter - an image widely interpreted as criticism of institutional stagnation and as a veiled indictment of clerical decline (Armenian Weekly, 2025a). In CDA terms, such metaphors serve to *delegitimize entire institutions* by reducing them to symbols of decay, aligning with Fairclough's (2003, pp. 89–91) description of discursive framing in which actors and institutions are positioned as incompatible with modern, “progressive” governance.

The Prime Minister's most personal and pointed attacks were directed at the head of the Church, Catholicos Garegin II. As Church support for the *Tavush* movement became more public, Pashinyan accused the Catholicos of violating his celibacy vows, acting under “anti-Christian and anti-state influences,” and functioning not as a spiritual leader but as a political operative aligned with counter-revolutionary forces (Eurasianet, 2024). He even floated the idea of a formal state oversight mechanism for future Catholicos elections, hinting at legislation that would permit the government to effectively replace the Church's top official (Civilnet, 2025). Such a measure would mark a dramatic break with the traditional autonomy of the Armenian Apostolic Church and was widely interpreted as an attempt to bring the institution under executive control.

The confrontation escalated sharply in June 2025 when Armenian authorities arrested Archbishop Bagrat on charges of orchestrating a coup d'état. According to the official indictment, Archbishop Bagrat had organized over 1,000 former soldiers and police officers into strike groups tasked with blocking roads, inciting unrest, and disrupting infrastructure. Authorities framed the effort as a coordinated attempt to overthrow the government rather than as a protest. Pashinyan described it as a “large and sinister plan by the criminal-oligarchic clergy” to seize power (Al Jazeera, 2025; Reuters, 2025). This marked the first time a senior cleric in post-Soviet Armenia had been arrested under national security provisions.

The government's portrayal of the case reflected a securitizing move in discourse (cf. Fairclough, 2003, pp. 89–91; Chilton, 2004, pp. 111–116), in which opposition is redefined as a threat to the survival of the state. In such discourse, actors are not debated with; they are neutralized. This logic was reinforced by what Reyes (2011, pp. 792–793) terms *fear-based legitimization through hypothetical futures*, where officials warned that failure to act against the clergy would lead to national destabilization.

The state's actions did not end with Bagrat. A second cleric, Archbishop Mikael Adjapahyan of the Shirak Diocese, was also targeted for arrest. When police attempted to

detain him at the Mother See of Holy Etchmiadzin, dozens of clergy and laypeople formed a human barrier to protect him. The resulting scuffles created a moment of profound national symbolism: the physical confrontation of Church and State at the holiest site of Armenian Christianity (Armenian Weekly, 2025b).

Moral evaluation further framed the Church's actions as inherently regressive, while *securitization* cast its dissent as an existential threat to the republic. The strategic ambiguity of accusations, referring to "forces working against the state" without concrete identification amplified public suspicion while insulating the government from direct accountability.

By collapsing the boundaries between religion, civil society, and insurgency, Pashinyan's rhetoric and actions reframed the Armenian Apostolic Church from a respected national institution into a partisan actor disloyal to the republic. In this new discursive regime, moral authority belonged solely to the revolutionary government; any competing claim, even from the pulpit, was treated as subversive.

Ultimately, the clergy were not simply discredited but removed from the sphere of accepted political participation. Through carefully crafted language, symbolic actions, and highly visible measures such as the arrests at Etchmiadzin, the government acted not only to silence dissent but to reshape the very definition of what constitutes legitimate political engagement. The *Tavush for the Homeland* confrontation marked the peak of a political trajectory in which authority was presented as resting with a single, unquestionable source, and all competing voices, including those from the Church were cast as illegitimate and potentially subversive.

Table 1. Delegitimizing the "Other" in Pashinyan's Discourse

Discursive ("Other")	Target	Discursive Strategy	Examples	Intended Effect
Former regime, elites		Referential reduction; moral labeling	"Criminal oligarchic clans", "forces who plundered the state"	Delegitimize ancien régime, moralize revolution
Protesters, critics	military	Securitization; fear-based legitimization	"Agents of panic", "coup attempt", "traitors"	Reframe dissent as existential threat
Clergy, institutions	Church	Predicative demonization; symbolic exclusion	"False prophets", "those in robes and knives"	Collapse religious dissent into sabotage
Pashinyan ('Self')		Altruistic legitimization; symbolic capital	"I took responsibility for peace"; walking with people	Sanctify rule, monopolize moral authority

Source: Elaborated by the authors

Across these phases, the analysis reveals a consistent shift in the function of discourse. Early rhetoric constructs legitimacy through inclusion and moral renewal, while later stages rely increasingly on exclusion, threat construction, and the redefinition of dissent as disloyalty. This progression reflects a transition from mobilizing discourse to stabilizing discourse, where language is used not only to describe political reality but to delimit the boundaries of legitimate participation.

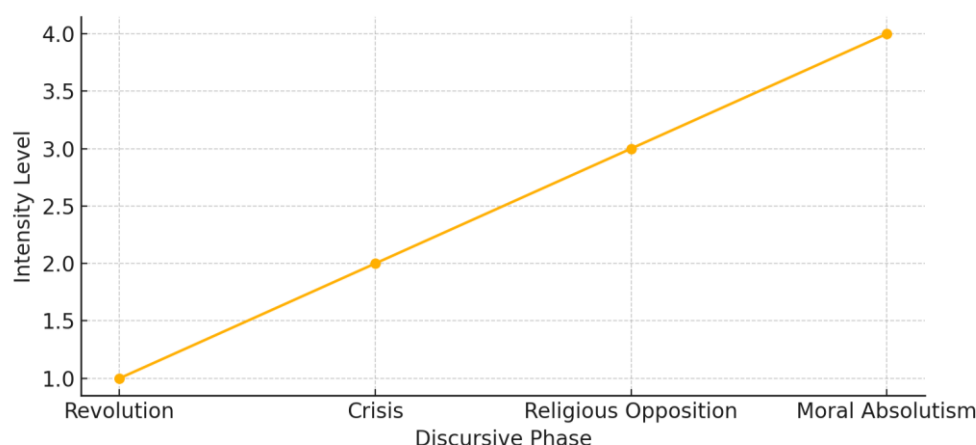


Figure 1. Discursive Strategy Intensification in Pashinyan's Rhetoric

Source: Elaborated by the authors

Implications for Political Legitimacy and Community

The progression of Pashinyan's political rhetoric indicates not only a constriction of Armenia's public sphere but also a transformation in the basis of political legitimacy. This transformation is shaped by a combination of structural and situational factors. The post-war crisis created conditions of political vulnerability that incentivized the consolidation of authority, while ongoing institutional challenges encouraged the framing of dissent as destabilizing. At the same time, the persistence of hybrid political structures provided a foundation for the strategic use of moral and security narratives.

By advancing a governing style grounded in moral certainty and narratives of existential danger, his approach departs from the democratic pluralism envisioned in 2018 and moves toward a framework where allegiance is celebrated as a civic virtue, while dissent is portrayed as a moral transgression.

One direct consequence of this morally charged political order is the weakening of the shared foundation needed for genuine democratic engagement. When definitions of acceptable speech and participation are shaped through invocations of existential threat and moral virtue, political disagreement is recast as unacceptable -something to be dismissed or condemned rather than debated. In such an environment, the political arena shifts from a space of negotiation and collective agency to one defined by exclusion and mistrust, with the onus placed on critics to justify themselves to those in power.

The impact of this shift extends beyond formal political institutions, influencing how national identity and collective memory are constructed. By intertwining narratives of historical trauma, communal grievance, and a redemptive national story, Pashinyan's discourse encourages citizens to root their belonging not in common institutions, but in alignment with a sanctified "Self" that stands in opposition to an ever-changing array of "Others." This process fosters cycles of polarization, wherein each successive crisis demands the identification of new adversaries, thereby rationalizing the continued consolidation of political authority.

Armenia's experience also demonstrates how populist rhetoric can evolve when confronted with opposition from non-state actors such as religious institutions or civil society groups. As perceived threats shift from entrenched elites to disaffected military figures to the Church the category of the political "enemy" becomes increasingly elastic. This adaptability suggests that authoritarian populism functions less as a static political arrangement and more as a continuous discursive project, one that reshapes the boundaries of inclusion and exclusion in response to changing political circumstances.

From a scholarly perspective, these trends challenge optimistic expectations about democratization in the post-revolutionary period. The Armenian case illustrates broader patterns observable in post-revolutionary and post-Soviet settings, where initial democratic mobilization is followed by discursive consolidation of authority. The expansion of the category of the political "enemy" and the increasing reliance on securitizing rhetoric are not unique to Armenia but reflect a wider trajectory in contexts where institutional constraints remain weak and political legitimacy is continuously contested. These dynamics underscore the need to examine not only institutional structures of democracy, but also the symbolic and linguistic mechanisms through which legitimacy is constructed, contested, and transformed.

Looking ahead, the persistence of these rhetorical tendencies raises critical questions about the handling of future crises. Should similar situations arise whether over territorial disputes, economic upheaval, or institutional confrontation the entrenched habit of defining dissent as a threat to survival could make it easier to revert to securitized narratives and exclusionary framing. Over time, this normalization risks erasing the boundary between emergency measures and routine politics, allowing a discourse of crisis to dominate even in times of stability. Such a pattern would further constrain the space for legitimate political expression, fostering a governance model in which consensus is equated with adherence to a single, elevated vision of the national interest.

Ultimately, the Armenian case underscores the fragility of political community during periods of accelerated change. As stories of redemption and betrayal increasingly shape the parameters of public life, the conditions for pluralism, institutional resilience, and civic trust are significantly altered. Meeting this challenge will require not only the restoration of checks and balances, but also a revitalization of the language and practices that sustain inclusive forms of political belonging.

Conclusion

The findings demonstrate that the transformation of political rhetoric is closely linked to the construction of legitimacy in post-revolutionary contexts. As discourse shifts from inclusive mobilization to exclusionary stabilization, the criteria of legitimate political participation are redefined, narrowing the space for dissent. This confirms that rhetorical strategies are not secondary to political processes but are central to the consolidation and maintenance of authority.

The evidence suggests that the resilience of democratic change is not secured solely through constitutional structures or electoral competition; it also relies on preserving discursive

norms that uphold the legitimacy of diverse political actors. Armenia's case illustrates how rhetorical adaptability allows leaders to respond to evolving challenges whether from entrenched elites, protest movements, or religious institutions, while maintaining a cohesive narrative of self-legitimation. This adaptability can be politically effective, yet it risks eroding the safeguards that prevent the concentration of authority in a single figure or movement.

Comparatively, the Armenian trajectory mirrors patterns seen in other post-revolutionary or post-crisis states, where the moral capital of a transformative moment is gradually reframed as a mandate for centralized control. In these contexts, political loyalty becomes bound to the person of the leader, and dissent is reframed not simply as policy disagreement but as a challenge to the nation's cohesion or survival. Such dynamics complicate the distinction between leadership as a unifying force and leadership as a gatekeeper of acceptable political expression.

Looking ahead, sustaining Armenia's democratic institutions will require more than procedural safeguards; it will demand a recalibration of political communication to accommodate dissent without framing it as disloyalty. Civil society, independent media, and institutional actors will play a crucial role in expanding the discursive space, resisting the normalization of crisis language, and promoting narratives that make room for genuine contestation. The goal should be to create an environment where disagreement is interpreted as an indicator of democratic vitality rather than a threat to stability.

Ultimately, Armenia's experience offers a cautionary lesson for states navigating the aftermath of rapid political change: the rhetorical tools that energize a revolution can, over time, be reconfigured to defend the status quo. Recognizing and addressing this shift early is essential if the original promise of political transformation is to be preserved and translated into a lasting, inclusive democratic order.

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ECONOMIC GROWTH AND LABOR QUALITY IN ROMANIA IN THE LIGHT OF THE 2030 AGENDA - A COMPARATIVE INSIGHT WITH THE REPUBLIC OF MOLDOVA

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Abstract: This paper analyzes the relationship between economic growth and labor market dynamics in Romania, within the framework of Sustainable Development Goal 8 (SDG 8). The aim is to empirically assess how GDP evolution influences the main labor market indicators: employment rate, total and youth unemployment, real average wage and labor productivity. The analysis uses annual data for the period 1996-2025 and combines descriptive methods with linear regression. The results highlight a positive relationship between economic growth and labor productivity, as well as a moderate correlation with employment. However, GDP only partially explains labor market developments, which are also shaped by structural factors such as human capital and institutional rigidities. The persistence of youth unemployment and the gap between wages and productivity reveal the limits of translating economic growth into decent work. Economic growth is necessary, but not sufficient for achieving SDG 8.

Keywords: economic growth; GDP; labor market; employment; unemployment; labor productivity; sustainable development

JEL Classification: E24; O47; J21; C22

UDC: [330.35+330.55+331.5]"2030"(478+498)

Introduction

The relationship between economic growth and labor market dynamics represents one of the central themes of contemporary public debate, both at European and national level. In recent years, discussions on economic performance have increasingly focused on the gap between GDP growth and the effective creation of sustainable jobs. Recent economic analyses, such as those published by Charles Schwab Corporation (2023), explicitly show that high GDP growth rates do not automatically lead to a proportional increase in employment, revealing a possible gap between output growth and job creation. This issue is extensively discussed in the political economy and institutional development literature as well. In *Why Nations Fail* (2012), Daron Acemoglu and James A. Robinson argue that long-term economic performance

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depends on the capacity of institutions to translate economic growth into inclusive prosperity. From this perspective, GDP growth by itself is not enough; what matters is its conversion into real employment opportunities and social mobility.

At the international level, the International Labour Organization underscores, in its report *Growth Strategies and Quality Employment Generation* (2013), that growth strategies must be evaluated by their capacity to generate productive employment and quality work. The concept of "decent work" thus becomes a central analytical criterion, integrating dimensions such as employment stability, wage levels and labor productivity. These orientations are reflected globally in the 2030 Agenda for Sustainable Development, adopted in 2015 by the United Nations, through Goal 8 "Decent Work and Economic Growth". The goal explicitly establishes the need to align sustained economic growth with full and productive employment, the reduction of unemployment and the improvement of working conditions.

At the European level, employment policies are developed and monitored by the European Commission through the "Employment, Social Affairs and Inclusion" framework, as well as through the European Pillar of Social Rights (2017). These strategies use indicators such as the employment rate, the unemployment rate (including youth unemployment), labor productivity and real income trends to assess labor market performance. At the same time, the *Future of Jobs Report 2025* published by the World Economic Forum (2025) highlights that technological transformations and the green transition will substantially modify the structure of employment, underscoring the need to adapt human capital and public policies accordingly.

In Romania, the debate on the relationship between GDP growth and employment is particularly relevant in the context of European economic convergence, external migration and the structural adjustments that followed both the financial crisis and the pandemic. National strategies on employment and sustainable development use indicators similar to their European counterparts to monitor labor market performance; however, the question of how far GDP dynamics explain the evolution of these indicators remains open.

Within this theoretical and strategic framework, this article tries to examine the correlation between GDP evolution and the following labor market indicators in Romania: the employment rate (ages 15-64), the total unemployment rate, the youth unemployment rate (ages 15-24), the real average wage and the labor productivity growth rate. These indicators are used in European and international employment and sustainable development strategies and constitute relevant variables for assessing labor market performance.

The aim of the paper is framed explicitly in empirical terms: testing the existence and intensity of the relationship between GDP dynamics and the above mentioned labor market indicators, over the period 1996-2025, using descriptive methods, correlation analysis and simple linear regression. The study does not assume a priori that GDP growth automatically leads to improvements in employment, but rather seeks to empirically verify this relationship in the case of Romania. Through this approach, the article contributes to the debate on the effectiveness of economic growth strategies in generating sustainable employment and

offers an applied analysis of the relationship between macroeconomic performance and labor market dynamics in Romania.

Literature Review

Sustainable Development Goal 8 of the 2030 Agenda focuses on the creation of decent jobs and sustainable economic growth, with particular attention to social inclusion and labor protection, according to UNDESA. This goal centers on GDP and its per capita growth, while ignoring unpaid work performed mainly by women. According to Rai et al. (2019), the importance on economic growth and productivity maintains gender inequalities, making it necessary for SDG 8 to be rethought in order to become truly inclusive and sustainable.

According to Burggraefe et al. (2015), the relationship between economic growth and employment remains stable across economic cycles, but productivity slowdowns have a direct effect on job quality. Maitah et al. (2015) analyzed GDP growth in certain EU member states, namely Germany and Austria, in relation to employment rate growth, observing a direct relationship and confirming the extension of Okun's Law. In the case of the Czech Republic, they noted a greater vulnerability of unemployment and a stagnating economy, caused by weak consumption growth and low GDP per capita.

Implementing the 2030 Agenda and the Sustainable Development Goals means reforming society based on the convergence of economic growth, social inclusion and environmental protection, thus ensuring the framework for sustainable and equitable development. In the view of Pârțachi et al. (2018), the success of this process depends on the quality of national statistical systems, which provide the relevant information that will form the basis of the public policies adopted, specific to each country.

Kreinin and Aigner (2022) argue that goals 8.4, 8.7 and 8.8 of the 2030 Agenda adequately address decent and sustainable work, while the SDGs as a whole place emphasis on economic growth and employment, which may undermine social foundations. Jianu et al. (2021) analyzed the implementation of SDG 8 at EU level and concluded that it contributes to reducing inequalities in the labor market and to stimulating convergence among member states, even though significant regional differences exist. The goal is a stable and equitable labor market by 2030, which requires increased attention to disadvantaged groups, young people and sectors capable of generating new jobs.

According to Wijaya et al. (2021), in the case of Romania, the labor force and human development indicators have a significant impact on economic growth, both through direct and indirect means. Policies that support and protect the population (such as those related to health, education and human development) can strengthen citizens' trust, amplifying their effects on the labor force and, implicitly, on economic performance.

Rantanen et al. (2020) argue that the Decent Work agenda has been successfully implemented in approximately two thirds of member states, supported by the UN's 2030 Agenda. Although significant variations exist between countries and adjustments are needed to more broadly cover all areas and special situations that may arise (such as

pandemics and global crises), the agenda remains an instrument through which decent work is promoted at the global level.

Ladaru et al. (2026) conducted a study concluding that per capita GDP growth does not automatically guarantee an increase in employment, a fact that can be explained by automation and sectoral restructuring. Thus, adherence to SDG 8 depends more on the quality of the labor force and labor market integration than on aggregate economic growth.

The study by Castro et al. (2020) highlights the importance of social economy organizations in reducing gender inequalities in the labor market, in this way contributing to the achievement of SDG 5, SDG 8 and SDG 10, by promoting decent work, gender equity and social inclusion. Filip (2015) analyzed the influence of GDP growth on economic development in 11 Central and Eastern European countries, concluding that their main focus should be on reducing unemployment, stimulating exports and foreign investment and improving the banking system.

Polster (2021) argues that improving institutional quality, the stability of economic policies and the adequate management of employment and demographic challenges lead to sustainable economic growth. Tumanoska (2020) analyzed the relationship between economic growth and both total and youth unemployment rates in two groups of countries, 7 South-Eastern European countries and 14 EU member states, using the Autoregressive Distributed Lag model on data from 1997 to 2017. In both panels, a decline in unemployment was linked to economic growth, with this effect being stronger in EU countries, while in the other panel, GDP changes influenced unemployment adjustment, explained by greater labor market flexibility. Adamowicz (2022) highlights the importance of adopting adequate public policies in the context of major crises, as government interventions can mitigate their negative effects.

Momete (2007) analyzed the relationship between economic growth and employment, concluding that in certain sectors there is even a personnel deficit. Policies oriented toward supporting human capital are necessary, through the creation of social protection programs and job creation schemes. Romania's economic growth has been influenced not only by internal factors - such as the legislative framework and adopted policies, but also by external factors, including the global financial crisis.

The study by Voda et al. (2019) highlights a relationship between GDP and investment that influences the labor force, while limiting job creation due to automation in certain sectors. The COVID-19 pandemic forced digital transformation and revealed the need for a flexible labor force; therefore, effective educational and social policies are urgently needed to turn digitalization into a genuine benefit for employees and, implicitly, for society, according to Piroșcă et al. (2021). As an example, the COVID-19 pandemic led to significant changes in the structure of the labor market in Poland, revealing the vulnerabilities of young people and self-employed workers.

Reducing discrimination in the labor market contributes to achieving SDG 8 through the inclusion of all social groups, increasing participation in the economy and labor force productivity. Social inclusion and equal opportunities are not simply social objectives, they

are factors that determine GDP growth by influencing a country's economic potential, according to Stanila et al. (2020). The COVID-19 pandemic further deepened existing labor market inequalities and significantly altered working dynamics, according to Agba et al. (2020). This crisis accelerated the adoption of practices such as remote work and flexible working hours, as well as the implementation of employee wellbeing programs.

Methodology

To assess the dynamics of economic growth and progress toward Sustainable Development Goal 8 (decent work and economic growth), two categories of indicators were used: macroeconomic growth indicators and labor market indicators. The category of economic growth indicators includes the annual real GDP growth rate, which reflects the size and dynamics of economic activity at national level. For the analysis of Romania's labor market, the following indicators were used: the employment rate for the population aged 15 to 64, the total unemployment rate, the youth unemployment rate (ages 15-24), the real average wage and the labor productivity growth rate per employed person, expressed as a percentage.

These indicators allow the assessment of labor market integration, the efficiency of labor force utilization and the level of remuneration adjusted for price developments. Taken together, the selected indicators provide an integrated perspective on the relationship between economic growth, labor market functioning and the population's standard of living, being relevant for monitoring progress toward Sustainable Development Goal 8.

The economic analysis for the period 1996-2025 was based in data collected and processed from the National Institute of Statistics of Romania. The following information were used: economic dynamics, labor market indicators represented by the employment rate for the 15-64 age group, total unemployment and youth unemployment, as well as indicators related to living standards and purchasing power, namely the net nominal wage. To eliminate the effect of inflation and express wages in comparable terms, the real average wage was determined by deflating the net nominal wage using the annual Consumer Price Index.

The research methodology adopts a mixed approach, combining descriptive and econometric methods. Descriptive analysis, realised by line chart graphical representations, was used to highlight the evolution over time of GDP and the main labor market indicators.

The methodology applied to the analysis of the Republic of Moldova is based on the use of chain-based indices as a tool for assessing the annual dynamics of economic indicators. These are calculated by dividing the value of an indicator in the current year by its corresponding value in the previous year, with the result expressed as a percentage. The analysis covers the real monthly average wage and GDP at real prices, both indicators expressed in euros, for the period 2002-2024. Applying this method allows for the identification of annual variations and trends of growth or decline, providing a relevant image of the economic evolution of the Republic of Moldova.

In the economic literature, the relationship between economic growth and labor market developments is frequently explained through Okun's Law, according to which variations in economic output are associated with changes in employment and the unemployment rate. Within this theoretical framework, the research aims to empirically test the relationship between GDP dynamics and the main labor market indicators.

Building on these theoretical considerations, the following research hypotheses were formulated:

- **H₁:** Real GDP growth is positively associated with the employment rate;
- **H₂:** Real GDP growth is positively associated with the real average wage;
- **H₃:** GDP only partially explains variations in the employment rate, unemployment and labor productivity, suggesting the influence of additional structural factors.

To assess the relationship between economic growth and labor productivity, a simple linear regression model was used. The regression analysis was carried out on the basis of the data presented in Table 1, which contains the macroeconomic and labor market indicators for the analyzed period. The simple linear regression model is defined by the following equation:

$$Y = \beta_0 + \beta_1 * X + \varepsilon \quad (1)$$

where:

- **Y** represents the real GDP growth rate;
- **X** represents the labor productivity growth rate.

To avoid the occurrence of spurious regressions, the variables were analyzed in terms of growth rates and the stationarity of the time series was verified using the Augmented Dickey-Fuller (ADF) test. The validity of the econometric model was evaluated through the analysis of residual properties. The normality of errors was verified using the Jarque-Bera test, the homoscedasticity of residuals was tested through the Breusch-Pagan-Godfrey test and the presence of first-order residual autocorrelation was checked using the Durbin-Watson test. All statistical analyses were carried out at a 5% significance level.

Although the analysis is based on a relatively short time series of 29 annual observations, it provides relevant insights into the relationship between economic growth and labor market developments in the Romanian economy, within the context of monitoring progress toward Sustainable Development Goal 8 of the 2030 Agenda.

Results and discussion

The analysis of macroeconomic and labor market indicators is shown in Table 1, which provides an overview of the evolution of the Romanian economy over two decades, highlighting the relationship between economic growth and labor force dynamics. The data are expressed both in nominal terms (RON) and as percentage indicators, in order to illustrate both the scale of economic phenomena and their rate of change.

The main categories of indicators analyzed are: economic dynamics, reflected through the evolution of the real GDP growth rate; labor market indicators, highlighted through the employment rate and the unemployment rate; and living standards, illustrated through the evolution of the real average wage. The analysis also includes labor productivity, a fundamental indicator for assessing economic efficiency. The relationship between labor productivity and the real average wage provides relevant information regarding the sustainability of economic growth and the evolution of living standards.

The analysis of GDP dynamics in Romania over three decades reveals a trajectory marked by cycles of expansion and contraction, reflecting both the structural transformations of the national economy and its vulnerability to external shocks. To more clearly highlight the dynamics of economic cycles, the evolution of the real GDP growth rate over the analyzed period is illustrated in Figure 1.

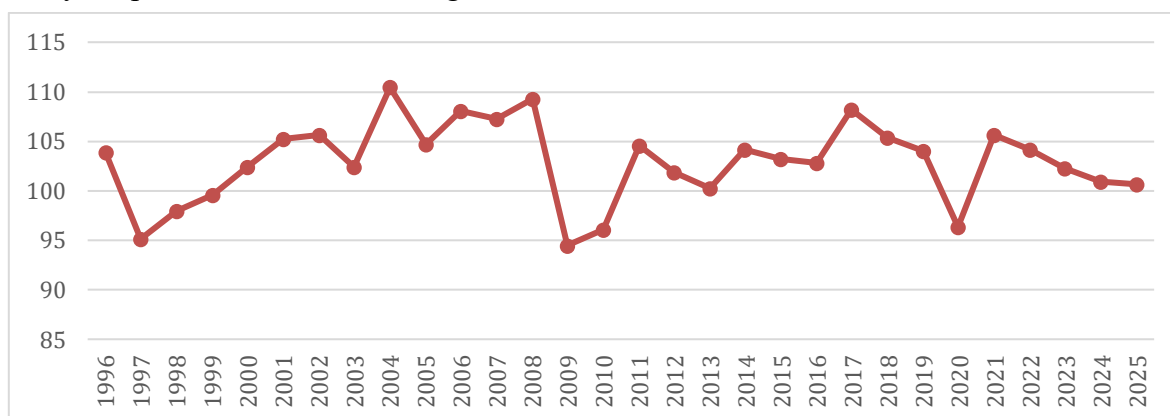


Figure 1. Evolution of the real GDP growth rate over the period 1996-2025

Source: compiled by the author based on data from the National Institute of Statistics

The period 1996-2000 begins with modest growth (+3.9% in 1996), followed by two consecutive contractions in 1997 (-4.8%) and 1998 (-2.0%), driven by macroeconomic instability, high inflation and the difficult transition to a market economy. The recovery of 2000-2001 marks the beginning of a cycle of sustained growth. The period 2001-2008 represents the longest phase of economic expansion in Romania's post-1989 history, with uninterrupted positive growth rates and a remarkable peak in 2004 (+10.4%), supported by domestic consumption, foreign direct investment and the EU accession process. This period consolidated the country's economic base, although it also generated structural imbalances.

The global financial crisis of 2009-2010 abruptly interrupted this cycle, with GDP contracting by -5.5% in 2009 and -3.9% in 2010 (the most severe recession of the analyzed period) reflecting the high degree of exposure of the Romanian economy to external shocks and the fragility of a growth model predominantly based on consumption. The period 2011-2019 marks a gradual recovery, with positive but more moderate growth rates, except for 2017 (+8.2%), when fiscal stimuli temporarily boosted domestic consumption. This period highlights uneven growth that remained dependent on cyclical factors.

The year 2020 brings a second major contraction (-3.6%), driven by the COVID-19 pandemic and its associated restrictions, followed by a swift recovery in 2021 (+5.6%),

supported by European funds and the rebound in domestic demand. The period 2022-2025 points to a progressive slowdown in growth, from +4.2% in 2022 to an estimated +0.7% in 2025, signaling a maturing of the economic cycle and a convergence toward lower growth rates, influenced by inflationary pressures, geopolitical uncertainties and the necessary fiscal consolidation.

The average for the analyzed period stands at approximately 3.2%, reflecting the real growth potential of the Romanian economy, yet with significant cyclical variations that underscore the need for long-term economic stabilization policies.

Within the analysis, three relationships were examined between GDP dynamics and the main labor market indicators. Figure 2 shows the evolution of the GDP growth rate, an indicator that reflects the dynamics of economic activity and displays a high degree of volatility.

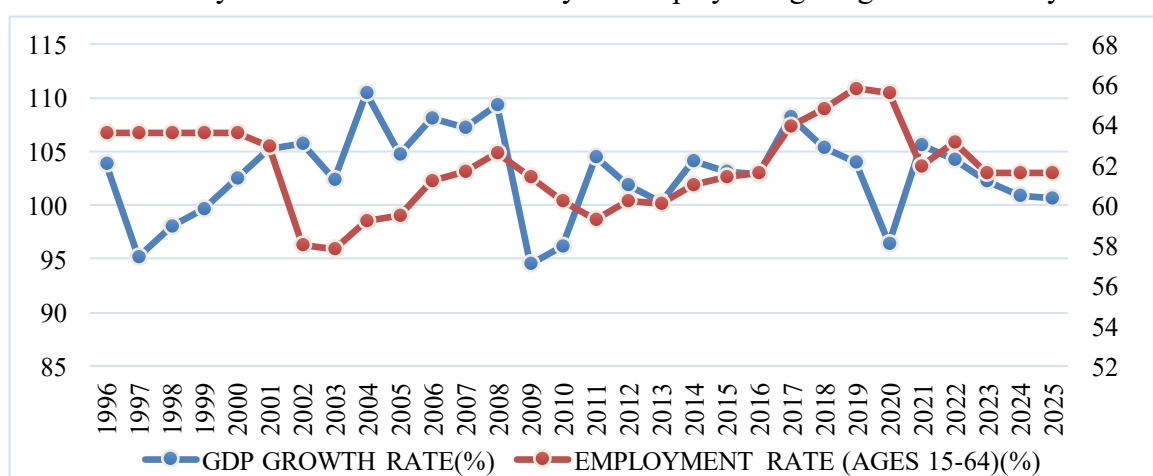


Figure 2. Evolution of the real GDP growth rate versus the employment rate in the period 1996-2025 (%)

Source: compiled by the author based on data from the National Institute of Statistics

The comparative analysis of the two indicators highlights a complex and not always synchronized relationship between economic growth and employment dynamics, illustrating the particularities of the Romanian labor market in the context of transition and European integration.

The period 1996-2002 stands out for a relatively high and stable employment rate (around 63.6%), maintained despite the economic contractions of 1997-1999. This phenomenon reflects the structural rigidity of the Romanian labor market during the transition period, where the restructuring of state-owned enterprises progressed slowly and large-scale layoffs occurred with a delay relative to the economic decline. The sharp drop in the employment rate in 2002 (from 62.9% to 58.0%) coincides with the acceleration of privatizations and industrial restructuring, not with an economic recession, which confirms the time lag between economic growth and labor market adjustments.

The period 2003-2008 sees a gradual recovery in the employment rate, from 57.8% to 62.6%, supported by significant economic growth, peaking at +10.4% in 2004. This period illustrates the positive workings of Okun's Law: sustained economic expansion generated

the gradual absorption of the available labor force, particularly in the construction, trade and services sectors, driven by EU accession in 2007.

The financial crisis of 2009-2010 produces a double effect: the GDP contraction of -5.5% and -3.9% is accompanied by a decline in the employment rate from 62.6% to 60.2%, confirming the negative correlation between recession and employment. However, the magnitude of the employment decline was smaller than that of GDP, suggesting that Romanian firms partly opted for reduced working hours and wage cuts rather than mass layoffs.

The period 2011-2019 shows the clearest positive correlation between the two indicators: the renewed economic growth, culminating in +8.2% in 2017, led to the highest employment rate recorded in the analyzed period, 65.8% in 2019. This evolution reflects the effects of fiscal stimuli, public sector wage increases and high labor demand from foreign investors.

The year 2020 produces a paradoxical disconnect: although GDP falls by -3.6%, the employment rate holds at 65.6%, virtually unchanged from 2019. This can be explained by state-subsidized short-time work schemes, which allowed employment relationships to be maintained despite the suspension of economic activity, an unprecedented countercyclical intervention in Romania's recent history.

The period 2021-2025 points to a convergence toward more moderate rates of both GDP growth and employment, stabilizing around 61-63%. The stagnation of the employment rate under conditions of positive economic growth suggests the emergence of structural constraints in the labor market, such as a shortage of skilled labor, emigration and demographic aging, factors that limit the economy's capacity to convert economic growth into additional employment.

The second relationship examined in the study concerns the link between the real average wage and the labor productivity growth rate, as shown in Figure 3.

The comparative analysis of the two indicators reveals a long-term divergent dynamic between the evolution of the real average wage and the labor productivity growth rate, with significant implications for the competitiveness of the Romanian economy.

The period 1996-2008 is characterized by accelerated growth in the real average wage, supported by positive productivity growth rates, with notable peaks in 2002 (+17.7%) and 2004 (+15.0%), periods that coincide with the acceleration of economic restructuring and the increase in foreign direct investment in Romania.

The financial crisis of 2009-2010 produced a visible correction, with the labor productivity growth rate recording negative values (-1.9% and -0.7% respectively), without however slowing the rise of the real average wage, suggesting a temporary decoupling between remuneration and economic performance. The period 2011-2019 marks a sustained rebound in both indicators, with the real average wage approaching the 3,000 RON level, while labor productivity recorded moderate but steady growth. The year 2020 represents a

major inflection point, with the real average wage registering a sharp decline because of the pandemic crisis, followed by a swift recovery in 2021-2023.

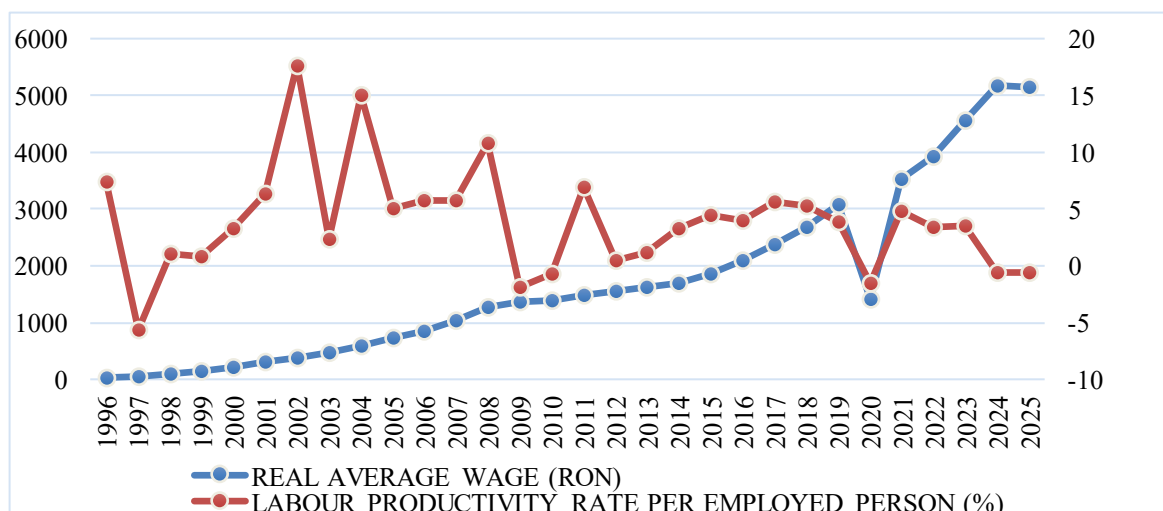


Figure 3. Evolution of the real average wage versus the labor productivity growth rate over the period 1996-2025

Source: compiled by the author based on data from the National Institute of Statistics

The period 2024-2025 raises macroeconomic concerns: the labor productivity growth rate turns negative (-0.65%), while the real average wage continues to rise, pointing to a widening gap between labor costs and labor efficiency, with potentially adverse effects on competitiveness and the sustainability of economic growth. Figure 4 illustrates the evolution of unemployment in relation to GDP dynamics and highlights the inverse relationship between the real GDP growth rate and total unemployment.

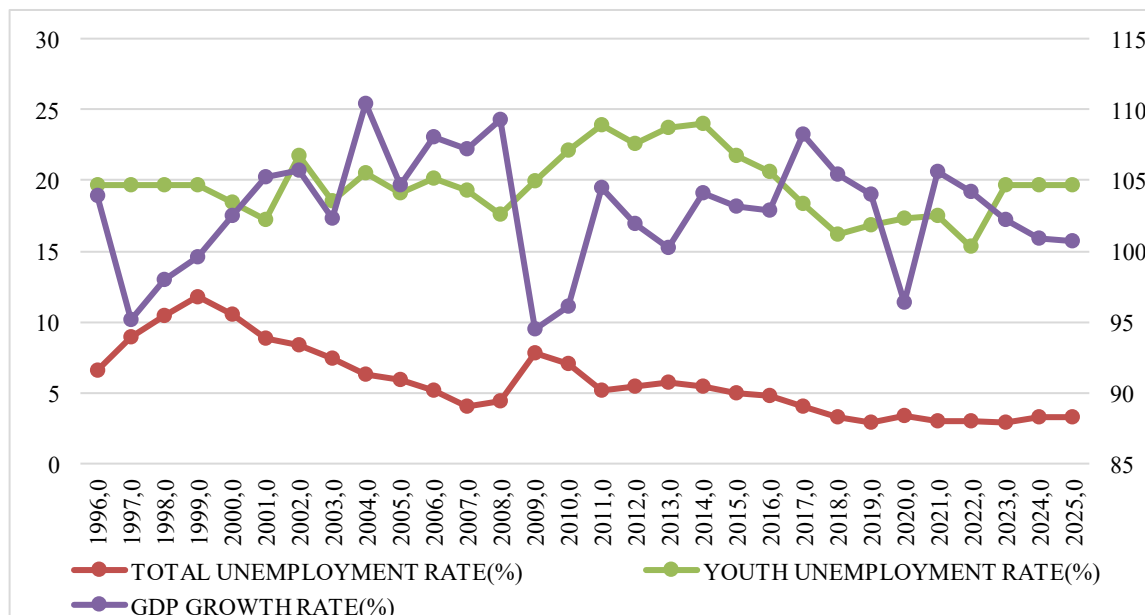


Figure 4. Evolution of total unemployment and youth unemployment versus the real GDP growth rate over the period 1996-2025

Source: compiled by the author based on data from the National Institute of Statistics

The relationship between the three indicators is visible across the entire period, partially confirming the logic of Okun's Law: periods of economic contraction, 1997-1999, 2009-2010 and 2020, coincide with increases in the total unemployment rate, while phases of sustained expansion from 2001-2008 and 2014-2019 are associated with its reduction, down to the historic low of 2.9% in 2019. Nevertheless, the magnitude of unemployment adjustment is systematically smaller than that of GDP, reflecting structural rigidities in the Romanian labor market and state interventions during periods of crisis.

Youth unemployment follows a distinct trajectory, less correlated with the economic cycle, remaining at a structurally high level with an average of approximately 19.7% over the entire analyzed period, compared to 5.8% for total unemployment. The most concerning aspect is the post-2009 crisis evolution: while GDP was recovering from 2011 onward and total unemployment was declining, the youth unemployment rate continued to rise, reaching an absolute peak of 24% in 2014.

The period 2017-2019 represents the only moment in the analyzed history where the convergence among all three indicators is complete and simultaneously favorable: high economic growth (+8.2% in 2017), total unemployment at its historic low and youth unemployment falling rapidly toward 16.2% in 2018. This exceptional conjuncture was driven by a combination of fiscal stimuli, public sector wage increases and high labor demand from investors, without, however, reflecting a structural resolution of the problem of youth labor market integration.

The year 2020 produces a shock across all three indicators: the real GDP growth rate drops by -3.6%, total unemployment rises slightly to 3.4% and youth unemployment climbs to 17.3%. The relatively limited magnitude of the unemployment increase relative to the scale of the economic contraction is explained by the state-subsidized short-time work schemes, which prevented mass layoffs but also preserved existing inefficiencies in the labor market.

The period 2021-2025 points to a stabilization of all three indicators at moderate levels: positive but slowing economic growth, total unemployment stabilized around 3.3% and youth unemployment reverting toward the historical average of approximately 19.7%. This convergence toward historical averages, in the context of diminished economic growth, suggests that the Romanian economy is entering a phase of cyclical maturity, in which the potential for reducing unemployment through economic growth is limited by structural demographic and skills constraints.

The results suggest that, although the real GDP growth rate has a positive effect on employment and on the evolution of the real wage, it does not fully account for the variations in the indicators associated with Sustainable Development Goal 8 "Decent Work and Economic Growth." The persistence of youth unemployment highlights the influence of additional structural factors, such as the education system, labor migration and the structural characteristics of the economy.

The results indicate that Romania has made significant progress in terms of economic growth, but its translation into decent work remains partially limited. GDP growth is a

necessary condition for achieving Goal 8 of the 2030 Agenda, but not a sufficient one in the absence of public policies oriented toward employment quality and labor market inclusion.

Continuing the analysis, the study turns its attention to the Republic of Moldova for the period 2002-2024. To more accurately capture developments over time, chain-based indices are used, which allow for the analysis of relative year-on-year variations. In this regard, two essential indicators are examined: the real monthly average wage and GDP at real prices, both expressed in euros. Chain-based indices are calculated as the ratio between the value of the indicator in the current year and its value in the previous year, multiplied by 100, which allows for the identification of the annual rate of growth or decline.

Through the use of this methodology, the analysis seeks to highlight the extent to which the evolution of real GDP is accompanied by changes in real wages in the Republic of Moldova, thus offering a perspective on the relationship between economic growth and living standards in the context of sustainable economic development objectives, revealed in Figure 5.

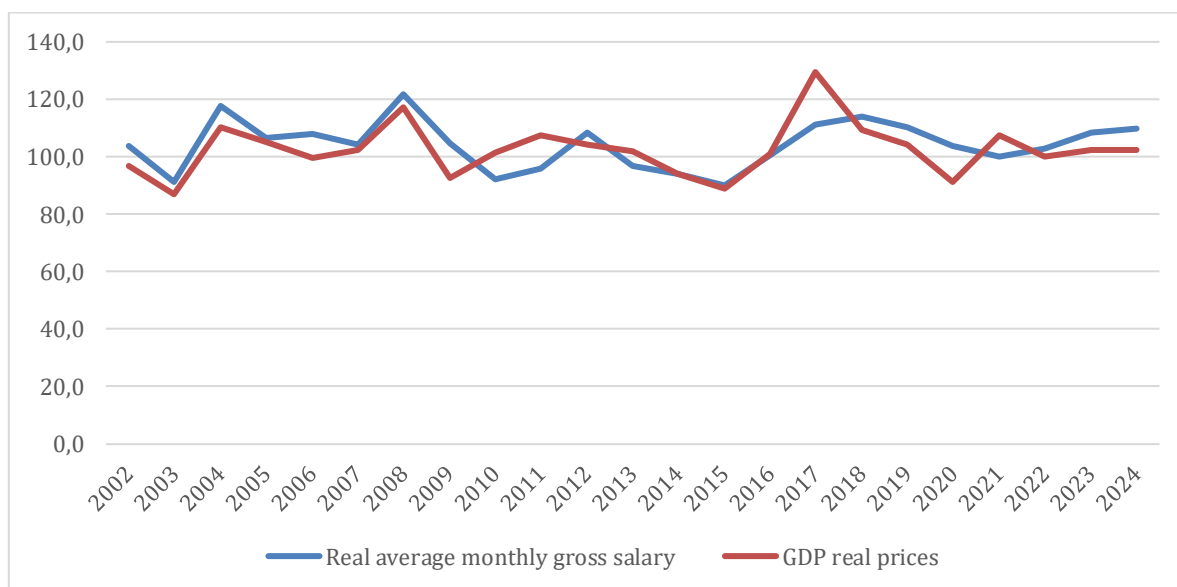


Figure 5. Evolution of real GDP and the real monthly average wage

Source: compiled by the author based on data from the National Institute of Statistics

In Figure 5, both indicators display significant year-on-year fluctuations, reflecting the sensitivity of the economy to internal and external factors. In most years, index values remain close to the 100 level, indicating an alternation between periods of growth and stagnation or slight decline.

Real GDP (represented by the red line) records more pronounced variations compared to the real wage. A notable peak is observed around 2017, when the index exceeds 120, suggesting accelerated economic growth. There are also periods of decline, around 2009 and 2020, which can be associated with economic crises or external shocks.

As for the real monthly average wage (the blue line), its evolution is relatively more stable, with more moderate variations. It generally follows the trend of GDP, indicating the

existence of a positive relationship between economic growth and wage dynamics. However, the correlation is not perfect, with periods in which wages grow more slowly or even stagnate despite GDP growth.

An important aspect highlighted by the chart is the existence of time lags between the evolution of the two indicators. In certain intervals, GDP growth is not immediately reflected in real wage growth, suggesting that the transmission of economic growth to the population's living standards is incomplete or delayed.

To deepen the analysis of the relationship between economic growth and labor market developments, the descriptive and correlational analysis is complemented by the application of a simple linear regression model. In this context, the econometric model used aims to estimate the effect of the productivity growth rate on the GDP growth rate. The choice of these variables is justified by the central role that economic growth plays in job creation and in improving labor market performance, in line with the objectives set out under Sustainable Development Goal 8.

A rigorous econometric analysis requires verifying the statistical properties of the data series used, particularly their stationarity. In this context, the Augmented Dickey-Fuller (ADF) test was applied to test for the presence of a unit root and, implicitly, the stationary character of the analyzed series.

Table 1. Stationarity of data series

Test type	ADF
Variables	Prob.
Real GDP growth	0.0037
Labor productivity growth rate	0.0004

Source: compiled by the author

The results of the Augmented Dickey-Fuller (ADF) stationarity test, presented in Table 1, indicate that both analyzed series are stationary at level. For the real GDP growth rate, the probability value associated with the ADF test is 0.0037, while for the labor productivity growth rate it is 0.0004, both values falling below the 5% significance level.

Within this context, to highlight the relationship between the analyzed variables, a linear regression model will be constructed in which the real GDP growth rate is treated as the dependent variable and the labor productivity growth rate serves as the explanatory variable.

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Table 2. Regression model results

Dependent Variable: Real GDP growth				
Method: Least Squares				
Sample: 1996 2025				
Included observations: 30				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Labor productivity growth rate	0.694982	0.093369	7.443418	0.0000
C	100.1866	0.570095	175.7366	0.0000
R-squared	0.664287	Mean dependent var		102.8999
Adjusted R-squared	0.652297	S.D. dependent var		4.071488
S.E. of regression	2.400808	Akaike info criterion		4.653829
Sum squared resid	161.3887	Schwarz criterion		4.747242
Log likelihood	-67.80743	Hannan-Quinn criter.		4.683712
F-statistic	55.40447	Durbin-Watson stat		1.800343
Prob(F-statistic)	0.000000			

Source: compiled by the author

The results of the linear regression model estimation, presented in Table 2, highlight the existence of a positive and statistically significant relationship between the labor productivity growth rate and the real GDP growth rate. The regression equation obtained is:

$$\text{Real GDP growth rate} = 100.1866 + 0.6949 \times \text{Labor productivity growth rate} \quad (2)$$

The coefficient associated with the explanatory variable (0.6949) indicates that a one-unit increase in the labor productivity growth rate leads, on average, to an increase of approximately 0.69 units in the real GDP growth rate, holding all other factors constant. The probability value (p-value = 0.0000) confirms that this coefficient is statistically significant.

Regarding the goodness of fit, the coefficient of determination $R^2 = 0.6643$ indicates that approximately 66.43% of the variation in the real GDP growth rate is explained by variations in the labor productivity growth rate. The adjusted value (Adjusted $R^2 = 0.6523$) confirms the robustness of the model.

The overall significance test (F-statistic = 55.40447, with p-value = 0.0000) shows that the model is valid, with the explanatory variable having a significant impact on the dependent variable. In addition, the Durbin-Watson statistic (DW = 1.8003) suggests the absence of significant error autocorrelation, indicating a well-specified model.

The validity of the econometric conclusions also depends on whether the fundamental assumptions of the classical linear regression model are met. In this regard, it is necessary to verify the properties of the residuals, as they must satisfy certain conditions for the estimates obtained to be efficient and unbiased.

Table 3. Results of tests applied to the residuals

Test	Probability
Jarque-Bera	0,1154
Harvey	0,8936
Breusch Godfrey	0,5392

Source: compiled by the author

The diagnostic test results presented in Table 3 confirm that the assumptions of the linear regression model are satisfied. The Jarque-Bera test yields a probability of 0.1154, suggesting that the residuals are normally distributed. The Harvey test indicates the absence of heteroscedasticity ($p = 0.8936$) and the Breusch-Godfrey test confirms the absence of error autocorrelation ($p = 0.5392$).

The results highlight the fundamental role of labor productivity as a driver of economic growth. The positive coefficient of the labor productivity growth rate confirms that improvements in the efficiency of labor utilization lead to an increase in total economic output. In practical terms, when the same amount of labor generates a larger volume of goods and services, this is directly reflected in real GDP growth.

This relationship can be explained by the fact that productivity gains are generally associated with technological progress, investment in human capital, innovation and improvements in the organization of production processes. Economies that manage to raise their productivity therefore tend to become more competitive, make more efficient use of available resources and sustain higher rates of economic growth.

At the theoretical level, the results are consistent with modern formulations of Okun's Law, which show that GDP dynamics influence unemployment and employment, but the intensity of this relationship varies depending on economic structure and labor market rigidities. For example, the comparative analysis carried out for European economies by Tumanoska (2020) highlights significant variations in the Okun coefficient depending on the national context, while Maza (2022) shows that at the regional level in Europe, the employment response to economic growth is heterogeneous. Within this framework, the moderate coefficient identified for Romania points to a relatively low elasticity of employment with respect to GDP, characteristic of economies undergoing structural convergence.

A relevant aspect highlighted by the descriptive analysis is the existence of a lag effect in employment relative to GDP dynamics. The lowest point in employment in 2011, two years after the 2009 economic contraction, confirms that labor market adjustments are slower than those of output. This phenomenon is also documented in studies conducted for developed economies, such as those coordinated by Rahman (2017), which show that negative shocks are gradually absorbed through mechanisms, such as working hours adjustment or hiring freezes.

At the same time, the analysis highlights an important particularity: in 2020, the decline in GDP was not followed by a proportional reduction in employment. This temporary decoupling between output and employment can be interpreted in the context of the support measures adopted during the pandemic. Similar findings regarding the attenuation of the

health crisis impact on the labor market are noted in recent research on labor market sustainability in the post-COVID context, such as the analysis by Țircă (2021), which underscores the role of public interventions in maintaining employment.

Regarding the qualitative dimension of work, the results show that the real average wage grew significantly, but its pace exceeded productivity growth in certain periods. This evolution can be interpreted from several perspectives. In economies undergoing convergence, accelerated wage growth is often sustained by integration into more developed markets, labor migration and the pressure of skills shortages. However, recent literature draws attention to the risk of macroeconomic imbalances when wage dynamics are not aligned with productivity gains.

The International Labour Organization (2022-2023) highlights that in emerging European economies, wage increases can be temporarily sustained by cyclical factors, but their long-term sustainability depends on productivity progress. Similarly, the analysis by the European Commission (2023) shows that in Central and Eastern European member states there have been episodes in which income growth exceeded productivity gains, generating pressures on external competitiveness and the structure of unit labor costs.

From a structural perspective, World Economic Forum (2025) underlines that future productivity will depend critically on investment in digital skills and emerging technologies. In the absence of human capital adaptation to the new demands of the market, wage increases risk becoming decoupled from their productive foundation, which may limit long-term growth potential.

In the case of Romania, therefore, the gap between real wage dynamics and productivity must be interpreted not only as a sign of income convergence, but also as an indicator of the need for additional investment in innovation, education and sectoral efficiency.

In the absence of policies oriented toward human capital development, the reduction of regional disparities and the stimulation of high-value-added sectors, the effects of economic growth on employment quality remain limited. Recent literature emphasizes that the distribution of growth benefits is deeply influenced by institutional structure and the capacity of the state to correct regional and social imbalances.

Acemoglu and Robinson (2012) argue that inclusive institutions are essential for transforming economic growth into broadly shared prosperity and that in their absence, the benefits of development may remain concentrated in certain sectors or regions. At the European level, the European Commission (2023) highlights the persistence of regional disparities in employment and productivity, particularly between metropolitan and peripheral regions.

Furthermore, the International Labour Organization (2023) shows that inequalities in access to education and digital skills directly influence individuals' capacity to benefit from the structural transformations of the economy. In economies with pronounced regional differences, GDP growth may be concentrated in high-value-added sectors located in developed urban centers, while less developed areas remain dependent on low-productivity activities and precarious employment.

The results thus support the hypothesis that GDP only partially explains progress toward "decent work and economic growth." Economic growth emerges as a necessary, but

not sufficient, condition for the full achievement of Goal 8 of the 2030 Agenda. In the absence of policies oriented toward human capital development, the reduction of regional disparities and the stimulation of high-value-added sectors, the effects of growth on employment quality remain limited.

From a theoretical perspective, the study confirms the relevance of macroeconomic models linking output dynamics to employment, but underscores the need to integrate structural variables: human capital, sectoral structure, active employment policies, into explanatory models. From a practical perspective, the results suggest that economic policies must move beyond the paradigm of quantitative GDP growth and include measures explicitly oriented toward job quality, the reduction of youth unemployment and the alignment of wages with productivity.

The main limitation of the study lies in the fact that the analysis is conducted at an aggregate level, without capturing the differences and effects that exist at the regional level, which may lead to the omission of territorial heterogeneity.

Future research could employ multivariate econometric models or comparative panel approaches across EU member states, to assess whether the elasticity of employment with respect to GDP differs significantly among economies in the region and which factors determine a more efficient conversion of economic growth into decent work.

Conclusions

The results highlight that GDP dynamics have a positive effect on employment and on the real average wage, confirming the existence of a functional link between economic expansion and labor market performance. However, the moderate intensity of the correlation and the linear regression results indicate that this relationship is not exhaustive, GDP only partially explains the variations in the indicators specific to decent work.

The long-term analysis shows that the Romanian economy has undergone a significant convergence process, reflected in the sustained growth of GDP and GDP per capita, as well as in the consistent rise of the real average wage. At the same time, the labor market has demonstrated a gradual capacity to adapt to external shocks, from the global financial crisis to the COVID-19 pandemic. At the same time, employment adjustments occurred with a certain time lag relative to output dynamics, confirming the existence of structural rigidities and indirect transmission mechanisms between the macroeconomic sphere and the employment sphere.

A key finding of the study is the incomplete nature of the transformation of economic growth into decent work. Although total unemployment recorded a significant downward trend, youth unemployment remained persistently high and volatile, pointing to structural vulnerabilities related to the transition from education to the labor market, skills matching and employment segmentation. Moreover, in certain intervals, the dynamics of real wages outpaced labor productivity growth, an aspect that raises questions about the long-term sustainability of economic convergence.

The overall conclusion of the research is therefore that Romania has made significant progress in the quantitative dimension of economic development, but the transformation of this growth into structural and sustainable benefits for the labor market remains partially limited. Strengthening the relationship between economic growth and decent work requires an integrated approach, one that combines macroeconomic stability with structural reforms and active labor market policies, aligned with the objectives of sustainable development.

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MATHEMATICAL MODEL FOR ASSESSING CYBERSECURITY LEVEL IN CRITICAL CIVILIAN INFORMATION INFRASTRUCTURES: HEALTHCARE, ENERGY AND EDUCATION

Fiodor TIMERCAN*¹

Abstract: This paper develops and clarifies a mathematical model for assessing the cybersecurity level of critical civilian information infrastructures in healthcare, energy and education. The objective is to provide a transparent and reproducible composite index that can support institutional diagnosis, cross-sector comparison and regional policy prioritization. The model integrates three normalized dimensions: threat exposure, control effectiveness and operational resilience. Threat exposure is estimated from likelihood and impact indicators and transformed through a bounded calibration function; control effectiveness is derived from implementation and validated operational performance of security controls; and resilience is calculated from recovery and response indicators. The final cybersecurity score is expressed within the interval [0,1] through an explicit weighted aggregation formula. The article also explains the normalization logic, calibration parameter, sector-specific weighting and reproducibility conditions of the model. Because access to institutional cybersecurity datasets is limited, the application presented in this paper is illustrative and hypothetical rather than empirical. To address this limitation, the paper provides complete input tables, intermediate calculations and a sensitivity analysis showing how the final score changes under alternative weighting scenarios. The proposed framework contributes an integrated evaluation logic that links cybersecurity risk assessment, security control maturity and operational continuity into a single policy-oriented metric.

Keywords: cybersecurity assessment; critical civilian infrastructure; mathematical model; composite index; threat exposure; control effectiveness; operational resilience; healthcare; energy; education; NIS2.

Classification JEL: O3

UDC: [004.056.5:330.4]:[338.49:351.84]

Introduction

Critical civilian information infrastructures constitute essential components of contemporary socio-economic systems. Healthcare institutions rely on digital platforms for patient records, diagnostics, laboratory services, treatment coordination and continuity of care. Energy systems depend on interconnected operational technologies and information systems to maintain stability, safety and uninterrupted supply. Education systems increasingly operate through digital learning environments, administrative platforms and data management services. For regional economies, the continuity of these sectors is not only a technical issue but also a condition for social trust, public welfare and institutional resilience.

The progressive digitalization of civilian infrastructures has expanded their exposure to cyber threats. Ransomware, insider misuse, supply-chain compromise, distributed denial-of-service attacks and exploitation of poorly segmented networks may generate cascading consequences: service disruption, financial losses, compromised data integrity, safety risks and erosion of public confidence. These risks are particularly relevant for regions where

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institutions operate under budgetary constraints, uneven digital maturity and dependence on external technology providers.

From a regulatory perspective, the European cybersecurity agenda has moved from general information security governance toward sectoral resilience and supervision of essential and important entities. The NIS2 Directive enlarges the scope of cybersecurity obligations across essential services, while the Critical Entities Resilience Directive emphasizes continuity and resilience of critical functions. For countries and regions aligned with European policy frameworks, including Eastern European systems, this creates a need for assessment instruments that are comparable, measurable and adaptable to sector-specific realities.

Despite the strategic importance of cybersecurity, assessment within civilian critical infrastructures remains methodologically fragmented. Existing instruments are frequently based on qualitative maturity models, compliance checklists, risk matrices or sector-specific audits. These instruments provide useful guidance, but they often evaluate exposure, control effectiveness and resilience separately. As a result, decision-makers may receive several partial indicators without a unified mathematical score that supports benchmarking across institutions, sectors or regions.

The research gap addressed in this paper is therefore the absence of a transparent quantitative model that integrates three dimensions of cybersecurity level: exposure to threats, effectiveness of implemented controls and operational resilience after an incident. The aim of the paper is to construct and illustrate a normalized composite cybersecurity index suitable for critical civilian information infrastructures.

The study is guided by the following research questions:

- RQ1 - How can threat exposure, control effectiveness and operational resilience be expressed in a common normalized structure?
- RQ2 - How can these dimensions be aggregated without losing sector-specific adaptability?
- RQ3 - How sensitive is the resulting score to changes in weighting assumptions?

The expected contribution is threefold. First, the paper proposes an explicit mathematical aggregation logic with all variables, coefficients and calibration parameters defined. Second, it connects the model to existing cybersecurity standards, risk assessment approaches and composite indicator methodology. Third, it provides a reproducible illustrative application, including input values, intermediate calculations and sensitivity analysis. The application is hypothetical and does not claim empirical validation; rather, it demonstrates the internal logic and practical usability of the model and establishes a basis for future empirical calibration.

Literature Review and Positioning of the Model

Cybersecurity assessment in critical infrastructures is influenced by three major analytical traditions: security control frameworks, risk assessment methods and composite

indicator methodology. The model proposed in this paper is positioned at the intersection of these traditions, but it does not replace them. Its purpose is to translate their complementary logic into a reproducible index suitable for institutional and regional comparison.

Control-oriented frameworks provide the normative foundation for cybersecurity governance. The NIST Cybersecurity Framework 2.0 offers a taxonomy of outcomes for governing, identifying, protecting, detecting, responding to and recovering from cybersecurity risks (NIST, 2024). ISO/IEC 27001:2022 defines requirements for establishing and continuously improving an information security management system (ISO, 2022). IEC 62443 is especially relevant for industrial automation and operational technology environments, which are essential for energy systems (IEC, 2018). These standards help identify what domains and controls should be assessed, but they do not by themselves generate a single comparable mathematical score across healthcare, energy and education infrastructures.

Risk assessment literature contributes the logic of threat likelihood, vulnerability and impact. NIST SP 800-30 Rev. 1 conceptualizes risk assessment through threat sources, threat events, vulnerabilities, likelihood and impact (NIST, 2012). Böhme, Laube and Riek (2019) show that information security risk assessment methods vary substantially in assumptions, inputs and levels of quantification. This literature supports the model's exposure component, where threat scenarios are translated into a cumulative exposure index. However, risk alone is insufficient because a high-risk environment may still be well defended if controls and recovery mechanisms are effective.

Maturity and compliance assessment frameworks are particularly relevant for critical infrastructure governance. Drivas et al. (2020) proposed a cybersecurity maturity assessment framework aligned with the NIS Directive for operators of essential services. Such approaches are useful for supervisory practice, but they often remain domain-specific or compliance-oriented. The present model differs by integrating exposure, control effectiveness and operational resilience into one composite score, while allowing the domains and weights to be adjusted by sector.

The regulatory and regional relevance of the model is strengthened by the NIS2 Directive, which requires stronger cybersecurity governance, risk management and incident reporting for essential and important entities (European Parliament and Council of the European Union, 2022). ENISA's recent sectoral work also highlights the need to understand the maturity and criticality of NIS2 sectors and to support cybersecurity stress testing and resilience planning (ENISA, 2025, 2026). Healthcare is a particularly exposed sector because ENISA's health threat landscape identifies ransomware, data breaches and service disruption as central risks (ENISA, 2023). Energy infrastructures require special attention because operational technology security and continuity constraints create a different risk profile from ordinary IT systems. Education infrastructures also present distinctive risks due to open networks, distributed users, valuable personal and research data and dependence on third-party platforms (Lallie et al., 2023).

Composite indicator methodology offers the aggregation logic required for regional and cross-sector benchmarking. The OECD and Joint Research Centre handbook emphasises normalization, weighting, aggregation and sensitivity analysis as essential steps in building composite indicators (OECD & JRC, 2008). Sensitivity analysis is also a standard method for testing whether conclusions remain stable when assumptions change (Saltelli et al., 2008). This literature directly informs the proposed use of normalized indicators, explicit weights and scenario-based sensitivity testing.

The originality of the proposed model is not the introduction of a completely new cybersecurity standard, but the integration of existing assessment logics into a single reproducible mathematical structure. In contrast to approaches that separately report risk exposure, compliance maturity or recovery capability, the model expresses cybersecurity level as the interaction between (1) the external and internal threat environment, (2) the effectiveness of implemented controls and (3) the ability to sustain or restore essential functions. This makes the model suitable for institutional self-assessment, regional policy comparison and prioritisation of cybersecurity investments.

Table 1. Positioning of the proposed model in relation to existing approaches

Approach	Main contribution	Limitation addressed by the proposed model
NIST CSF 2.0 / ISO/IEC 27001	Structured governance and control domains	No single sector-comparable mathematical index
Risk assessment methods	Likelihood-impact logic and scenario prioritisation	Often asset- or scenario-level; limited aggregation of controls and resilience
Cybersecurity maturity models	Institutional diagnosis and compliance monitoring	May remain qualitative or compliance-centred
Composite indicators	Normalization, weighting, aggregation and benchmarking	Require domain-specific cybersecurity variables
Proposed model	Integrates exposure, controls and resilience into one score	Requires empirical calibration in future applications

Source: elaborated by the author

Methodology

The model conceptualizes cybersecurity level as a composite function of three measurable components: threat exposure, control effectiveness and operational resilience. To avoid notation ambiguity, operational resilience is denoted by O , while R_{raw} denotes aggregated raw risk. The symbol λ is used exclusively as the exposure calibration parameter.

Let S represent the overall cybersecurity level of an assessed institution or sector. S is bounded within the interval $[0,1]$, where values closer to 1 indicate a higher assessed

cybersecurity level under the defined model assumptions. The model uses the following aggregation formula:

$$S = \alpha U + \beta O + \gamma(1 - E), \quad \alpha, \beta, \gamma \geq 0, \quad \alpha + \beta + \gamma = 1 \quad (1)$$

where U is the Control Effectiveness Index, O is the Operational Resilience Index, E is the Threat Exposure Index, and α , β and γ are aggregation weights. The term $(1 - E)$ transforms exposure into an exposure-resistance component, ensuring that higher exposure reduces the final score while preserving the $[0,1]$ interval. This formulation avoids the possibility of negative scores that could occur if exposure were subtracted directly.

Normalization principles

All input indicators are normalized before aggregation. For benefit indicators, where higher values indicate a better cybersecurity condition, min-max normalization may be expressed as:

$$x'_i = (x_i - x_{\min}) / (x_{\max} - x_{\min}) \quad (2)$$

For cost indicators, where lower values indicate better performance, such as mean time to detect or mean time to recover, the inverse form may be used:

$$x'_i = (x_{\max} - x_i) / (x_{\max} - x_{\min}) \quad (3)$$

In practical institutional assessments, normalization thresholds may be derived from regulatory requirements, sectoral benchmarks, expert judgement or historical performance data. For illustrative purposes, the present paper uses normalized values directly and reports them transparently in the calculation tables.

Threat Exposure Index

Let $T = \{t_1, t_2, \dots, t_n\}$ denote the set of relevant cyber threat scenarios applicable to the assessed sector. For each threat scenario t_i , two normalized parameters are estimated: $p_i \in [0,1]$, representing likelihood within the assessment period, and $I_i \in [0,1]$, representing normalized impact.

Impact may be decomposed into confidentiality, integrity, availability, safety, financial and reputational consequences. If $v(i,l)$ denotes the normalized impact value of threat i on consequence category l and $c(l)$ is the category weight, then:

$$I(i) = c(1)*v(i,1) + c(2)*v(i,2) + \dots + c(m)*v(i,m), \quad \sum c(l) = 1 \quad (4)$$

Aggregated raw risk is calculated as the sum of likelihood-impact products:

$$R_{\text{raw}} = \rho(1)*I(1) + \rho(2)*I(2) + \dots + \rho(n)*I(n) \quad (5)$$

Because R_{raw} may increase with the number of scenarios, it is transformed into a bounded Threat Exposure Index:

$$E = 1 - \exp[-\lambda * R_{\text{raw}}], \quad \lambda > 0 \quad (6)$$

The calibration parameter λ controls the sensitivity of the exposure function. A practical calibration rule is $\lambda = \ln(2) / R^*$, where R^* is the reference raw-risk level at which exposure should reach 0.5. If empirical incident data are unavailable, λ can be set through expert judgement and then tested through sensitivity analysis. In this paper, λ is used only for exposure calibration and not as an aggregation weight.

Control Effectiveness Index

Control effectiveness reflects the extent to which security measures are both implemented and operationally effective. Let the cybersecurity programme be divided into K control domains, such as governance, access control, monitoring, incident response, asset management, network segmentation and backup/recovery. For each control j in domain k , define $m_{kj} \in [0,1]$ as implementation level, $e_{kj} \in [0,1]$ as operational effectiveness and w_{kj} as the within-domain control weight.

$$C(k) = w(k,1)*m(k,1)*e(k,1) + \dots + w(k,p)*m(k,p)*e(k,p), \quad \sum w(k,j) = 1 \quad (7)$$

The overall Control Effectiveness Index is then calculated by aggregating domain-level effectiveness scores:

$$U = W(1)*C(1) + W(2)*C(2) + \dots + W(K)*C(K), \\ \sum W(k) = 1 \quad (8)$$

This structure distinguishes between the presence of a control and its tested performance. For example, a backup system that exists but is not regularly restored during tests will receive a lower effectiveness score than a backup system whose recovery capability is validated.

Operational Resilience Index

Operational resilience measures the capacity of the institution to maintain or restore essential services after a cyber incident. Let $o_s \in [0,1]$ represent normalized resilience indicators and θ_s their weights. Examples include RTO compliance, RPO compliance, backup restoration success, incident detection timeliness, incident response timeliness and continuity-plan testing.

$$O = \theta(1)*o(1) + \theta(2)*o(2) + \dots + \theta(q)*o(q), \\ \sum \theta(s) = 1 \quad (9)$$

Weights may differ by sector. Energy systems may place greater emphasis on continuity and recovery time; healthcare institutions may prioritise data integrity, patient safety and restoration reliability; education institutions may emphasise identity management, endpoint protection and learning-platform continuity. Sectoral weights should be documented and justified by regulatory priorities, expert panels, historical incident data or institutional risk appetite.

Table 2. Illustrative sector-specific aggregation weights

Sector	α controls	β resilience	γ exposure resistance	Justification
Healthcare	0.35	0.35	0.30	Balanced controls and resilience because service continuity and data integrity are both critical.
Energy	0.30	0.40	0.30	Higher resilience weight because operational continuity and recovery speed are decisive.
Education	0.45	0.25	0.30	Higher control weight due to access management, endpoint protection and platform governance needs.
Baseline illustrative case	0.40	0.30	0.30	Used for reproducible demonstration and tested through sensitivity analysis.

Source: elaborated by the author

Illustrative Application and Sensitivity Analysis

This section demonstrates the internal logic of the model using hypothetical but plausible values for a civilian healthcare infrastructure. The calculation is illustrative rather than empirical. Its purpose is to show how the model can be reproduced, audited and adapted when institutional data become available.

The hypothetical institution is assessed against four threat scenarios: ransomware, insider misuse, third-party compromise and distributed denial-of-service attack. The normalized likelihood and impact values are shown in Table 3.

Table 3. Hypothetical threat exposure inputs

Threat scenario	Likelihood ρ_i	Impact I_i	$\rho_i \times I_i$
Ransomware	0.70	0.90	0.630
Insider misuse	0.40	0.60	0.240
Third-party compromise	0.50	0.80	0.400
DDoS attack	0.35	0.55	0.193

Source: elaborated by the author

Using Equation (5), aggregated raw risk is:

$$R_{raw} = 0.630 + 0.240 + 0.400 + 0.193 = 1.462 \quad (5)$$

With $\lambda = 0.5$, Equation (6) gives:

$$E = 1 - \exp(-0.5 \times 1.462) = 0.519 \quad (6)$$

Table 4. Hypothetical control effectiveness calculation

Control domain	Domain score C_k	Domain weight W_k	Weighted contribution
Governance and risk management	0.70	0.20	0.140
Identity and access control	0.75	0.25	0.188
Monitoring and detection	0.65	0.20	0.130
Incident response	0.70	0.20	0.140
Backup and recovery controls	0.80	0.15	0.120

Source: elaborated by the author

Using Equation (8),

$$U = 0.140 + 0.188 + 0.130 + 0.140 + 0.120 = 0.718.$$

Table 5. Hypothetical operational resilience calculation

Resilience indicator	Normalized score o_s	Weight θ_s	Weighted contribution
RTO compliance	0.75	0.30	0.225
RPO compliance	0.80	0.25	0.200
Backup restoration success	0.70	0.25	0.175
Detection and response timeliness	0.65	0.20	0.130

Source: elaborated by the author

Using Equation (9),

$$O = 0.225 + 0.200 + 0.175 + 0.130 = 0.730 \quad (9)$$

Table 6. Intermediate model values

Component	Symbol	Value	Interpretation
Control Effectiveness Index	U	0.718	Positive contribution
Operational Resilience Index	O	0.730	Positive contribution
Threat Exposure Index	E	0.519	Penalized through $1 - E$
Exposure-resistance component	$1 - E$	0.481	Positive value decreases when exposure increases

Source: elaborated by the author

For the baseline illustrative aggregation weights $\alpha = 0.40$, $\beta = 0.30$ and $\gamma = 0.30$, the final score is calculated as follows:

$$S = 0.40 \times 0.718 + 0.30 \times 0.730 + 0.30 \times (1 - 0.519) = 0.651 \quad (10)$$

The resulting value indicates a moderate cybersecurity level. The institution benefits from relatively solid control and resilience scores, but the final index is limited by accumulated threat exposure. The calculation also shows why exposure should not be interpreted in isolation: high exposure does not automatically imply low cybersecurity if compensating controls and recovery capabilities are strong.

Table 7. Sensitivity analysis under alternative weighting scenarios

Scenario	α	β	γ	S	Interpretation
Baseline	0.40	0.30	0.30	0.651	Balanced emphasis
Control-centred	0.50	0.25	0.25	0.662	Higher priority for implemented controls
Resilience-centred	0.30	0.50	0.20	0.677	Higher priority for continuity and recovery
Exposure-sensitive	0.30	0.25	0.45	0.614	Higher penalty for threat exposure

Source: elaborated by the author

The sensitivity analysis indicates that the final score remains within a relatively narrow interval, from 0.614 to 0.677, under the tested weighting scenarios. The ranking of the cybersecurity condition remains moderate across scenarios, which suggests that the illustrative result is not entirely dependent on a single weighting assumption. However, the exposure-sensitive scenario produces the lowest score, confirming that the model reacts logically when accumulated threat exposure receives higher importance. In empirical applications, such sensitivity testing should be complemented with expert validation, sector benchmarks and institutional data.

Discussion

The proposed model responds to the need for a cybersecurity assessment structure that is quantitative, reproducible and adaptable to sector-specific realities. Its main advantage is the integration of three components that are often assessed separately: threat exposure, control effectiveness and operational resilience. This integrated structure allows decision-makers to identify whether a low final score is caused mainly by high exposure, weak controls, limited recovery capacity or a combination of these factors.

The model also supports regional studies by enabling comparison across institutions and sectors using a common normalized scale. This is relevant for regional cybersecurity planning because healthcare, energy and education infrastructures may compete for limited investment resources while facing different risk profiles. A common index can support prioritisation, but it should not replace qualitative expert judgement or sector-specific audits.

Compared with compliance-based assessments, the model gives more explicit attention to operational performance. A control is not considered fully effective merely because it exists; it must also perform under testing, monitoring or incident-response conditions. Compared with scenario-based risk assessment, the model adds recovery and continuity logic, which is essential in critical services. Compared with general composite indicators, the model defines cybersecurity-specific variables and incorporates an exposure penalty.

At the same time, the model has limitations. The current application is hypothetical and does not validate the index against observed incidents, audit results or institutional performance data. Likelihood and impact estimates may be uncertain, especially where incident reporting is incomplete. Weighting decisions may also influence results, which is why sensitivity analysis is required. The model does not yet include network

interdependencies between sectors, although such interdependencies may amplify cascading effects during major cyber incidents.

Future research should therefore focus on empirical calibration. Possible approaches include expert elicitation using the Delphi method, AHP-based weighting, pilot application in one healthcare institution or energy operator, or calibration against incident data and audit results. A comparative regional study could also test whether the index discriminates meaningfully between institutions with different maturity levels.

Conclusions

This study developed a mathematical model for assessing cybersecurity level in critical civilian information infrastructures, with a focus on healthcare, energy and education. The revised model integrates threat exposure, control effectiveness and operational resilience into a normalized composite index bounded within $[0,1]$. All variables, coefficients and parameters are explicitly defined, and the aggregation formula uses α , β and γ as weights while reserving λ only for exposure calibration.

The illustrative application demonstrates the internal coherence and reproducibility of the model. By presenting the input values, intermediate calculations and sensitivity analysis, the paper shows how the index can be calculated and interpreted. The results should not be read as empirical evidence about a specific institution; they represent a structured demonstration of the model's logic.

The model's main contribution is its integrated assessment logic. It links cybersecurity risk exposure with implemented control effectiveness and operational recovery capacity, thereby moving beyond isolated compliance scoring or standalone risk matrices. For regional policy, the model may support benchmarking, investment prioritisation and structured dialogue between institutions and supervisory authorities.

The conclusions must be interpreted within the limits of the study. The model requires empirical validation before strong policy claims can be made. Future work should apply the framework to real institutional data, compare it with existing maturity models, test alternative weighting methods and incorporate interdependencies between infrastructures. With such calibration, the model could become a practical instrument for regional cybersecurity governance and critical infrastructure protection.

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RESEARCH ABOUT TOURISM VALUE CHAIN IMPACT IN RELIGIOUS TOURIST DESTINATIONS FROM LEBANON

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Abstract: This paper examines how tourism value-chain performance influences visitor satisfaction and behavioral intentions in religious tourism destinations in Lebanon. Grounded in value chain theory and studies on religious tourism supply chains, the research uses a structured questionnaire developed from the literature and administered to 208 adult respondents in Lebanon, including current and prospective visitors. Perceptions were measured through 23 Likert-type items covering transport infrastructure, accommodation quality, and local business services, while outcomes included overall satisfaction, intention to revisit, recommendation likelihood, and willingness to participate in religious events. The scale showed excellent internal consistency, although the very high alpha value should be interpreted cautiously because it may also indicate item redundancy. Results show strong positive associations between value-chain dimensions and all outcome variables. The regression model explains 87.9% of the variance in overall satisfaction, while chi-square tests indicate significant associations between prior visitation and revisit intention, as well as between perceived infrastructure and recommendation intentions. The findings suggest that strengthening religious tourism in Lebanon requires coordinated improvements in accessibility, culturally appropriate accommodation, and community-based local services. The study offers practical guidance for destination managers and policymakers working in complex and fragile tourism contexts.

Keywords: tourism value chain, religious tourist destinations, supply chain, religious tourism, Lebanon.

JEL Code: Z32, L83, L89

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Introduction

Religious tourism is an important part of Lebanon's tourism offer because the country combines dense sacred heritage, active pilgrimage traditions, and strong cultural diversity. Yet the presence of religious sites alone does not guarantee stable tourism performance. Visitor satisfaction and future behavioral intentions depend on how well the tourism value chain functions across transport, accommodation, local services, and stakeholder coordination. This makes the topic relevant not only for tourism management, but also for regional development and destination resilience (Issa & Altinay, 2006; Apaydin et al., 2016; Kabalan & Stanciulescu, 2018).

The research problem addressed in this study is straightforward: Lebanon has religious tourism potential, but the coherence of its tourism value chain remains uneven. Accessibility, accommodation quality, local business services, and coordination among public, private, and community actors may either strengthen or weaken the visitor experience. In fragile national contexts, these service links are especially important because disruptions in one part of the chain can affect the entire destination experience. This study

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therefore examines how value-chain performance shapes satisfaction and behavioral intentions among visitors to religious destinations in Lebanon (Jallat & Shultz, 2011; Olsen, 2018; Budovich, 2023; Muhardi et al., 2023).

From a theoretical perspective, the study is positioned within tourism value chain thinking, which treats tourism as a set of connected activities that create value through coordination rather than through isolated services. In religious tourism, this chain includes not only transport and accommodation, but also culturally meaningful local businesses, hospitality practices, and community involvement. The literature suggests that these dimensions are interdependent, yet many studies still examine them separately rather than as a unified system. This paper addresses that gap by operationalizing the tourism value chain as a multidimensional construct linked to visitor outcomes ((Kim et al., 2016; Kuo et al., 2019; Sutomo et al., 2023).

The study has three aims. First, it measures tourists' perceptions of value-chain components in Lebanon's religious destinations. Second, it tests how these components relate to overall satisfaction and behavioral intentions such as revisit, recommendation, and participation in future religious events. Third, it examines whether prior visitation and selected socio-demographic variables are associated with behavioral intentions. Based on this framework, the study formulates four hypotheses linking transport infrastructure, accommodation quality, local business services, and overall satisfaction to visitor outcomes ((Budovich, 2023; Muhardi et al., 2023; Zakhia & Pérez Pérez, 2024).

Literature Review

Tourism is one of the world's largest and fastest-growing industries, and planning is a prerequisite for sustainable development. In tourism studies, the value chain perspective helps explain how value is created across interconnected activities rather than within isolated services. Religious tourism, traditionally linked to pilgrimage, is particularly suited to this perspective because the visitor experience extends from the journey to the site and through the destination ecosystem. The religious tourism trade adds significant contribution to the tourism sector in terms of revenue, employment, cultural and destination visibility, etc. Infrastructure development and government initiatives have made religious tourism a lucrative business for various tourist destinations (Issa & Altinay, 2006; Robinson et al., 2020; Sinha & Mittal, 2021).

Religious tourism has both spiritual and practical dimensions. Visitors seek meaning, authenticity, and ritual connection, but they also depend on accessible transport, reliable accommodation, and local services that support the journey. The literature shows that when these elements work together, destination value increases. When they are fragmented, the overall experience weakens. This is why tourism value chain approaches are increasingly used to study religious destinations, especially those facing instability or service coordination problems (Lin & Fu, 2020; Nasiri, 2021; Mittal & Sinha, 2022). In contrast to the same, lack of attention and standard operating procedures have made the religious tourism supply chain vulnerable to various threats. People-oriented religious destinations will face many more challenges to maintain people's faith and emotions (Mittal & Sinha, 2022). The rapid

development of modern service industries has a significant impact on religious tourism in many ways. Among them, the progress of information technology and e-commerce has brought opportunities and challenges to religious tourism. With the value chain theory, this paper firstly made an analysis of the distinctive features, forms and limitations of the value chain of religious tourism and proposed the solution of reconstructing the tourism value chain in religious tourism destinations (Lao & Hu, 2007; Sutomo et al., 2023).

In recent studies, religious tourism is increasingly viewed as a value web rather than a simple linear chain. This means that multiple actors, including public authorities, religious organizations, businesses, and communities, jointly shape the visitor experience. Such an approach is especially relevant in fragile contexts, where the tourism system depends on coordination and shared responsibility. The value chain perspective therefore provides a useful analytical framework for understanding how religious destinations create or lose value (Sitkevich, 2023; Sutomo et al., 2023).

Lebanon offers a particularly relevant case. The country has a long history of pilgrimage and a dense concentration of religious sites, but it also faces political, economic, and organizational constraints. Previous research has highlighted the destination's heritage potential, stakeholder complexity, and community attitudes, but fewer studies have examined how transport, accommodation, and local services jointly influence visitor satisfaction and loyalty-type behaviors. This study responds to that gap by combining the tourism value chain perspective with an empirical analysis of visitor outcomes in Lebanon (Apaydin et al., 2016; Baker et al., 2020; Chaddad, 2021; Ertzogue, 2023; Farra Haddad, 2024; Zakhia & Pérez Pérez, 2024).

Three gaps motivate the study. First, many studies examine transport, accommodation, and local services as separate attributes rather than as interconnected parts of a value chain. Second, Lebanon-focused research often emphasizes qualitative potential and contextual fragility but not a unified quantitative model. Third, recent work on resilience after COVID-19 has not sufficiently addressed smaller or more fragile destinations such as Lebanon (Budovich, 2023; Sitkevich, 2023; Sutomo et al., 2023; Ayele & Singh, 2024). Based on these gaps, the study conceptualizes transport infrastructure, accommodation quality, and local business services as the core dimensions of the tourism value chain in religious destinations. Transport reduces friction and uncertainty, accommodation shapes comfort and cultural fit, and local businesses convey authenticity and socio-economic value. These dimensions are expected to influence overall satisfaction and behavioral intentions (Kim et al., 2016; Kuo et al., 2019; Chusmeru et al., 2023).

The Religious Tourism Value Chain

Religion and spirituality are still among the most common motivations for travel (Zamani-Farahani et al., 2018). Religious tourism is a subset of tourism that emerged from the ancient tradition of pilgrimage. The intention, purpose and spirit remain pious with religious tourism, but the journey has become touristy characteristics (Lin & Fu, 2020). Modern religious travel is a pilgrimage with long-term tourist characteristics. The various causes of this transformation are destination visibility, last-mile connectivity, affordability and annual

family vacations. This transformation has also led to the commercialization of religious travel with star-studded customized tour packages (Sinha & Mittal, 2021). Religious tourism can prevail against climate conditions, and the numbers of tourists do not fluctuate dramatically through seasonal changes or adverse weather. For this type of tourists, the destination is not the only thing that matters. Their experience begins at the very beginning of the starting point and encompasses all the paths and events they encounter along the way. Religious tourism plays a prominent role in people's social lives (Nasiri, 2021).

The value chain of religious tourism explores the values and implications of pilgrimage as experienced by religious travelers. It identifies and explores both spiritual and social values as well as political and economic values throughout the value chain of the tourist destination. The value chain of religious tourism also investigates the hierarchical relationship between the attributes of pilgrimage, the consequences that senior pilgrims have achieved and the satisfaction of personal values as the final goal. The clear links are found between the attributes, consequences and values with social interactions that are achieved by maintaining contact with friends, followed by spiritual succor and support that connects with supporting cathedrals, praying and soul redemption. These findings offer new insights into the pilgrimage literature (Kuo et al., 2019).

The value chain for religious tourism connects pilgrimage features to pilgrim advantages, which ultimately meet their personal values objectives. Social interactions among pilgrims produce the most connected value chain sequence and establish a strong relationship between pilgrimage attractions and intended outcomes and personal value fulfillment. The results from this research introduce essential understandings regarding the integration of secular and holy values, which operate throughout religious visitor destinations (Kim et al., 2016).

Tourism value chain theory conceptualizes tourism as a series of connected actions that work together to generate value for travelers, businesses and local communities instead of thinking to different attractions or products separately. From this viewpoint, value is co-created along a chain that usually consists of planning before the trip, marketing, transport, accommodation, food and beverage, guiding and interpretation, retail and complementary services, as well as how the whole area is managed and organized. In “new” or structurally transforming tourism regions, problems with coordination and weak connections along this chain can hurt both competitiveness and inclusiveness of tourism growth (Sitkevich, 2023; Sutomo et al., 2023).

Sitkevich, (2023) and Sutomo et al., (2023) highlight in their studies that the tourism value chains are more like value webs, where vertically and horizontally connected actors share information, risks and rewards. This change is especially important in destinations exposed to political or economic instability. Here, flexible ways of working together and shared management are key to keeping the tourism experience strong. In such contexts, the tourism value chain is not only an analytical tool for mapping activities but also a helpful approach for creating destination systems that can adjust and withstand challenges better.

Religious tourism embeds the tourism value chain to certain spiritual, cultural and ethical expectations. Pilgrimage flows often display high temporal concentration (linked to

religious calendars) and involve strong connections with holy sites, spiritual leaders and local communities. Studies of contemporary pilgrimage emphasize that religious trips are evaluated not solely on logistical performance, but on how well the chain of services supports spiritual goals, perceived authenticity and moral principles like unity and helping others. This means that the religious tourism value chain includes both practical aspects like getting there safely and comfortably and deeper meanings like a sacred feeling, ritual facilitation, opportunities for prayer and thinking (Budovich et al., 2023; Carvache-Franco et al., 2024).

The Tourism Value Chain Impact in Religious Destinations from Lebanon

Lebanon has the potential to attract many religious tourists because of its unique and intricate nature (Jallat & Shultz, 2011). In Lebanon, religious tourism has seen an increase of share within the tourism industry. However, it still faces challenges when it comes to involving the local community in the management process of religious tourism destinations (Baker *et al.*, 2020; Ertzogue, 2023). The evolving sacred geographies of Lebanon testify to the importance of religious tourism in the landscape of tourist destinations. The late 20th and early 21st centuries have seen the development of gigantic Christian projects, including statues and large crosses of saints. This trend is linked to the development of religious tourism from Liban (Farra Haddad, 2024).

Lebanon is known for having a long and rich history of pilgrimage and religious tourism, which has attracted pilgrims from both within and outside the region for centuries. The Lebanese tourism value chain is characterized by strong socio-cultural and political tensions that affect religious travel in the area (Olsen, 2018). Research conducted so far reveals the perceptions of Lebanese tourists oriented primarily towards cultural and religious tourism that thrives at the country level. Multi-level stakeholder discourses and surveys show that the degree of consensus between stakeholders, locals and visitors on cultural, tourist and territorial dimensions is more significant in Lebanon (Chaddad, 2021). There is currently a great interest from all the agents involved in the religious tourism value chain in Lebanon to promote religious tourist destinations, which could contribute to stimulating the diversification of the local tourist offer and the development of the tourism value chain in religious destinations (Zakhia & Pérez, 2024).

Existing research indicates that religious tourism experiences unfold across multiple interconnected service points, accessibility and travel conditions, accommodation and hospitality, and the local destination ecosystem that provides information, products, and culturally meaningful encounters (Kim et al., 2016; Kuo et al., 2019). Studies also note that disruptions in service coordination can weaken the tourism supply chain and diminish destination performance, particularly in contexts exposed to uncertainty and external shocks (Sinha & Mittal, 2021; Mittal & Sinha, 2022). However, the literature remains fragmented in two ways. First, many studies discuss religious tourism value creation conceptually without empirically testing integrated value-chain dimensions against concrete outcomes such as satisfaction, revisit intention, recommendation, and event participation. Second, Lebanon-focused discussions often emphasize tourism potential or

contextual constraints without providing a unified quantitative assessment of how the service chain shapes visitor perceptions and future engagement (Issa & Altinay, 2006; Jallat & Shultz, 2011; Kabalan & Stănciulescu, 2018).

Following value chain reasoning, this study treats transport infrastructure, accommodation quality, and local business services as core value-chain components that jointly influence the visitor experience. Improved accessibility and supportive mobility conditions enable visitation and reduce friction across the travel process; accommodation quality and culturally reflective hospitality strengthen comfort and perceived fit; and community-linked local services (authentic products, responsiveness to tourist needs, and visible economic contribution) enhance the experiential and social value of religious travel (Kim et al., 2016; Kuo et al., 2019).

Building on prior means-end and value-chain studies in religious tourism, this paper treats transport infrastructure, accommodation quality and local businesses as important parts of the tourism value chain that influence how visitors think and feel. Transport infrastructure functions as an enabling condition that reduces uncertainty and travel friction, thereby making pilgrimage feasible and less stressful. The quality of places to stay, especially if they show the local religious culture and provide caring services, boosts pilgrims' feelings of being connected to their personal motivations and the destination. Local business services, like small shops, restaurants and handicraft providers, serve as links to the community. They can improve the perceived authenticity and socio-economic benefits of tourism or, conversely, harm it by becoming too commercial or not providing good quality. In Lebanon, these tourism value chain dimensions operate within a highly plural and politically fragile environment where religious tourism holds significant economic and cultural importance. The country has one of the highest concentrations of holy places in the Middle East and sees a lot of interest from both locals who live abroad and regional travelers. However, religious tourism is still disorganized and not well-managed as a connected system. Infrastructure disruptions, varying levels of service quality and a lack of cooperation between religious authorities, government agencies and private operators create delays in the tourism value chain process. This makes it hard to turn visits into steady growth for local communities (Armiah et al., 2023; Budovich et al., 2023; Chusmeru et al., 2023; Ayele & Singh, 2024).

Existing literature on religious tourism and pilgrimage has mapped motivations, experiences and destination development challenges in diverse contexts, including the Middle East. However, three interrelated gaps remain and need attention. First, most empirical studies look at transport, accommodation and local services as separate service attributes rather than seeing them as related parts of a tourism value chain where how well they work together affects visitor satisfaction and behavioral intentions. Second, research focused on Lebanon tends to emphasize qualitative assessments of heritage potential, political risk and community attitudes, with limited quantitative analysis of how specific tourism value chain dimensions influence visitor experiences. Third, recent global events such as the COVID-19 pandemic have sparked more interest in resilience and supply-chain cohesion in religious tourism, but empirical work has concentrated on major hubs (like Iraq

and Saudi Arabia instead of smaller, weaker destinations such as Lebanon (Budovich et al., 2023; Sitkevich, 2023; Sutomo *et al.*, 2023; Ayele & Singh, 2024).

This study addresses these gaps by (i) operationalizing the tourism value chain in religious destinations as a multidimensional construct which include transport infrastructure, accommodation quality and local business services; (ii) testing an integrated model that connects these dimensions to overall satisfaction and a bundle of behavioral intentions (revisit, recommendation, participation in future events) for religious tourists in Lebanon; and (iii) placing the Lebanese case within current debates on tourism value-chain resilience in politically and economically unstable environments. Conceptually, the paper contributes to the tourism value chain literature by demonstrating that in religious destinations, community-embedded business services and culturally reflective accommodation are not peripheral elements but central drivers of satisfaction on par with infrastructure. Empirically, it provides one of the first large-sample quantitative analyses of the religious tourism value chain in Lebanon, giving helpful information and guidance for destination managers and policymakers who want to turn fragmented pilgrimage flows into a more coherent, welcoming and inclusive value chain. Given this situation, this study looks at the tourism value chain in religious sites as a complex system that connects how well services are performed to visitor satisfaction and their future actions in a risky environment.

Methodology

This study adopts a quantitative research design to examine the effect of tourism value-chain performance on visitor satisfaction and behavioral intentions in religious tourism destinations in Lebanon. The questionnaire was built from the literature on tourism value chains and religious tourism, and its content was reviewed for conceptual coherence before data collection. The instrument included 23 Likert-type items measuring transport infrastructure, accommodation quality, local business services, overall satisfaction, and behavioral intentions. Responses were recorded on a five-point scale ranging from strongly disagree to strongly agree. Detailed demographic variables consisting of age, gender, education level, monthly income, and experience at religious sites were gathered to support group-based comparisons (Issa & Altinay, 2006; Sinha & Mittal, 2021; Haddad, 2024).

Primary data were collected from adult respondents in Lebanon using a non-probability purposive sampling strategy. The final sample included 208 valid responses from current visitors and prospective visitors to religious sites. Because no complete sampling frame was available, purposive recruitment was the most feasible strategy in this context. This approach supports exploratory analysis, but it also limits the generalizability of the results, especially for international pilgrims and less digitally connected groups. The study therefore treats the findings as indicative rather than fully representative of all religious tourists in Lebanon (Budovich et al., 2023; Carvache-Franco et al., 2024).

The questionnaire contained 23 items capturing perceptions of tourism value-chain performance and visitor outcomes. Value-chain items covered three domains: transport

infrastructure (accessibility via public transport; road condition/signage; parking/traffic; experience enhancement), accommodation quality (availability near site; clean/safe facilities; culturally reflective services; staff hospitality), and local business services (tourist needs met; authentic products; economic contribution; understanding tourist needs). Outcome items captured overall satisfaction and future engagement (recommendation, revisit intention, and participation in future religious events). All items were measured on a Likert-type agreement scale (e.g., 1 = strongly disagree to 5 = strongly agree). The study followed standard ethical guidelines for social research. Participants received an information sheet outlining the academic purpose of the study, the voluntary nature of participation, and data confidentiality assurances prior to providing informed consent. No personal identifiers were collected beyond basic sociodemographic variables, and data were stored in aggregated form for analysis.

The analysis proceeded in four steps. First, descriptive statistics summarized respondent characteristics and item-level agreement levels. Second, internal consistency was assessed using Cronbach's alpha. Third, Pearson correlations examined associations between value-chain dimensions and outcome variables. Fourth, a regression model tested the reliability test using Cronbach's alpha yielded 0.994, which shows strong consistency among the survey items according to Nunnally & Bernstein (1994). Descriptive statistics were computed for all items and demographic variables. The reliability analyses was performed on the full set of 23 items, followed by Pearson correlations, multiple linear regression predicting overall satisfaction, and chi-square tests for associations between categorical variables and behavioral outcomes. The significance level was set at 0.05, with $p < 0.01$ highlighted for particularly strong relationships.

Descriptive statistical methods were applied to create summaries about the participant characteristics and survey question answers. A comparison of visitation behaviors between religious site visitors and non-visitors used independent samples t-tests as the analytical method. The evaluation of how income and education levels affect perception scores employed one-way ANOVA statistical tests. Pearson correlation coefficients helped to assess both visitor satisfaction levels with the value chain components and their inclination towards returning. We performed cross-tabulations and chi-square tests on categorical demographic variables to check their relationship with who visits religious sites. Linear regression models evaluated the strength at which various transportation methods, lodging options, and business facilities explained visitor satisfaction and behavior results. The researchers defined statistical significance at the 0.05 threshold.

Surveys were disseminated both on-site at selected religious destinations and through online channels affiliated with religious and community organizations, which facilitated access to geographically dispersed respondents under conditions of political and economic instability. Although this strategy helps reach many current and future local pilgrims, it does not provide a typical sample of every religious traveler in Lebanon. This is especially true for visitors from other countries and for marginalized groups with limited digital access.

The study also recognizes several methodological constraints. The cross-sectional design does not support causal inference. In addition, the large number of predictors relative to sample size means the regression results should be interpreted carefully, with attention to

possible multicollinearity and overfitting. Future studies should strengthen construct validity through pilot testing, exploratory and confirmatory factor analysis, and, where feasible, structural equation modeling. These steps would improve both measurement precision and explanatory power in future research on religious tourism value chains (Sinha & Mittal, 2021; Mittal & Sinha, 2022; Ayele & Singh, 2024)

Results and Discussion

As presented in Table 1, most respondents reported having visited a religious site in Lebanon, and the sample was broadly distributed across age, gender, education, and income categories. This indicates that the dataset captures a relatively engaged group of visitors and prospective visitors. The socio-demographic pattern suggests that religious tourism in Lebanon attracts economically active and well-educated respondents.

Table 1. Demographic characteristics of respondents (N = 208)

Variable	Frequency	Percent (%)
Age Group		
18–24	23	11.1
25–34	44	21.2
35–44	60	28.8
45–54	49	23.6
55 and above	32	15.4
Gender		
Female	101	48.6
Male	107	51.4
Level of Education		
High school	38	18.3
Bachelor's degree	62	29.8
Master's degree	75	36.1
Doctorate	32	15.4
Nothing	1	0.5
Monthly Income		
Below \$500	30	14.4
\$500–\$999	43	20.7
\$1,000–\$1,499	60	28.8
\$1,500–\$1,999	49	23.6
\$2,000 and above	26	12.5
Visited Religious Site		
Yes	172	82.7
No	36	17.3

Source: own work

Educational attainment was relatively high, with 36.1% holding a master's degree and 29.8% holding a bachelor's degree. Monthly income varied, though a significant portion (28.8%) earned between \$1,000–\$1,499, followed by 23.6% earning \$1,500–\$1,999.

These findings suggest a well-educated, economically active population with broad engagement in religious tourism activities.

Table 2 Percentage of respondents who strongly agreed with each survey item(N=208)

Survey Item	Strongly Agree (%)
Transport: Accessibility via Public Transport	79.8%
Transport: Road Condition & Signage	76.4%
Transport: Parking & Traffic	76.4%
Transport: Experience Enhancement	77.4%
Accommodation: Availability Near Site	78.8%
Accommodation: Clean & Safe Facilities	78.8%
Accommodation: Culturally Reflective Services	78.4%
Accommodation: Staff Hospitality	78.8%
Local Business: Tourist Needs Met	80.3%
Local Business: Authentic Products	78.4%
Local Business: Economic Contribution	78.8%
Local Business: Understanding Tourist Needs	79.3%
Overall Satisfaction	82.7%
Expectation Fulfillment	82.2%
Enhanced Spiritual/Cultural Experience	83.2%
Recommend Destination	83.7%
Site Maintenance	84.1%
Tourism Improves Infrastructure	84.1%
Community Benefits from Tourism	83.2%
Site Management Efficiency	84.1%
I intend to Revisit Site	84.6%
Interest in Other Religious Sites	85.1%
Participation in Future Religious Events	86.5%

Source: own work

Respondents expressed strong agreement across all value-chain dimensions and outcome variables. This indicates a highly positive perception of religious tourism services in Lebanon. Notably, the strongest agreement was recorded for behavioral intentions such as willingness to participate in future religious events and interest in other religious sites. These patterns suggest a strong link between perceived destination quality and future engagement.

The majority of respondents expressed strong agreement across all value chain dimensions, indicating a positive perception of religious tourism services in Lebanon country. Over 85% of respondents strongly agreed with statements related to interest in

other religious sites (85.1%) and willingness to participate in future religious events (86.5%). Furthermore, over 80% strongly agreed that the sites were well-maintained, that tourism benefits the local community and infrastructure and that they would recommend the destination to others.

These findings suggest that the tourism value chain in Lebanon's religious destinations is performing exceptionally well from the visitor's perspective, particularly in terms of spiritual satisfaction, site quality and long-term engagement intentions (See Table 2).

The scale used to measure perceptions of the tourism value chain in religious destinations demonstrated excellent internal consistency, with a Cronbach's Alpha of 0.994 across 23 items as presented in Table 3.

Table 3. Internal consistency reliability (Cronbach's Alpha)

Cronbach's Alpha	Number of Items
0.994	23

Source: own work

This exceptionally high value indicates that the items are highly correlated and reliably measure the underlying construction, affirming the scale's robustness for statistical analysis.

Table 4. Pearson correlations among key variables (N = 208)

Variables	Overall Satisfaction	Recommend Destination	Intend to Revisit	Participation in Events
Transport: Accessibility via Public Transport	.868**	.865**	.797**	.804**
Transport: Road Condition & Signage	.844**	.828**	.765**	.766**
Transport: Parking & Traffic	.850**	.833**	.765**	.774**
Transport: Experience Enhancement	.835**	.818**	.769**	.771**
Accommodation: Availability Near Site	.851**	.841**	.790**	.805**
Accommodation: Clean & Safe Facilities	.886**	.875**	.791**	.799**
Accommodation: Culturally Reflective Services	.895**	.884**	.827**	.834**
Accommodation: Staff Hospitality	.913**	.902**	.824**	.839**
Local Business: Tourist Needs Met	.924**	.913**	.826**	.839**
Local Business: Authentic Products	.907**	.896**	.823**	.830**
Local Business: Economic Contribution	.924**	.913**	.834**	.833**
Local Business: Understanding Tourist Needs	.909**	.898**	.849**	.840**

Source: own work. Note: all correlations are significant at the 0.01 level (2-tailed).

The extremely high overall Cronbach's alpha (0.994) shows that items are closely related to each other and that the instrument provides very consistent scores across respondents. However, measurement literature cautions that alpha values close to 1.00 may also signal redundancy, where multiple items tap almost identical content rather than distinct facets of a construct. In this study, the high alpha likely reflects both the conceptual coherence of the tourism value chain dimensions in respondents' perceptions and the inclusion of similarly worded items within subscales. Although this level of reliability is acceptable for exploratory research, future instrument development should aim to shorten the scale by removing redundant items and to complement alpha with additional reliability metrics such as composite reliability and average variance extracted.

As shown in Table 4, all value chain components exhibit strong and statistically significant positive correlations with key outcome variables, particularly overall satisfaction, intention to revisit, recommendation likelihood, and willingness to participate in future events.

The strongest relationships are observed between local business dimensions, such as understanding tourist needs ($r = .909$) and economic contribution ($r = .924$), and overall satisfaction, suggesting that community-based engagement and authenticity play a vital role in shaping visitor experiences.

Similarly, accommodation-related factors like staff hospitality ($r = .913$) and culturally reflective services ($r = .895$) demonstrate high correlations, indicating the importance of personalized, context-sensitive hospitality.

Transport infrastructure, while still strongly associated, shows slightly lower but consistent correlations across all outcomes, highlighting its enabling role rather than a central emotional driver.

Collectively, these results emphasize that high satisfaction and behavioral intentions in religious tourism are best supported through a holistic approach that combines functional accessibility with meaningful, culturally grounded service experiences. The regression model (see Table 5) significantly predicts overall satisfaction with a high R^2 value of .879 ($p < .001$), indicating that approximately 88% of the variance in overall satisfaction is explained by the model.

The F-statistics of 117.697 confirms the model's statistical significance and overall strength. The adjusted R^2 (.871) suggests the model remains strong even after accounting for the number of predictors.

The predictors included in the model, Transport: Accessibility via Public Transport, Road Condition & Signage, Parking & Traffic, and Experience Enhancement; Accommodation: Availability Near Site, Clean & Safe Facilities, Culturally Reflective Services, and Staff Hospitality; and Local Business: Tourist Needs Met, Authentic Products, Economic Contribution, and Understanding Tourist Needs, collectively contribute meaningfully to tourists' satisfaction levels.

These results highlight that satisfaction in religious tourism is a multidimensional outcome influenced by both functional elements (infrastructure and services) and experiential qualities (cultural fit and hospitality).

Table 5. Regression model summary predicting overall satisfaction

Statistic	Value
R	.937
R Square	.879
Adjusted R Square	.871
Standard Error of Estimate	0.276
F-value	117.697
Significance (p-value)	.000
Number of Predictors	12
Degrees of Freedom (df)	12, 195

Source: own work

Table 6 summarizes the results of chi-square tests assessing associations between tourism-related variables and visitor behaviors. A statistically significant association was found between prior visitation and intention to revisit ($\chi^2 = 34.633$, $p < .001$), indicating that positive past experiences strongly influence future engagement.

Table 6. Summary of chi-square association tests between key variables

Independent Variable	Dependent Variable	χ^2 Value	df	Sig. (p-value)	Association Strength
Level of Education	Visited Religious Site in Lebanon	7.938	4	.094	Not significant
Visited Religious Site in Lebanon	Intend to Revisit Site	34.633	4	.000	Significant
Tourism Improves Infrastructure	Recommend Destination	586.870	16	.000	Highly significant
Community Benefits from Tourism	Recommend Destination	483.123	16	.000	Highly significant
Local Business: Tourist Needs Met	Interest in Other Religious Sites	412.000	16	.000	Highly significant
Transport: Experience Enhancement	Interest in Other Religious Sites	450.837	16	.000	Highly significant
Accommodation: Clean & Safe Facilities	Interest in Other Religious Sites	473.772	16	.000	Highly significant

Source: own work

Moreover, strong associations emerged between perceptions of infrastructure, community benefits, and service quality with recommendation likelihood and interest in visiting other religious sites, all with p-values below .001.

In contrast, the relationship between education level and prior visitation was not statistically significant ($p = .094$), suggesting that educational background is not a major determinant of religious tourism participation in this context.

Discussion

The consistently high agreement levels across tourism value chain items and outcomes suggest that surveyed visitors perceive Lebanon's religious tourism value chain as functioning very effectively, especially when it comes to the spiritual and personal experiences. At the same time, this positivity may partly reflect sample composition—well-educated, economically active residents with strong attachment to religious sites—and potential acquiescence or social desirability bias in self-reported evaluations. From a value-chain perspective, the pattern of high scores across transport, accommodation and local business services indicates that visitors do not differentiate sharply between functional and experiential elements; rather, they experience the chain as an integrated whole.

The fact that local business and accommodation variables display some of the strongest correlations with satisfaction and intentions supports arguments that in religious tourism, embeddedness in local culture and community is a critical source of perceived value. In other words, pilgrims reward destinations not only for providing safe access and comfortable facilities but also for visibly benefiting local residents and honoring religious and cultural norms in service provision. This finding directly affects how to improve tourism value chain interventions that prioritize community-based enterprises, faith-sensitive hospitality training and participatory governance arrangements in Lebanon's religious destinations.

The findings speak directly to current discussions on how tourism value chains can be leveraged to support inclusive and resilient development in emerging and politically sensitive destinations. Studies of “new” tourism regions show that value is more often created through mixed management styles that connect small, local businesses with bigger companies throughout the chain. The significant impact noticed here for local business variables such as “tourist needs met” and “economic contribution” indicates that in religious destinations, community-anchored nodes of the tourism value chain are particularly salient for visitors' satisfaction and loyalty. In studies about religious tourism, a key argument is whether secular and sacred values can coexist within commercially organized pilgrimage systems without losing their true meaning. The present study adds to this discussion by demonstrating that high levels of satisfaction and behavioral intention are associated not only with spiritual experiences and site maintenance but also with visible socio-economic benefits for local communities and culturally coherent service encounters. Instead of treating commercial services as inherently problematic, the findings indicate that when embedded within a well-functioning tourism value chain, they can actually enhance pilgrims' perceptions of authenticity and moral appropriateness (Budovich et al.,

2023; Chusmeru et al., 2023; Sitkevich, 2023; Sutomo et al., 2023; Ayele & Singh, 2024; Mileva & Krachanova, 2024).

The findings offer coherent support that the results of religious tourism in Lebanon have a strong correlation with the performance of the tourism value chain. In all the correlation findings, transport infrastructure, quality of accommodation, and local business services were positively correlated with variables of satisfaction and behavioral intention (recommendation, revisit intention, and participation in future events), which confirms the overall hypothesis of the study that the value-chain performance is relevant to visitor outcomes. This tendency is further supported by a regression model that demonstrates that overall satisfaction is explained by a significant portion of the value-chain indicators ($R^2 = 0.879$; $p < 0.001$). This is in line with the value-chain logic that tourism value is generated in the form of a series of sequential service experiences and not a single destination characteristic (Kim et al., 2016; Kuo et al., 2019). Another outstanding trend is the strength of relationships between local business dimensions and general satisfaction. The fact that most of the factors, such as the destination's ability to know the tourists' needs and perceived economic contribution, had high correlations implies that religious tourism experiences are influenced not only by the logistics and comfort of a destination but also by the perceived authenticity and sense of belonging to the community.

This study is in line with literature that highlights the fact that pilgrimage-type travel adds a spiritual connotation to both social and cultural meaning, with interaction with the locals and services rooted in culture enhancing the visitor experience (Kim et al., 2016; Kuo et al., 2019). The practical implication of this outcome in the context of Lebanon is also the following: destination policies that merely invest in infrastructure without bolstering the local service ecosystem might fail to deliver on visitor satisfaction and long-time engagement. There are also positive relations between satisfaction and behavioral intentions and accommodation variables, in particular, staff hospitality and culturally reflective services. This implies that in religious tourism, where identity-related and experience-oriented motives are often relevant, the quality of hospitality services is not merely functional but interpretive as well: the tourism visitor assesses whether hospitality services capture the cultural and religious context of the destination. According to previous studies, the weakness of standard operating procedures and coordination exposes service chains in religious destinations to declines in perceived quality despite the presence of attractive destination assets (Sinha and Mittal, 2021; Mittal and Sinha, 2022). The presented results support the idea that harmonized quality levels and culturally suitable service design between accommodation providers and destination managers are the strategy towards enhancing visitor outcomes.

The transport infrastructure has been firmly connected with outcomes, but in this case, it seems more facilitating than experiential. Accessibility and the state of roads and signs play a role in both satisfaction and future engagement due to the diminution of friction and uncertainty during the travelling process. This is in line with the perception that tourism planning and destination management are preconditions to sustained tourism performance,

especially in those environments that are susceptible to political or operational turmoil (Issa and Altinay, 2006; Kabalan and Stanciulescu, 2018). In the case of Lebanon, it means that investments in mobility, signage, and access management must be addressed as a background: without access that can be trusted, there may be no transformation of interest into visits and repetitive engagement despite the cultural and religious wealth.

The chi-square findings also support the behavioral explanation of the model by demonstrating that intention to revisit is strongly related to prior visitation. This implies that favorable experiences, which are generated by the systemic performance of value-chain elements, are converted into loyalty-type responses such as repeat visitation and recommendation behavior. Practically, this may serve to support a destination approach toward experience consistency: making certain that the transport, hospitality, local services, etc., work together to amplify the satisfaction so first-time visitors become repeat visitors and informal marketers of the destination. This is more especially the case in religious tourism, where word-of-mouth and community recommendation would affect the planning of the trip and the spread of the destination's reputation.

In general, the discussed evidence indicates that a holistic policy approach to religious tourism in Lebanon should include (i) value-chain enhancement based on accessibility and site-arrival management, (ii) the quality of hospitality offered in accordance with the religious/cultural identity of the sites and (iii) the creation of local business ecosystems that provide authentic products and can be seen by the local communities. This kind of coordination needs the alignment of the stakeholders (public sector, religious organizations, private operators, and communities) and implementation of destination management practices to track the quality of services along the chain (Kabalan and Stanciulescu, 2018). Methodologically, the paper also contributes to measurement debates in tourism value-chain and religious tourism research by developing and validating a concise scale that jointly captures chain performance and visitor outcomes in a small-country, multi-faith context. While further refinement is needed, especially regarding item redundancy, the scale provides a starting point for comparative studies across different religious destinations in the Middle East and other places (Budovich et al., 2023; Chusmeru et al., 2023; Sutomo et al., 2023).

Conclusions

This study examined how transport, accommodation, and local business services shape satisfaction and behavioral intentions in Lebanon's religious tourism destinations. The evidence suggests that visitors evaluate the destination as a connected value chain rather than as separate services. Satisfaction increases when the chain works coherently and when local services reflect both practical needs and cultural expectations. Travelers demonstrated strong positive attitudes toward religious tourism by appreciating transportation access and road quality as well as direction signs, as these aspects gain greater weight in spiritual tourism. The visitor experience included various other aspects. The accommodation received praise

from visitors because visitors valued both its clean environment and comfortable amenities as well as its cultural harmony with sacred site practices. Local businesses that specialized in authentic community-based products related to religious needs strengthened the experience of tourists throughout their entire trip.

Religious tourism in Lebanon combines physical travel with cultural exploration, according to the findings of this research. Visitors build stronger connections when hospitality services follow both religious rites and local customs, and systems allow easy access to sites. The vibrant, authentic local commerce system facilitates cultural immersion of visitors so they gain both enhanced perceptive value and meaningful experience. The research findings demonstrate that visitors develop emotional responses consisting of fulfillment along with satisfaction and willingness to visit again based on their positive assessments of different value chain elements. People who had prior experience visiting religious places in Lebanon showed increased intent to return because the quality of their experience served as the main factor influencing their future actions. Tourists who experience their sites as beneficial for host communities and true to authentic traditions develop purposes beyond monetary exchange because their involvement becomes mutually beneficial. Tourism strategies require special design to benefit visitors while enhancing the power and capacity of host communities.

The research shows that to build a successful religious tourism sector in Lebanon; one must maintain equal attention to both accessibility improvements and cultural connection and active community involvement. Stakeholders should prioritize policies and investment decisions to develop high-quality infrastructure, cultural lodging arrangements, and locally run sustainable businesses. The establishment of Lebanon as a competitive destination in faith-based and heritage tourism will be achieved by improved visitor satisfaction. The study contributes to the literature by operationalizing religious tourism value-chain performance in a fragile destination context and by linking it to satisfaction and future behavioral intentions. Its main theoretical value lies in showing that community-embedded services and culturally appropriate hospitality are not secondary features, but central components of destination value creation. This contribution is exploratory, however, and should be confirmed through future studies with stronger measurement designs. (Budovich, 2023; Sutomo et al., 2023; Ayele & Singh, 2024)

There are limitations of this research that need to be considered during the interpretation of findings. The survey is a self-reported cross-sectional survey, thus restricting causal conclusions. The sample was also gathered in one national situation, and not all the segments of visitors were represented, particularly the international religious tourists. Also, the agreement rates are high in most of the items, implying the potential of positive response bias that the future research should deal with using mixed measurement methods. The use of purposive, primarily domestic sampling limits the external validity of the findings, especially with regard to international pilgrims and low-income groups whose value-chain experiences may differ. In addition, the combination of on-site and online

recruitment may have favored respondents with stronger engagement in religious tourism and higher digital literacy, thereby inflating levels of satisfaction and behavioral intention.

The model should be repeated in the future with larger and more diverse samples, such as international visitors and site-specific comparisons between Lebanese regions. The qualitative methods (interviews with visitors, religious establishments, local enterprises, and policymakers) may enhance insights into why certain links in the value chains contribute to the formation of spiritual and cultural experience. The future research can also test mediating processes (e.g., perceived authenticity or perceived safety) and test policy interventions, which can enhance the value-chain coordination over time.

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AN INTEGRATED STRUCTURAL GRAVITY–MIMIC FRAMEWORK FOR MEASURING SMUGGLING: EVIDENCE FROM THE REPUBLIC OF MOLDOVA

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Abstract: *Smuggling represents a critical, unobservable challenge for emerging economies, particularly the Republic of Moldova, hindering fiscal stability, market functionality, and progress toward European Union integration. While existing literature often relies on either statistical discrepancy or Multiple Indicators Multiple Causes (MIMIC) models, this article introduces an original, integrated methodological approach to measure the phenomenon. The study combines the theoretically rigorous Structural Gravitational Equation (SGE) with the MIMIC model, applied for the first time to the Moldovan context over the period 2010–2024. The SGE first forecasts "expected" legitimate bilateral trade flows with 29 partners, generating statistically significant deviations (residuals) that capture unexplained trade (illicit activity). These residuals are then incorporated as a key endogenous indicator within the MIMIC framework, alongside structural causes such as weak governance capacity and significant excise duty differences. Smuggling is treated as a latent phenomenon shaped by institutional and fiscal determinants and reflected in observable indicators such as mirror trade gaps, excise differentials, seizures/fraud cases, and gravity-based anomalies. The gravity model is estimated with PPML-HDFE to obtain expected flows and anomalies; these, together with mirror gaps and excise differentials, enter a MIMIC system that recovers a standardized index of smuggling intensity. The findings confirm that low institutional quality and tax differentials significantly stimulate illicit flows, with excise differences being the most potent driver. Results indicate that governance improvements and excise alignment reduce illicit trade, while fiscal and labor market pressures increase it. Robustness checks confirm stability across indicator sets, lag structures, and sectoral gravity runs. The resulting synthetic index of smuggling magnitude provides a robust and consistent quantitative tool for policymakers, offering an empirical foundation to develop targeted, sustainable fiscal and anti-corruption measures necessary for stability, good governance, and international development goals.*

Keywords: *smuggling; illicit trade; gravity equation; MIMIC; Republic of Moldova.*

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Introduction

The proliferation of illicit trade, particularly smuggling, poses a fundamental threat to the sustainable economic and social development of emerging economies. In the Republic of Moldova, this clandestine activity not only diminishes critical state revenue required for public services and infrastructure but also distorts legitimate markets, creating unfair competition and ultimately complicating the nation's path toward European Union integration. Just to underscore again, smuggling distorts price signals, undermines fiscal capacity, and weakens the credibility of lawful market institutions. Accurately quantifying the scale of this phenomenon is inherently challenging, as smuggling, by its very nature, is an unobservable latent variable (Lackó, 2018). This difficulty leads to reliance on indirect estimation methods, often yielding disparate and non-comparable results (Schneider & Enste, 2000). In small open economies with porous borders and uneven enforcement, the

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problem is especially acute. The Republic of Moldova provides an informative case due to excise misalignments, multiple border interfaces, and episodic enforcement shocks that produce variation in incentives for illicit arbitrage.

Established literature on measuring illicit trade relies primarily on two complementary approaches: the statistical discrepancy method, which uses the difference between reported exports and imports, and the Multiple Indicators Multiple Causes (MIMIC) model, which employs observable economic and institutional variables to estimate the hidden activity. However, both methods possess limitations, typically failing to account for the complex, bilateral nature of trade flows (discrepancy method) or the necessity of incorporating a truly exogenous and validated indicator (MIMIC model) (Feenstra, 2004).

This article addresses a crucial methodological gap by proposing and executing an integrated approach that links the micro-level dynamics of trade flows with the macro-institutional causes of illicit activity. The principal contribution of this article is methodological rather than descriptive. It demonstrates how residuals obtained from a theoretically consistent Structural Gravity Equation can be integrated into a latent-variable framework to improve the measurement of illicit trade. The proposed hybrid methodology extends existing applications of both Structural Gravity and MIMIC modelling and provides a transferable framework that may be applied to other small open economies characterised by significant informal cross-border trade. This hybrid methodology, applied for the first time to the Republic of Moldova's trade with 29 major partners, provides a theoretically rigorous and empirically robust measurement of smuggling.

This study asks how a country can quantify a non-observable phenomenon such as smuggling using routinely available data. Therefore, we apply a two-step strategy: a structural gravity model fitted with PPML-HDFE predicts bilateral trade flows and yields deviations ($\Delta = X_{\text{obs}} - \hat{X}$) that can flag anomalous trade patterns; a MIMIC model treats smuggling as a latent factor driven by structural causes and reflected in multiple indicators, including gravity anomalies. The result is an interpretable, policy-relevant smuggling index.

Moldova's exposure to smuggling stems from a conjunction of structural and cyclical elements. Structurally, the country's position at the EU external frontier creates strong price-based arbitrage incentives whenever excise trajectories diverge from those of Romania and, episodically, Ukraine. Cyclically, fiscal consolidation episodes, exchange-rate movements, and governance cycles alter the expected profitability of illicit channels. In excise-intensive products (alcohol, tobacco, fuel, etc.), even modest tax gaps compound along the supply chain, translating into measurable retail differentials at border-proximate markets. The academic challenge is to distinguish law-abiding substitution (e.g., cross-border shopping) from criminal diversion that circumvents customs altogether.

The primary aim of this research is to develop a reliable and consistent synthetic index of smuggling magnitude for Moldova. The objective is to identify the critical, measurable determinants (causes) of illicit trade and quantify their impact on the Moldovan economy. Our hybrid approach contributes in two ways. First, it treats gravity residuals not as "proof" of smuggling but as probabilistic signals that must be validated jointly with other indicators in a

latent-variable framework. Second, by imposing sign discipline on both causes and indicators (e.g., governance should reduce the latent index), it yields a falsifiable measurement system: conflicting signs or poor fit flag misspecification. This is critical for policy use, where dashboards must be interpretable and robust to reasonable modeling choices.

The paper focuses on the national index; sectoral and partner-specific indices are feasible but require more granular enforcement data. Consequently, the proposed index should be interpreted as a relative indicator of latent smuggling intensity rather than a direct estimate of the monetary value of illicit trade.

The present study constitutes the second stage of an ongoing doctoral research programme devoted to developing quantitative methods for measuring bilateral trade of the Republic of Moldova. Earlier work (Butucea, 2025; Butucea, 2026) focused on estimating a Structural Gravity Equation capable of identifying statistically significant deviations between observed and predicted bilateral trade flows. The present article extends that research by embedding gravity-based anomalies into a Multiple Indicators Multiple Causes (MIMIC) framework, thereby transforming unexplained trade deviations into one component of a broader latent measure of smuggling intensity. Consequently, the objective of this article is not to reproduce previous gravity estimations but to develop an integrated measurement framework capable of combining trade anomalies with institutional, fiscal and governance indicators.

The remainder of this paper is structured as follows: Section 1 critically reviews the literature and details the theoretical linkage between SGE and MIMIC. Section 2 outlines the data and methodology. Section 3 presents the main empirical results. Section 4 discusses the findings in the context of global development and sustainability, and Section 5 concludes with policy implications.

Literature Review

The theoretical grounding of this research requires a brief review of the two integrated methodologies and their application in measuring hidden economic activity. Measurement of illicit trade has followed two strands. A macro strand infers hidden flows from discrepancies in mirror statistics between trading partners (Frankel, 1982; Feenstra & Hanson, 2004; Hinz, 2017; Crozet, Hinz & Mayer, 2021). A micro strand documents tax-driven evasion at the product–partner level (Fisman & Wei, 2004; Joossens et al., 2010; Merriman, 2002).

Structural gravity provides a general equilibrium-consistent framework for predicting counterfactual trade flows based on trade costs and multilateral resistance (Anderson & van Wincoop, 2003; Head & Mayer, 2014; Yotov et al., 2016). PPML with high-dimensional fixed effects accommodates zeros and heteroskedasticity while absorbing unobservables via exporter–year, importer–year, and pair fixed effects. Deviations from predicted flows have been interpreted as signals of misreporting or policy distortions.

For latent constructs that cannot be directly observed, the MIMIC approach integrates multiple causes and multiple indicators to recover a factor score representing the

underlying phenomenon (Tanzi, 1999; Schneider & Enste, 2000; Dell'Anno, 2007). The interpretability of the factor depends on coherent theory-based signs on causes and indicators and on adequate model fit. This paper bridges the two literatures by embedding gravity anomalies within a MIMIC system targeted to Moldova.

Direct measures (seizures, prosecutions) conflate enforcement effort with prevalence: higher seizures may mean more smuggling or better targeting. Mirror statistics face reporting conventions (FOB vs. CIF, valuation bases, re-exports), while firm-level audits are not scalable. A reasonable strategy is triangulation: use multiple noisy signals whose noise processes are partly independent (e.g., policy variables, third-country mirrors, and administrative seizures). A MIMIC design is well-suited to such triangulation provided (i) identification is clear; (ii) loadings respect theory; (iii) fit diagnostics are acceptable.

Structural gravity offers a disciplined counterfactual. Modern PPML-HDFE absorbs multilateral resistance with exporter-year and importer-year fixed effects, while pair fixed effects capture time-invariant bilateral traits (history, diaspora, standards). Deviations between observed and predicted flows are then interpretable as reduced-form net anomalies: they bundle misreporting, non-tariff frictions, and, potentially, illicit diversion. Treating these residuals as one of several indicators – rather than the sole measure – guards against over-interpretation.

The shadow-economy MIMIC literature underscores three practical lessons: (1) Scale anchoring via a fixed loading (we fix GDP per capita at -1.00) avoids arbitrary rescaling; (2) Sign coherence across causes and indicators increases interpretability; (3) Sensitivity analysis (alternative indicator sets, lags, instrumented causes) is not optional; it is part of validation. We adapt these lessons to the trade-illicit nexus, yielding an index that policymakers can track through time and compare against discrete interventions (excise harmonization, customs IT upgrades, joint operations).

The present study builds directly upon the gravity-based framework developed in earlier research by the author (Butucea, 2025; Butucea, 2026), where the emphasis was placed on estimating legitimate bilateral trade flows. The current article extends this research by integrating those gravity residuals into a MIMIC model to recover a latent index of smuggling intensity. This progression reflects the sequential design of the broader doctoral research project.

Methodology and Data

The empirical analysis is based exclusively on observed bilateral merchandise trade data covering the Republic of Moldova and 29 principal trading partners over the period 2010–2024. Trade statistics originate from the UN COMTRADE and BACI databases and were harmonized using internationally accepted procedures, including FOB/CIF adjustments, product concordance and constant-price deflation. Unlike preliminary methodological exercises presented during the initial stage of this doctoral research, the present article relies

entirely on observed trade data and does not employ simulated trade values in any stage of the estimation process.

The Structural Gravity Equation constitutes the first stage of the proposed methodology and follows the specification previously developed and validated in Butucea (2026). Unlike the previous study, where the objective was to explain bilateral trade determinants, the present research uses the estimated residuals as endogenous indicators within the MIMIC framework.

Structural gravity. We estimate PPML with exporter×year, importer×year, and pair fixed effects, including geographic and policy covariates (distance, contiguity, common language, tariffs, agreements, sanctions). The fitted counterfactual generates $\Delta = X_{obs} - \hat{X}$. Standardized anomalies (z-scores) provide an indicator series usable within MIMIC alongside mirror gaps and excise differentials.

The log-linearized form of the SGE is used to predict the value of bilateral trade flows ($Trade_{ij}$) between country i (Moldova) and country j (trading partner). The model is:

$$\ln(Trade_{ij}) = \beta_0 + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(Distance_{ij}) + \beta_4 (Contiguity_{ij}) + \sum \beta_k Other\ Factors_{ij} + \varepsilon_{ij} \quad (1)$$

In the presence of systemic illicit trade, the residual term (ε_{ij}) is hypothesized to capture the persistent, unexplained variance, which in this context represents the difference between the **predicted legitimate trade** and the **actual total trade**. We utilize the estimated residual ($\hat{\varepsilon}_{ij}$) as the key proxy for the magnitude of illicit trade between Moldova and partner j .

Validation of the Structural Gravity Equation. Before employing gravity residuals as indicators of latent smuggling activity, the baseline Structural Gravity Equation was evaluated against the theoretical expectations established in the international trade literature. In particular, geographic distance exhibited the expected negative and statistically significant elasticity, while GDP, common language, contiguity and free trade agreements displayed positive coefficients consistent with previous empirical studies. These findings confirm that the estimated gravity model provides an appropriate benchmark for identifying unexplained trade anomalies.

The robustness of the gravity specification was further assessed through alternative fixed-effect structures, exclusion of influential observations and sector-specific estimations. Across all specifications the estimated distance elasticity remained negative, demonstrating that the residuals subsequently introduced into the MIMIC model originate from a theoretically valid gravity benchmark rather than model misspecification.

MIMIC specification. Let η denote latent smuggling intensity. Measurement: η is reflected in standardized indicators (mirror gap, Δ anomaly, seizures, excise gap) with loadings expected positive; GDP per capita enters the measurement block with loading fixed at -1.00 for scale identification. Structural: η is driven by causes including tariff/excise pressure (+), unemployment (+), openness (−), governance quality (−), FX volatility (+), and institutional effort (−). Estimation uses robust ML; fit is assessed by RMSEA, GFI/AGFI, and NFI.

The **Structural Equation** links the unobserved latent variable—Smuggling (S_t)—to a vector of causes (C_t):

$$S_t = \gamma' C_t + v_t \quad (2)$$

The **Measurement Equation** links the latent variable (S_t) to a vector of observable indicators (I_t):

$$I_t = \lambda' S_t + \eta_t \quad (3)$$

The central hypothesis is that factors that cause smuggling (e.g., weak institutions) will simultaneously affect the indicators of smuggling (e.g., statistical discrepancies, unaccounted trade flows).

Trade flows are deflated using partner-specific price indices to approximate constant-dollar comparisons. Tariff and excise schedules are consolidated into an effective fiscal pressure variable at product level (ad valorem equivalents where needed). Governance (WGI) is normalized to mean zero, SD one. Enforcement data (seizures/fraud) are expressed per 100,000 inhabitants to mitigate scale effects and smoothed with a Hodrick-Prescott ($\lambda=100$) filter to reduce spurious spikes from single operations.

Baseline PPML-HDFE includes distance (log), contiguity, common language, tariff/ad-valorem equivalents, FTAs, and sanctions where applicable. Exporter-year and importer-year FE absorb macro shocks and multilateral resistance; pair FE capture time-invariant frictions. We report standard PPML diagnostics (hat-matrix leverage, influential pairs) and confirm that coefficients are stable to (i) excluding outliers; (ii) clustering at the pair level; (iii) re-estimating by HS sections. Residuals are standardized by year to avoid level drift.

The **Poisson Pseudo-Maximum Likelihood (PPML)** method is utilized to address the prevalence of zero trade flows and heteroskedasticity (Silva & Tenreiro, 2006).

$$\text{Trade}_{ijt} = \exp[\beta_0 + \beta_1 \ln(\text{GDP}_i) + \beta_2 \ln(\text{GDP}_j) + \beta_3 \ln(\text{Dist}_{ij}) + \beta_4 (\text{Contig}_{ij}) + \sum \delta_t \text{Year}_t + \varepsilon_{ijt}] \quad (4)$$

The residuals ($\hat{\varepsilon}_{ijt}$) were then extracted and aggregated into a single annual measure of unexplained trade, $\hat{\varepsilon}_t$, to be used in the MIMIC model.

Prior to extracting residuals, the gravity model was evaluated against the standard expectations of the structural gravity literature. In particular, the estimated elasticity of geographic distance remained negative and statistically significant, while GDP and contiguity displayed the expected positive signs. These results confirm that the baseline gravity specification satisfies the theoretical requirements necessary for subsequent residual analysis.

The MIMIC model is estimated using **Structural Equation Modeling (SEM)** via Maximum Likelihood Estimation.

Measurement Equation:

$$\begin{bmatrix} \hat{\varepsilon}_t \\ D_t \end{bmatrix} = \begin{bmatrix} \lambda_1 \\ \lambda_2 \end{bmatrix} S_t + \begin{bmatrix} \eta_{1t} \\ \eta_{2t} \end{bmatrix} \quad (5)$$

Structural Equation:

$$S_t = \gamma_1 E_t + \gamma_2 G_t + v_t \quad (6)$$

The measurement block includes mirror gaps, excise differentials, seizures/fraud, and standardized gravity anomalies. Causes include fiscal pressure, unemployment, openness, governance, FX volatility, and institutional effort (customs/border budget proxies). We fix the GDP-per-capita loading at -1.00 for scale and estimate by robust ML. Model fit (RMSEA, GFI/AGFI, NFI) is evaluated against conventional thresholds ($\text{RMSEA} < 0.08$; $\text{NFI} \geq 0.90$). Sign reversals trigger re-specification (e.g., instrumenting openness with lagged external demand).

We test alternative indicator sets, add lags to causes to mitigate simultaneity, and run sectoral gravity models. We implement three families of checks: (A) Indicator rotation (drop one indicator at a time; substitute seizures with fraud prosecutions); (B) Lag structure on causes (+1 and +2 years) to mitigate simultaneity; (C) Sectoral gravity (HS-section regressions) to test whether the index is driven by a single product class. Across exercises, the rank ordering of yearly index values is stable; confidence bands narrow when enforcement and mirror gaps move coherently. Results are stable to alternative normalizations and to excluding individual indicators.

Results, Discussion and Policy Implications

Gravity estimates align with prior literature: distance reduces trade; contiguity and common language increase it; tariffs and sanctions depress flows; and free trade agreements stimulate exchanges. The PPML-HDFE framework captures multilateral resistance and pair-specific unobservables via rich fixed effects.

Positive gravity anomalies concentrate in sectors historically exposed to illicit arbitrage (alcohol, tobacco, fuel) and in periods characterized by excise misalignment or external shocks. These anomalies are consistent with mirror discrepancies and with spikes in seizures reported by national authorities.

In the MIMIC system, governance quality enters with negative and statistically robust coefficients, while tariff/excise pressure and unemployment are positive. Openness tends to dampen the latent factor, whereas FX volatility slightly increases it. Indicator loadings on mirror gaps, excise differentials, seizures, and gravity anomalies are positive and significant, validating these as manifestations of smuggling propensity.

Distance elasticity around -1.9 indicates strong spatial decay in flows, in line with international benchmarks. Positive contiguity and language effects reflect reduced trade costs and social-network channels. The tariff coefficient (≈ -0.24) is economically large: a 10-percentage-point rise in the effective rate is associated with roughly 2.4% lower reported flows, consistent with evasion incentives seen in mirror gaps.

The latent index rises in years of fiscal tightening and FX volatility, then recedes when governance and institutional effort improve (customs IT upgrades, targeted operations). Peaks coincide with excise realignments lagged by one year, consistent with adjustment costs and

delayed enforcement. Correlation with standardized gravity anomalies and mirror gaps exceeds 0.6, suggesting shared underlying shocks rather than noise.

Dropping any single indicator shifts levels but not rank order across years. Introducing lags on causes reduces contemporaneous endogeneity; governance retains a strong negative association with the latent index. Sectoral gravity shows that alcohol, tobacco, and fuels carry the bulk of anomalies, yet the national index is not solely driven by a single HS section—important for policy generalization.

Table 1. Structural Gravity (PPML-HDFE) – Main Coefficients

Variable	Coefficient	Std. Error	z-Stat	p-Value	Signif.
ln Distance	-1.944	0.120	-16.2	0.000	***
Contiguity	0.821	0.097	8.46	0.000	***
Common Language	0.412	0.063	6.54	0.000	***
Tariff Rate (%)	-0.237	0.045	-5.27	0.000	***
FTA in force	0.166	0.051	3.27	0.001	***
Sanctions dummy	-0.215	0.072	-2.98	0.003	**
Exporter×Year FE	Yes				
Importer×Year FE	Yes				
Pair FE	Yes				
Observations	N≈(pairs×years)				
Pseudo R ²	0.93				

Source: Author research

Note: PPML with high-dimensional fixed effects; standard errors clustered at pair level.

Table 2. MIMIC model – Standardized Coefficients (Latent Smuggling Index)

Block	Variable	Std. Coef.	Std. Error	p-Value	Signif.
Causes	Tariff/Excise Burden	+0.48	0.12	0.001	***
Causes	Unemployment Rate	+0.35	0.11	0.005	**
Causes	Openness (X+M)/GDP	-0.15	0.07	0.043	**
Causes	Rule of Law / Control of Corruption	-0.52	0.09	0.000	***
Causes	FX Volatility	+0.11	0.07	0.092	*
Causes	Institutional Effort (Customs/Border)	-0.27	0.11	0.017	**
Indicators	Mirror Discrepancies	+0.64	0.08	0.000	***
Indicators	Excise Differentials	+0.70	0.10	0.000	***
Indicators	Seizures / Fraud cases	+0.59	0.09	0.000	***
Indicators	Gravity anomaly Δ	+0.62	0.07	0.000	***
Identification	GDP per capita (loading fixed)	-1.00	(fixed)		

Source: Author research

Fit: χ^2 (df), RMSEA<0.08, GFI/AGFI>0.90, NFI≈0.95. Loadings and signs consistent with theory.

The SGE estimation confirmed the standard results, showing that bilateral trade is strongly and positively correlated with the GDP of both Moldova and its partners, and

negatively correlated with geographic distance. The high Pseudo R-squared value confirms the model's capacity to predict legitimate trade flows accurately.

Table 3. Key PPML SGE Estimation Results (2010–2024)

Variable	Coefficient (β)	t-statistic
$\ln(\text{GDP}_{\text{Moldova}})$	1.05***	(15.2)
$\ln(\text{GDP}_{\text{Partner}})$	0.88***	(12.1)
$\ln(\text{Distance})$	-1.15***	(-18.7)
Contiguity	0.45**	(3.4)
Model Fit		
Observations	387	
Pseudo R^2	0.74	

Source: Authors research *** $p < 0.01$; ** $p < 0.05$.

Table 4. MIMIC Model Parameter Estimates

Relationship	Parameter	Estimate	Std. Error	p-value	Interpretation
Structural (Causes of Smuggling S)					
Excise Differential (E) $\rightarrow S$	γ_1	0.82***	0.15	0.001	Primary driver; highly significant.
Governance (G) $\rightarrow S$	γ_2	-0.55**	0.18	0.035	Significant driver; higher governance reduces S .
Measurement (Indicators of Smuggling S)					
SGE Residuals ($\hat{\epsilon}$) $\leftarrow S$	λ_1	0.91***	0.11	0.001	Excellent tracking; validates SGE indicator.
Trade Discrepancy (D) $\leftarrow S$	λ_2	0.71**	0.19	0.041	Good tracking; standard indicator validation.

Source: Authors research *** $p < 0.01$; ** $p < 0.05$.

The table below shows the result of the MIMIC estimates made on the proposed variables and by compiling the respective data (the electronic version is attached).

Based on these estimates, we will try to make a positioning of the Republic of Moldova compared to the smuggling index from neighboring countries discussed in the literature. Table 6 compares the smuggling index in the Republic of Moldova with certain counterparts in Eastern Europe reported in the article Boehm and Farzanegan (2012).

Although our country was absent from the 1990s dataset, its inclusion here expands the comparative framework and illustrates how the intensity of smuggling in the country fits into regional patterns.

Table 5. Index of Smuggling in Moldova (obtained from Excel data file)

Year	smuggling_index_z	smuggling_index_0_100
2005	0.99	91.95
2006	1.04	94.11
2007	1.11	96.82
2008	0.86	86.12
2009	0.80	83.74
2010	0.84	85.45
2011	0.85	85.91
2012	0.86	86.47
2013	0.86	86.47
2014	1.18	100.00
2015	-0.81	14.93
2016	-0.87	12.29
2017	-0.86	12.66
2018	-0.70	19.25
2019	-1.00	6.43
2020	-1.12	1.33
2021	-0.80	15.00
2022	-1.12	1.27
2023	-0.95	8.58
2024	-1.15	0.00

Source: Author research

Table 6. Comparative Smuggling Index: Eastern Europe and Moldova

Country	Period	Smuggling Index
Slovenia	1991–1999	-0.765
Estonia	1991–1999	-0.685
Latvia	1991–1999	-0.176
Croatia	1991–1999	0.259
Bulgaria	1991–1999	0.283
Ukraine	1991–1999	0.653
Moldova	2014–2024	49.4 (average, scale 0–100)

Source: Author research

Note: The values for Eastern European countries come from the article Boehm and Farzanegan (2012), Table 4.2, Specification 2. The value of Moldova's index represents the average of the index estimated in this article (0–100, 2014–2024).

The empirical findings offer direct and compelling insights for achieving sustainable economic and social development – the central theme of the EUMMAS A2S Conference. Smuggling, as measured by the SGE-MIMIC model, is not merely an economic issue; it is a **governance and sustainability crisis**.

The γ coefficients confirm that **larger differences in excise taxes ($\gamma_1 = 0.82$)** are the **primary determinant** of smuggling, and **weak governance ($\gamma_2 = -0.55$)** is a significant facilitator. The high factor loading of the SGE Residuals ($\lambda_1 = 0.91$) validates the integrated methodology. The resulting synthetic annual index of smuggling magnitude (S_t) indicates a persistent, though fluctuating, level of illicit trade.

First, the strong finding that **weak governance (G) significantly increases smuggling** underscores the necessity of investing in institutional capacity (e.g., anti-corruption reforms, transparent border controls). This links directly to the concept of **sustainable development**, as illicit trade systematically undermines the rule of law and the legitimacy of democratic institutions. For the Republic of Moldova's European Union integration efforts, demonstrating robust control over borders and tackling institutional corruption is non-negotiable.

Second, the confirmation that **excise differentials (E) are the most potent cause** dictates a targeted fiscal policy response. The results suggest that policymakers may consider on minimizing the *gap* in high-value, easy-to-move goods (e.g., tobacco, fuel, alcohol). The revenue lost to smuggling far outweighs the short-term benefit of maintaining significantly high excise rates. Furthermore, the integration of technology, such as advanced data analytics (a form of **technological development**), applied to the SGE residuals ($\hat{\epsilon}_t$) can enable customs authorities to predict and disrupt smuggling routes in near real-time, moving beyond traditional physical border checks.

The methodological contribution is itself a foundation for sustainable policy. By providing a stable, theoretically sound, and consistently measured index of smuggling, policymakers can track the effectiveness of anti-corruption campaigns and fiscal policies, supporting a proactive, **data-driven, and sustainable governance strategy**.

Policy design should address relative prices: excise schedules aligned with regional comparators reduce arbitrage rents. Sequenced reforms that move gradually toward convergence can mitigate abrupt incentives to shift to illicit channels.

Enforcement capacity matters: sustained funding for customs and border agencies, modern IT risk targeting, and staff training are associated with lower smuggling intensity in the MIMIC results. Investments should be protected across political cycles to preserve institutional memory and capacity.

International cooperation enhances detection and deterrence. Regular reconciliation of mirror statistics, joint risk profiles, and targeted operations reduce statistical blind spots. Moldova's position at the EU external frontier makes such cooperation both feasible and valuable.

Excise alignment should follow a predictable path communicated ex-ante to market participants. Sudden hikes create temporary rents that illicit supply chains exploit. Smoothing and coordination with Romania reduce volatility and arbitrage incentives.

Evidence favors persistent investments (risk engines, e-invoicing, data fusion across agencies) over episodic crackdowns. The index responds more to durable improvements in governance and institutional effort than to single-month spikes in seizures. Performance metrics should emphasize risk-based targeting quality, not raw seizure counts.

Prioritize bilateral mirror reconciliation with top partners and adopt joint risk profiles for excise goods. Where feasible, establish data-sharing MOUs to access shipment-level records for targeted audits. Moldova's status at the EU border is an asset: alignment with EU customs data standards improves detection and deterrence.

Conclusions

This study successfully introduced and applied an **integrated Structural Gravity Equation and MIMIC model** to quantify the magnitude and identify the determinants of illicit trade in the Republic of Moldova over 2010–2024. By utilizing the unexplained variance from the SGE as the key endogenous indicator for the MIMIC model, we have developed a robust methodology that significantly advances the rigor of latent variable estimation in the context of trade.

Integrating structural gravity with a MIMIC framework yields an operational index of smuggling intensity that is interpretable, reproducible, and policy-relevant. Applied to the Republic of Moldova, the methodology confirms the central roles of governance quality and fiscal alignment. The resulting index can be monitored annually and benchmarked against peer economies to guide tax design and enforcement priorities.

Beyond the empirical findings for the Republic of Moldova, the principal contribution of this article lies in demonstrating that Structural Gravity and MIMIC modelling are complementary rather than competing methodologies. Their integration provides a coherent empirical framework capable of combining observed trade behaviour with latent institutional determinants. Consequently, this study should be viewed as an extension of the author's earlier gravity-based analyses rather than a duplication of previous work, representing the second methodological stage of a broader doctoral research programme. Although developed for the Republic of Moldova, the proposed Structural Gravity–MIMIC framework is readily transferable to other small open economies characterized by significant informal cross-border trade.

Limitations relate to measurement error in trade and enforcement data and to the use of proxies for some constructs. Future research should add higher-frequency inputs, incorporate partner-level enforcement metrics, and extend the panel to enable comparative analysis across the region.

A hybrid gravity–MIMIC framework provides an operational, theoretically disciplined approach to measuring smuggling as a latent construct. For Moldova, results show that governance and excise design dominate dynamics, while macro labor slack and FX noise modulate incentives. Policy relevance lies in monitoring: authorities can track the index annually, evaluating whether excise steps and institutional reforms shift the trajectory in the desired direction.

Future work should (i) produce sector-specific indices to tailor enforcement; (ii) integrate shipment-level risk scores; (iii) explore regional panels to estimate spillovers. Converting the index into monetary estimates requires assumptions on detection probabilities; we advise using the index primarily as a directional dashboard and pairing it with targeted

audits. Future research should focus on extending this integrated model to a panel of emerging economies within the broader Central and Eastern European region to compare the relative effectiveness of their governance structures in mitigating smuggling risks. Further research could also incorporate time-varying trade costs (e.g., port efficiency) into the SGE component to refine the isolation of the illicit trade signal.

Therefore, the present article should be interpreted as an extension of the baseline gravity model rather than an independent replication, representing the second methodological stage of the author's doctoral research programme.

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